DEMOLITION EVOLUTION: EMBRACING CHALLENGES AND CHANGES IN THE UK DEMOLITION INDUSTRY

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The demolition industry, in contrast to the broader construction sector, has significantly lagged in research and development. While numerous studies have addressed the persistent challenge of waste management, essential facets within the industry have been largely neglected. Notably, issues such as limited diversity, insufficient educational opportunities, and a lack of engagement with the wider construction sector remain unexplored in existing research. This paper, therefore, aims to explore the underlying factors and consequences of limited diversity, educational opportunities, and engagement in the UK demolition industry. Data for this research were collected through three focus groups with industry professionals, including demolition engineers, consultants, project managers, and designers with extensive experience in both demolition and construction industries. Thematic analysis using NVIVO revealed significant gaps in education, engagement, and diversity, with each theme heavily influencing the others. The findings highlight that addressing these interconnected themes through integrated strategies can enhance educational programs, foster industry collaboration, and promote diversity, driving substantial improvements in innovation, efficiency, and sustainability within the demolition industry.

Keywords: demolition; diversity; engagement; education

INTRODUCTION

The construction industry has witnessed a significant advancement in recent years, marked by improvements in professionalism, higher education, research and development, and diversification. In contrast, the demolition sector has not progressed at the same pace. Lauritzen (2019) and Osaily (2021) highlight education, industry engagement, and diversity as particularly lacking in the demolition sector, pointing out that these areas are not only under-researched but also critical to the industry's future growth and sustainability. This gap in knowledge poses a significant risk to the industry's development, making it imperative to delve into these critical themes.

This paper aims to investigate these key areas within the demolition industry. Through research and discussions from three focus groups, including participants

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from both the demolition and construction sectors, the study seeks to uncover the underlying issues and identify potential pathways for progress.

LITERATURE REVIEW

Research relating to the demolition industry is scarce. Therefore, a large portion of the literature reviewed for this study is related to the construction industry, supplemented by papers and articles relevant to demolition where these are available. Research based on construction is applicable to this study because the construction industry faces similar challenges to the demolition industry and is largely based on trade type work.

The literature review focuses on three primary themes: Diversity, Education, and Engagement with the wider construction industry. By analysing a range of academic papers and online articles, the aim is to outline the current state of knowledge in these fields and their relevance to and impact on the demolition industry in the UK.

Diversity

Diversity and inclusion studies in the construction sector have thoroughly investigated gender disparities, assessed the efficacy of targeted training program, and proposed methods to boost gender diversity. The UK's Construction Skills Network report (CITB, 2023) highlights a significant skills shortage, projecting a need for 225,000 more construction workers by 2027. Diversification has been identified as a crucial strategy for bridging this gap (Fernando *et al.,* 2014). Consequently, the recruitment of women is increasingly recognised as a necessity rather than an option (Ginige *et al.,* 2007).

Studies underline factors such as industry image, career awareness, workplace culture, family commitments, and training practices as barriers to female entry and retention, alongside issues like workplace hazards and inflexible working practices (Aulin and Jingmond, 2011). Furthermore, Barreto *et al.,* (2021) describe the industry as traditionally masculine, characterised by hard, heavy, and dirty work, which discourages many women from pursuing careers in this field.

The demolition industry, facing similar challenges, likely reflects these statistics but perhaps more acutely due to its lesser visibility as a career choice. A study conducted by Ginige *et al.,* (2007) highlighted that the construction industry was characterised by low professionalism, public unawareness of industry and career opportunities, and a poor image, all of which led to negative perceptions. This contrasts with the perception of the industry today, which generally portrays greater professionalism and more educated and inclusive career opportunities. The benefits of a diverse workforce are demonstrated in numerous papers, which show that a varied workforce leads to higher productivity and efficiency (Husam *et al.,* 2024). Furthermore, the WISE report, as cited in Seidu *et al.,* (2022), emphasizes that a slight improvement in gender balance, specifically a 1% increase in the ratio of women to men, could potentially boost the sector's revenue by £300 million annually.

Education

The lack of education in the demolition industry is evident in practice and recognised in limited research. The topic is often briefly alluded to within research when other topics are discussed, largely in the context of the application of the circular economy in the demolition industry (Osaily, 2021; Ferriz-Papi *et al.,* 2024). Numerous articles highlight the urgent need for young, skilled workers in the demolition industry, which

is currently facing a significant skills crisis. This crisis mirrors challenges faced by the broader construction industry. According to the 2011 UK Census, 20% of construction workers were at least 55 years old and approaching retirement, underscoring the imminent need to attract and train a new generation of workers to sustain the industry.

The census report also stated that the skills gap is compounded by the increase in technology and automation which means that job growth now favours more skilled roles as opposed to unskilled ones. Killip (2020) reports that the current state of learning in the construction sector is preventing the achievement of net zero carbon targets and rather than simply focusing on the skills gap, consideration of the demand and use of skills is required. Similarly in demolition, recent technological advancements, such as Building Information Modelling (BIM), have not been fully integrated into the demolition phase, primarily due to insufficient research and training on applying these tools in end-of-life processes (van den Berg, 2019). Although organisations like the National Demolition Training Group (NDTG) and the National Federation of Demolition Contractors (NFDC) offer specialised training, there is a broader need for comprehensive education that covers the latest advancements and trends in the industry.

To exasperate this, Osaily *et al.,* (2019) stated that the industry is also suffering from lack of researchers as well as lack of academically qualified practitioners, which means conducting credible research for the purposes of industry development is a challenge on its own. The demolition sector also faces a significant challenge in the lack of collaboration between industry and academia. Establishing strong partnerships is essential for creating educational programs that are closely aligned with the practical needs of the industry and equipping the workforce to meet future challenges. This includes not only technical skills but also regulatory knowledge, environmental sustainability practices, and soft skills like project management and communication.

Engagement

Demolition is often viewed merely as preparatory work, distinct from the main construction activities, leading to limited interaction between demolition professionals and other construction experts. Like education and training, research on engagement between the demolition and construction industry is generally limited to the context of circular economy (Osaily, 2021). The lack of collaboration between stakeholders is widely recognised as a barrier to the implementation of circular economy in the construction and demolition industry (Ferriz-Papi *et al.,* 2024) and compromises profitability and effectiveness (Leising *et al.,* 2018).

A study by Osaily *et al.,* (2019) highlights that in construction projects, while designers typically lead discussions on sustainable practices, they often overlook the crucial input of demolition engineers particularly in areas pertaining to waste management (i.e. recycling and reusing), which falls under the expertise of the demolition industry. This oversight not only undermines the potential contributions of demolition professionals, but also feeds the perception of undervaluing the expertise of an industry which holds significant specialised knowledge and expertise (Osaily, 2021). Furthermore, Leising *et al.,* (2018) stress the importance of incorporating the entire construction cycle to foster a circular built environment. Yet, it is evident that the significant role of demolition professionals is frequently disregarded.

Despite the numerous studies underlying the issues regarding the lack of engagement, there is little research to understand why this is the case. Osaily *et al.,* 2019 stated that

one reason for the limited engagement is due to the lack of academic research and qualifications in the industry whilst Jørgensen and Emmitt (2009) states that engagement requires willingness to alter behaviours and unusual ways of working.

The gap in research surrounding poor engagement between demolition and construction prevents progression in the industry, therefore further research is required to assess barriers and understand what changes are required.

METHOD

To explore the underlying factors and consequences of limited diversity, insufficient educational opportunities, and lack of engagement in the UK demolition industry, this study employed a qualitative research design. Specifically, focus groups were utilised to gather in-depth insights from industry professionals.

Participants were selected using purposive sampling to ensure a diverse and knowledgeable sample (Merriam, 1998). The selection criteria were as follows:

- Gender representation: Each focus group included female professionals from both construction and demolition backgrounds to ensure gender diversity in perspectives.
- Experience: All participants had a minimum of 10 years of industry experience, ensuring they all possessed substantial knowledge and long-term observations of industry trends.
- Professional background: Participants included demolition professionals (contractors and consultants) and construction professionals with significant involvement in demolition projects.
- Academic Representation: Each focus group included at least one academic with experience in demolition research to incorporate theoretical and research-based insights.

This purposive approach to participant selection aimed to create a rich environment where diverse viewpoints could be expressed and analysed (Merriam, 1998). The criteria were specifically designed to capture a broad spectrum of experiences and understandings within the industry, thus enriching the research findings.

Focus group discussions were favoured upon individual interviews to enable participants to build on each other's responses (Krueger and Casey, 2015), and to facilitate an in-depth exploration of diverse perspectives within a short timeframe (Gray, 2009). Further, it provided a platform for participants to share detailed experiences and perspectives, capturing a wide array of viewpoints essential for understanding the complex issues under investigation. As Krueger and Casey (2015) highlight, focus groups allow for the exploration of attitudes, feelings, beliefs, and experiences in a way that other methods cannot, offering rich, contextual insights that inform practical applications and policy decisions. The qualitative data obtained offered deep contextual insights, often missing in quantitative studies, and the findings provided essential guidance for future demolition research.

Three focus groups, each comprising 3-5 participants, were conducted. The discussions were semi-structured to allow for guided yet open-ended conversations (Ryan *et al.,* 2009). Preparation involved developing a discussion guide based on a thorough literature review, featuring open-ended questions designed to elicit detailed narratives on diversity, education, and engagement. Each focus group session lasted approximately 90 minutes and was recorded and transcribed for analysis.

Thematic analysis was employed to analyse the focus group data. This method involved several stages: initial coding to identify key themes and patterns, reviewing and grouping these themes into broader categories using NVIVO software, and interpreting the themes in the context of the research questions and existing literature. This approach facilitated a systematic and comprehensive analysis, ensuring that the findings were grounded in the data collected from the participants.

RESULTS

The study involved three focus groups comprising 12 participants with varying roles and levels of experience within the demolition and construction industries. The details of the participants are summarised in Table 1.

Table 1: Focus Groups Details

Participant Reference	Job Title	Years of experience
P1.1	Demolition Contractor	30+
P1.2	Demolition Consultant: Managing Director	28
P1.3	Academic	10
Participant Reference	Job Title	Years of experience
P2.1	Demolition Contractor	28
P2.2	Demolition Consultant	10
P2.3	Senior Demolition Consultant and Principal Designer	28
P2.4	Environmental and Demolition Consultant	15
P2.5	Principal Designer	20
P2.6	Academic	30+
Participant Reference	Job Title	Years of experience
P3.1	Project Manager	40
P3.2	Demolition Consultant	30
P3.3	Academic	10

The analysis of the focus group discussions identified several key themes related to diversity, engagement, and education within the demolition industry. These themes and their descriptions are summarised in Table 2.

DISCUSSION

Education

There is a notable difference of opinions within the demolition industry regarding the importance of academic education. When asked about the preference between vocational and academic education, focus group participants consistently agreed that both are essential. However, there is a recognised consensus on the lack of academic education in the industry. Some industry professionals believe that on-site learning is sufficient and view academic education as less important. Findings show that the lack of academic education is contributing to a lower quality workforce, which hinders the industry's ability to embrace these trends, limiting innovation and best practices, and reducing the efficiency of demolition processes. In contrast, the construction industry, despite facing challenges, has made significant progress in recent years through the adoption of research and development.

> "I always argue that the main reason that construction has advanced significantly is the collaboration between academics, researchers and the industry" - P2.2

Participant 3.1, a Project Manager with experience in both demolition and construction, stated that there is a clear lack of understanding of environmental management, stakeholder management and communication which are generally skills that are required in senior roles, and these are not typically taught on non-academic demolition training courses.

Table 2: Elicited Themes from the Focus Groups

Item	Diversity	Description
1.	Innovation and creativity	A diverse workforce brings varied perspectives, leading to innovative solutions and creative problem-solving.
2.	Diversity in the Workplace	Promoting gender diversity creates a balanced and equitable work environment.
3.	Range of Skills and Perspectives	Diverse teams offer a broad range of skills and viewpoints, enhancing decision-making and project outcomes.
4.	Problem-solving Capabilities	Diverse experiences and viewpoints improve the ability to tackle complex challenges effectively.
5.	Inclusivity Policies	Implementing inclusivity policies ensures equal opportunities and a supportive work environment for all employees, attracting more people to join the industry.
Item	Engagement	Description
6.	Lack of Collaboration with other Construction Phases	Lack of collaboration hinders the industry's development through limited knowledge sharing. Additionally, the poor image of demolition remains persistent.
7.	Knowledge Sharing	Promoting knowledge exchange between demolition and construction professionals improves practices and outcomes.
8.	Adoption of Sustainable Practices	Engagement increases awareness of the importance of sustainability. Hence, improved waste management and environmental processes through recycling and reuse.
9.	Regulatory Support	Strong regulations enforce standards and promote collaboration and sustainability in the industry.
Item	Education	Description
10.	Lack of Academic Qualifications	A shortage of academically qualified professionals' limits research, innovation and best practice adoption.
11.	Quality of Workforce	Education enhances workforce skills, knowledge, and capability.
12.	Innovation and Best Practices	Higher education fosters the development and implementation of innovative techniques and best practices.
13.	Efficiency of the demolition process	A combination of academic and practical knowledge enhances demolition processes and techniques.
14.	Safety standards	Education enhances safety awareness, reducing accidents and improving overall safety.

Recently, a demolition foundation degree and master's course have been introduced to bridge the gap between on-the-job learning and higher management training. However, uptake is predominantly among current industry professionals, with few newcomers. P1.2 suggested integrating demolition topics into existing construction-related courses to improve career awareness and attract new talent.

> "I can tell you that the demolition industry is rough and risky. The demanding conditions and inherent dangers turn many people away from pursuing careers in this field" - P3.2

Engagement

In each of the focus groups it was consistently agreed that engagement between the demolition and construction industry is minimal. When asked for examples of where engagement has been undertaken with positive outcomes, examples could not be presented. Participant P2.4 stated this is generally because demolition is typically viewed as an enabling function and not as a main project, and when demolition is needed, it usually means that the building has reached the end of its useful life.

Findings from the literature review demonstrate that engagement is a crucial part of implementing sustainable practices throughout the entire construction cycle which requires knowledge sharing from demolition contractors to advise on deconstruction approaches and waste management. However, this is seldom done. Some demolition engineers believe that the responsibility to engage should come from the client. However, in the first focus group, it was stated by P1.1 that most of the industry do not want to engage or share information.

Consultants and designers in the focus groups agreed that clients have substantial responsibility but need guidance from their consultants. It is the consultants' responsibility to demonstrate the benefits of engaging demolition contractors on waste management and sustainability. However, this approach might not incentivise clients. To mandate change, stringent regulations are necessary—either directly requiring clients to engage with demolition contractors or setting high targets for waste management and circular economy contributions. Without such legislation, projects remain cost-driven, and the added cost of a demolition expert is often unjustified.

Diversity

Discussions on diversity in the demolition industry presented divisive opinions across the focus groups. Whilst most participants had the opinion that diversity in the demolition industry is still poor, one attendee stated that gender diversity in office, admin and management roles is excellent, however agreed that there are limited women in site-based roles. Participants P2.1 and P2.6 strongly stated that women should not be in site-based roles because conditions of demolition projects are harsh and physically demanding. They also stated that it was their opinion that women do not want to work in site-based roles but instead opted for more educated senior roles (e.g., engineer, cost managers and project managers. Other participants in the group believe that some women do want site based and physical roles and should be given the choice. They discussed that the industry should be addressing and removing the barriers and improving inclusivity policies to enable women to make educated decisions as to what role they want to undertake within the industry.

Participant P3.2 stated that improvements to diversity in the industry are crucial to broaden the range of skills and perspectives across the workforce, which will in turn increase innovation and creativity and better problem-solving capabilities. They also stated that women are generally more conscientious which would lead to better and safter projects. This was substantiated by P1.3:

> Improving diversity is key to bringing in different skills and perspectives, which can really boost our performance on-site. Plus, I do believe that women tend to be more detail-oriented, which makes projects safer. - P1.3

Despite the differing opinions regarding diversity, as stated when discussing the theme of education, the demolition industry is facing a significant skills shortage. Both the literature reviewed, and the focus groups highlighted that improvements in diversity would help reduce the skills gap by increasing the workforce pool available to the demolition sector.

Interconnected Themes and Their Impacts

Figure 1 illustrates the connections between the identified themes. Notably, the lack of academic qualifications, quality of workforce, insufficient collaboration with other construction cycles, knowledge sharing and diversity in the workforce are key factors that significantly influence the outcomes of the other themes, either positively or negatively.

Lack of academic qualifications has been observed in both the literature and the focus groups to impact on the engagement with other aspects of the construction cycle due to the poor quality of the workforce. P1.3 stated that people within the construction industry would not want to establish any collaboration with demolition contractors because they have a well-established assumption that they are uneducated, and the poor stereotypical image of demolition is overall negative from the perception of other

construction phases. When it comes to critical topics such as implementing sustainable practices and design, construction professionals do not see the benefit to engaging with the demolition industry when they have no academic qualifications to inform

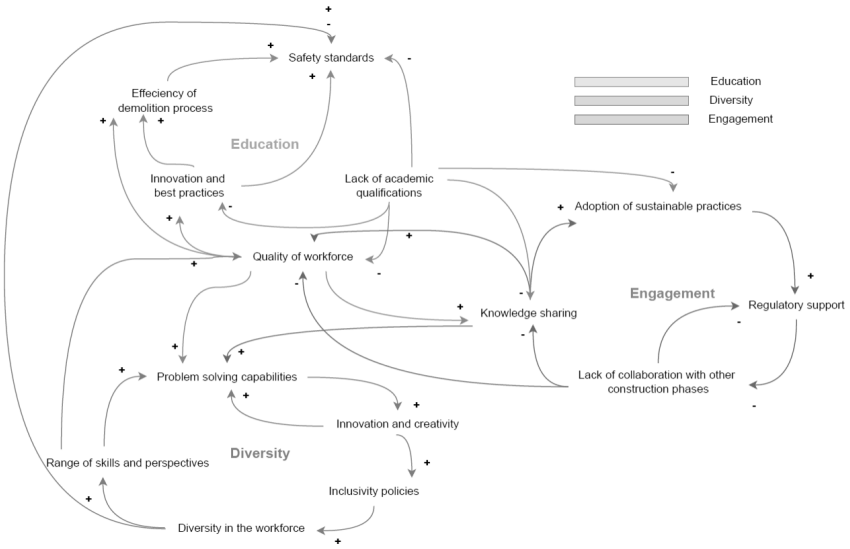

Figure 1: Causal Loop Diagram of the Themes

their knowledge.

> "We've got to have people who understand demolition sat with architects and designers at that early stage influencing what they do" - P.2.6

In focus group 2, this was discussed heavily and agreed by all participants that demolition contractors must be involved in the design of new buildings, however when asked whether the industry is actively trying to change perceptions and collaborate, the consistent answer was negative.

P1.1 indicated that the demolition industry is resistant to change and engagement, primarily due to a tendency to withhold knowledge. This reluctance is largely driven by client pressures to maintain the lowest possible costs, which discourages open collaboration and the sharing of expertise.

Research shows that this is a common challenge that was faced by the construction industry 20 years ago (Ginige *et al.,* 2007). The industry had a lack of education and a negative image largely driven by poor construction work, bad safety standards, negative impact of construction works on society. P3.1 stated that the construction industry has improved significantly over recent years with the adoption of more professional construction schemes such as Considerate Constructors Scheme (CCS) and through better education. These improvements have not yet been adopted by the demolition industry.

Both the literature review and the focus groups demonstrated that an improvement in academic education would also have a notable impact on diversity in the sector by increasing the talent pool available. Additionally, if women prefer to undertake more senior office-based positions as stated by P2.1 and P2.6, which require academic qualifications, then by increasing demolition academic education this would subsequently appeal to a more diverse group of people.

An interesting finding was related to diversity. Although this paper focuses on gender diversity, in contrast, when discussing cultural diversity, a more diverse workforce

may indeed replenish the shortage of skills in the UK demolition sector, however, may also lead to a positive or negative changes in safety standards due to different culturally influenced risk perceptions and tolerances.

Finally, the lack of collaboration between the demolition industry and other construction phases has far-reaching consequences. When collaboration is neglected, it impedes knowledge sharing and degrades the quality of the workforce. Extant literature and focus groups indicate that the expertise of demolition engineers is often undervalued by other construction professionals. This issue arises not only from the demolition industry's poor reputation but also from its lack of proactive engagement and attempts to collaborate. Improving collaboration can foster a culture of knowledge exchange, enhance workforce skills, and ensure stronger adherence to regulations, ultimately driving the industry's progress and reputation.

CONCLUSIONS

Diversity, engagement, and education were thoroughly investigated in this study in the context of the UK demolition sector. Through reviewing extant literature and conducting three focus groups, it became apparent that these three factors interconnect and substantially impact one another.

The findings revealed that the demolition industry's lack of academic qualifications contributes to a lower quality workforce, which, in turn, limits the industry's ability to innovate and adopt best practices. This educational gap hinders the implementation of sustainable practices and reinforces negative stereotypes about the demolition sector. Moreover, insufficient collaboration with other construction phases further exacerbates these issues, impeding knowledge sharing and reducing the industry's overall efficiency and effectiveness.

Engagement between demolition and construction professionals was found to be minimal, largely due to the perception of demolition as merely an enabling function rather than a critical component of the construction process. This lack of engagement restricts the flow of expertise and innovative solutions that could enhance project outcomes and sustainability. Diversity in the workplace also emerged as a critical factor. While gender diversity in office and management roles has seen some improvement, site-based roles remain predominantly male-dominated. The industry's harsh working conditions and physically demanding nature deter many potential female candidates. However, fostering diversity can bring a broader range of skills and perspectives, boosting innovation and problem-solving capabilities. The interconnected nature of these themes suggests that addressing one factor can positively influence the others. For example, improving academic education within the demolition sector can elevate workforce quality, which can, in turn, enhance engagement with other construction phases and foster a more inclusive and diverse work environment.

In conclusion, the lack of academic qualifications, quality of workforce, insufficient collaboration with other construction cycles, knowledge sharing, and diversity in the workforce are key factors that significantly influence the outcomes of other themes, either positively or negatively. By focusing on these critical factors, the UK demolition industry can drive substantial improvements, leading to enhanced innovation, efficiency, and sustainability. Addressing these interconnected issues will not only improve the industry's reputation but also ensure its future growth and resilience.

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