Transforming Construction with Off-site Methods and Technologies - TCOT 2026 Conference

August 18-20, 2026, Newcastle upon Tyne, UK

Mass Timber Construction in South Africa: Assessing Perceived Sustainability Benefits and Industry Adoption Challenges

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Abstract: This study investigates the perceived contribution of mass timber (MT) construction to Sustainable Development Goal 3 (SDG 3: Good Health and Well-being) by analysing survey responses from 54 construction industry professionals, including engineers and architects from South Africa and international contexts. The findings reveal a notable divergence in perception: while 100% of international respondents agreed on the comfort-related benefits of MT, South African respondents demonstrated higher levels of uncertainty, particularly regarding indoor air quality and post-construction performance. Overall, respondents reported strong positive perceptions of MT's contribution to health and well-being, with a composite mean score of 4.56 out of 5. High levels of agreement were observed for improved indoor air quality (mean = 4.51) and psychological well-being benefits (mean = 4.63). Despite strong global consensus, the results highlight limited familiarity and adoption barriers within the South African context, including educational gaps, lack of local demonstration projects, and socio-cultural perceptions. The study underscores the need for targeted industry education, policy support, and practical implementation strategies to facilitate the adoption of MT in emerging markets.

Keywords: Mass Timber Construction, Sustainable Construction, Built Environment

1 INTRODUCTION

The global construction industry is a major contributor to climate change, accounting for approximately 30–38% of global carbon dioxide (CO_2) emissions. Given that individuals spend over 90% of their time indoors, the built environment plays a critical role in advancing SDG 3, which promotes good health and well-being. In response to growing environmental and health concerns, MT, including engineered wood products such as Cross-Laminated Timber (CLT) and Glue-Laminated Timber (glulam), has emerged as a promising sustainable alternative to conventional construction materials such as concrete and steel. MT offers potential benefits including reduced embodied carbon, improved indoor environmental quality, and enhanced occupant well-being. Despite its recognized global potential, the adoption of MT in South Africa remains limited. South African construction professionals generally possess significantly less experience in MT relative to broader construction practices, contributing to uncertainty regarding its practical application and benefits. Consequently, MT in South Africa exists at the intersection of scientifically supported sustainability potential and ongoing scepticism shaped by limited industry familiarity, educational gaps, and socio-cultural perceptions.

MT construction is also closely associated with off-site manufacturing and Design for Manufacture and Assembly (DfMA) principles due to its reliance on prefabricated structural systems, factory-controlled production, and rapid on-site assembly processes. The study aims to explore built environment professionals' perceptions regarding the contribution of MT construction to health, well-being, and sustainability within the South African context. Specifically, the study seeks to:

1. Examine perceptions regarding the contribution of MT to SDG 3 (Good Health and Well-being);
2. Investigate awareness and experience levels associated with MT construction; and
3. Identify perceived barriers affecting MT adoption in South Africa.

2. LITERATURE REVIEW

2.1 Benefits of using Mass Timber

Concrete remains the most widely utilized construction material globally due to its affordability, structural performance, and established role within modern infrastructure systems (Foster, 2023). However, its substantial environmental impact, particularly through carbon-intensive cement production, has intensified global interest in more sustainable building alternatives. Although, timber is unlikely to surpass concrete as the dominant construction material, growing concerns regarding climate change, embodied carbon, and environmental sustainability have increased attention toward engineered wood products such as MT as viable complementary solutions (Yale Environment 360, 2019). In South Africa, the built environment has historically relied heavily on masonry and conventional construction methods. Nevertheless, increasing awareness of construction-related carbon emissions has encouraged stakeholders within the sustainable architecture and built environment (SABE) community to explore alternative materials that align with environmental, aesthetic, and health-oriented objectives. MT has emerged as a promising option due to its potential to reduce carbon footprints, enhance indoor environmental quality, and support sustainable development goals. As discussions surrounding timber construction expand within South Africa, understanding both the opportunities and limitations of MT adoption is essential for evaluating its broader industry relevance. CLT, one of the most widely used mass timber products, consists of layered timber boards bonded orthogonally to form structural panels with high dimensional stability and load-bearing capacity (Gagnon and Pirvu, 2011). The following sections outline the key environmental, structural, and well-being-related benefits associated with mass timber construction.

2.1.1 *Shortened Construction Time and Cost*

MT construction offers significant advantages in terms of construction speed, efficiency, and potential cost savings due to its high level of prefabrication and off-site manufacturing capabilities. Engineered timber components can be manufactured in controlled factory environments, precision-fabricated into structural elements, and transported to construction sites for rapid assembly, thereby reducing on-site labor requirements, construction timelines, and material waste (Rees, 2018; Smily, 2020). This industrialized construction approach is particularly beneficial in improving project delivery efficiency and minimizing disruptions on-site. Research indicates that MT can be economically competitive, especially for mid-rise buildings and institutional projects such as schools and libraries (Ahmed and Arocho, 2020). Comparative studies have demonstrated measurable cost benefits; for example, Jayalath et al. (2020) reported approximately 4% cost savings for selected Australian projects when compared to equivalent steel and concrete structures. Similarly, investigations by Forest and Wood Products Australia found that CLT solutions across office, residential, healthcare, and industrial projects were often more cost-effective than traditional construction systems (Evison, Kremer and Guiver, 2018; Dunn, 2015). These findings suggest that MT may offer both economic and operational benefits, supporting its viability as a sustainable construction alternative.

2.1.2 Improved Aesthetics

MT is widely recognized for its distinctive aesthetic qualities, characterized by natural textures, warmth, and visual appeal that contribute positively to interior architectural environments. Exposed timber surfaces are frequently incorporated into building designs to create bright, natural, and visually engaging indoor spaces (Harte, 2017). Beyond aesthetics, emerging research suggests that visible timber elements may also provide measurable psychological and physiological benefits. Studies indicate that exposure to natural wood surfaces can reduce sympathetic nervous system activation, thereby lowering stress responses and promoting greater occupant comfort and relaxation (Li et al., 2021). These biophilic properties position MT not only as a structural and sustainable material but also as a design solution that may enhance occupant well-being through improved sensory and emotional experiences within built environments.

2.1.3 Increased Carbon Sequestration

MT construction offers substantial environmental advantages through its capacity for carbon sequestration and reduced greenhouse gas (GHG) emissions relative to conventional construction materials. Unlike concrete and steel, timber products store atmospheric carbon absorbed during tree growth, effectively serving as long-term carbon sinks throughout a building's lifecycle (Mallo and Espinoza, 2015). Additionally, the manufacturing processes associated with engineered wood products generally require lower energy inputs, resulting in reduced embodied carbon emissions. Comparative lifecycle assessments further highlight these benefits; for instance, Hammond and Jones (2008) demonstrated that a six-storey concrete and steel building embodied approximately 1,984 tons of CO_2, whereas an equivalent CLT structure embodied only 727 tons of CO_2. These findings underscore the significant potential of MT to reduce the environmental footprint of the construction sector while contributing to broader climate change mitigation objectives.

2.1.4 *Resistance to Earthquakes*

Superior seismic resilience has been demonstrated through large-scale shake table experiments. A seven-story CLT building in Japan was subjected to fourteen consecutive seismic events on one of the world's largest shake tables and exhibited no observable damage (Huang, 2017; Gunawan et al., 2020). More recently, in May 2023, a 10-story hybrid CLT–GLT–LVL building was tested on the world's largest outdoor shake table at the University of California, San Diego. The results confirmed that tall MT seismic systems can withstand repeated, high-intensity earthquake loading without significant structural degradation (WoodWorks, 2023).

2.1.5 *Improved Indoor and Outdoor Environmental Performance*

According to Georgescu et al. (2022), Núñez Ávila and Giménez Blanca (2023), and Michálková and Ďurica (2022), timber is an effective thermal insulating material, with timber-framed floors, roofs, and walls contributing to warm indoor conditions in winter and cooler environments in summer. In addition, the use of sealants and membrane systems at wall and floor interfaces has been shown to enhance acoustic insulation and improve airtightness (Yang et al., 2019).

2.1.6 Excellent Comfort and Sustainability

Compared to conventional concrete and steel buildings, MT structures offer enhanced occupant comfort and sustainability performance (Scott et al., 2019). MT products also demonstrate significant potential due to their improved energy efficiency, structural performance, thermal insulation properties, fire resistance, and suitability for rapid prefabrication (Scalet, 2015; Mohd and Mohamad, 2015). In addition, MT construction contributes to substantial reductions in carbon footprint and can play an important role in mitigating global warming. Their production process enables off-site prefabrication with minimal waste generation, further enhancing environmental performance. Moreover, timber acts as a carbon sink, with its carbon sequestration capacity reducing GHG during both manufacturing and construction phases (Mallo and Espinoza, 2015). Operationally, MT buildings have been reported to require approximately 10% less energy than comparable concrete structures (Liang et al., 2020; Chen et al., 2021). In recent years, MT has gained increasing attention within sustainable building materials discourse in South Africa. This growing interest is reflected in initiatives by higher education institutions, including the establishment of research chairs (Macnamara, 2021) and the development of demonstration projects (NMU, 2020). Notable examples include the first CLT house constructed in 2013, the Pinotage House in Cape Town, and the Future Africa

Innovation Campus at the University of Pretoria, which was built using plywood in 2020. Collectively, these projects have stimulated engagement within the building and construction sector, encouraging exploration of more sustainable MT construction methods.

2.2 The Effect of Wood on Health, Wellness and Wellbeing

According to Burns et al. (2019), research on the built environment has historically focused on physical health outcomes, with less emphasis on mental health and well-being. However, the World Health Organization has increasingly highlighted health and well-being as key components of the SDG 2030 (Moore et al., 2018; United Nations, 2015). In this context, Al Horr et al. (2016) and Xue et al. (2019) emphasise the role of human interaction with nature in supporting both physical and psychological well-being, as described by the concept of biophilia. Wood, as a natural material, is widely associated with enhanced well-being through its integration into built environments. Evidence from a large-scale study in Australia reports that wood interiors are linked to increased productivity (8%) and improved well-being (13%) in offices, as well as improved learning outcomes in educational settings and reduced recovery times (8.5%) and pain medication use (22%) in healthcare environments (Knox and Parry-Husbands, 2018). Overall, timber contributes to occupant health and well-being across multiple building typologies, as demonstrated in global studies.

2.2.1 Indoor Air Quality

Mannan and Al-Ghamdi (2021) report that urban populations spend over 90% of their time indoors, with similar estimates in North America indicating approximately 87% indoor exposure. This high level of indoor occupancy increases exposure to indoor air pollutants, with implications for health and productivity. Despite this, research has traditionally prioritised outdoor air quality, while indoor air quality (IAQ) has received comparatively limited attention (Saini, Dutta and Marques, 2020). More recently, growing evidence that indoor air can be more polluted than outdoor air has increased focus on IAQ (Mendoza, Benney and Boll, 2021; Mannan and Al-Ghamdi, 2021).

In this context, timber has been identified as a material that may improve indoor environmental quality. Its hygroscopic properties enable moisture regulation, helping to stabilise indoor humidity and reduce conditions such as excessive dryness or condensation, which are linked to respiratory health risks (Ran et al., 2024). Evidence from timber buildings, such as the University of British Columbia's Earth Sciences Building, indicates improved indoor environmental performance (Moniz de Sa, 2023). Additionally, timber-framed houses have been associated with lower indoor pollutant concentrations, suggesting improved IAQ compared to conventional construction systems (Mannan and Al-Ghamdi, 2021). Certain species, such as cedar, may further enhance humidity regulation and reduce indoor contamination (Azuma et al., 2016).

2.2.2 Psychological Well-Being

The presence of timber in indoor environments has been associated with positive psychological effects. Its natural aesthetics, texture, and perceived warmth contribute to a calming and restorative atmosphere, which may help reduce stress and enhance overall well-being (Whyte et al., 2024). A well-known international example is the Maggie's Centre in the United Kingdom, designed by Norman Foster, which makes extensive use of timber to create a comforting and supportive environment for cancer patients (Battisto and Wilhelm, 2019). Similarly, the uMkhumbane Cultural and Heritage Museum in Durban, South Africa, incorporates timber as a key architectural element, contributing to a welcoming and culturally resonant space that enhances visitor experience and well-being (Bolkaner, Inançoglu and Asilsoy, 2019).

2.2.3 Biophilic Design

Timber is frequently used in biophilic design, which integrates natural elements into the built environment to strengthen human–nature connections. Exposure to natural materials such as timber has been associated with improved mental health outcomes, reduced stress levels, and enhanced productivity (Ryan et al., 2014). A notable international example is the Tamedia Office Building in Zurich, Switzerland, which incorporates extensive timber elements as part of its biophilic design strategy to create a work environment that supports employee well-being (Salingaros, 2015). In the South African context, the Timber Innovation Company in Stellenbosch promotes biophilic design principles using engineered timber structures, aiming to foster a stronger connection to nature and enhance occupant well-being.

2.2.4 Noise Reduction

Timber exhibits favourable acoustic properties, contributing to the reduction of noise transmission and the enhancement of acoustic comfort in indoor environments. Improved acoustic performance has been associated with reduced stress levels and positive effects on mental health and overall well-being (Lorenzon et al., 2021). For example, the John W. Olver Design Building at the University of Massachusetts, United States, incorporates extensive timber elements to improve acoustic performance, reduce noise levels, and create a more comfortable and conducive learning environment (Happold, 2017). In the South African context, the Nelson Mandela University Missionvale Campus Library utilises timber extensively to enhance acoustic comfort and provide a quiet, supportive space for study and relaxation.

3 METHODOLOGY

3.1 Demographics of Respondents

The study adopted an exploratory quantitative research approach to examine built environment professionals' perceptions of MT construction in relation to SDG 3 (Good Health and Well-being) and SDG 13 (Climate Action). The paper forms part of a broader doctoral study investigating the use of MT for a more sustainable built environment in South Africa. A non-probability purposive sampling strategy was employed to engage participants with professional awareness, knowledge, or experience relating to sustainable construction, offsite construction methods, timber systems, or broader built environment sustainability practices. The sample comprised architects, engineers, construction professionals, researchers, and sustainability practitioners from South Africa and selected international contexts. International respondents were intentionally included to provide comparative perspectives from regions where MT adoption is more established, particularly given the relatively limited exposure to MT construction within the South African built environment. The study therefore sought to capture both operational experience and broader industry perceptions, awareness levels, and knowledge gaps associated with MT adoption in an emerging market context. Data were collected using a structured questionnaire developed from themes identified in the literature review, including indoor environmental quality, psychological well-being, sustainability performance, climate action, and construction innovation. The questionnaire primarily utilised Likert-scale items to assess perceptions relating to the perceived benefits and adoption challenges associated with MT construction. A total of fifty-four valid responses were analysed using descriptive statistical techniques, including frequencies, percentages, mean item scores, correlation analysis, and stacked bar chart visualisation. The correlation analysis explored relationships between aggregated respondent perceptions associated with SDG 3 and SDG 13. The findings are presented as exploratory perception-based insights rather than industry-wide generalisations. Ethical considerations relating to voluntary participation, informed consent, anonymity, and confidentiality were observed throughout the study in accordance with the ethical framework governing the broader doctoral research.

The study adopted a quantitative research approach, analysing responses from a sample comprising 30.4% South African and 69.6% international professionals. The data were visualised using stacked bar charts to assess material awareness and perceptions related to Sustainable Development Goals (SDGs). The results indicate a strong positive correlation between SDG 3 and SDG 13, with a correlation coefficient of $r = 0.856$. The strong positive correlation ($r = 0.856$) suggests that respondents who perceived MT as contributing positively toward climate action also tended to perceive strong contributions toward health and well-being. This indicates that environmental sustainability and occupant well-being are viewed as interconnected outcomes within MT construction. In terms of perceptions, all international respondents (100%) agreed on the comfort-related benefits of MT, whereas South African respondents demonstrated comparatively higher levels of uncertainty, particularly regarding post-construction property management experience, where 100% reported no experience.

Table 1 presents the demographic profile of respondents. The majority (69.6%) were based internationally, while 30.4% were operating within South Africa. The distribution of job roles was diverse, with engineers representing the largest proportion (42.6%), followed by architects (11.1%), contractors (7.4%), and property managers (1.9%), while 37% of respondents were classified under other professional categories. Overall, respondents reported an average of 16.99 years of professional experience, with an average of 7.30 years specifically in MT-related fields. In terms of organisational size, most respondents (66.7%) were employed in companies with fewer than 50 employees. Additionally, 12.1% of respondents worked in organisations with 50–250 employees, 9.1% in firms with 251–500 employees, and a further 12.1% in large organisations with more than 1,000 employees. A total of 54 responses were collected for the study. However, not all respondents completed every demographic question. For the “Country of Operation” variable, 23 respondents provided a valid response, while 31 entries were left blank or incomplete. As such, percentages reported for this variable are based on valid responses only.

Table 1: Demographics of Respondents

Country of Operation		**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	South Africa	7	12.96	30.43	30.43
	Other	16	29.63	69.57	100.00
	Total	23		100,0	
Missing		31	57.41		
Total		54	100.00		
Job title		**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Architect	6	11.11	11.11	11.11
	Engineer	23	42.59	42.59	53.70
	Contractor	4	7.41	7.41	61.11
	Property Manager	1	1.85	1.85	62.96
	Other	20	37.04	37.04	100.00
	Total	54	100.00	100.00	
Highest educational qualification		**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	PhD	2	3.70	6.06	6.06
	Masters degree	17	31.48	51.52	57.58
	BSc Honours	3	5.56	9.09	66.67
	BSc Degree	3	5.56	9.09	75.76
	Diploma	4	7.41	12.12	87.88
	Certificates	1	1.85	3.03	90.91
	High School /Grade 12	1	1.85	3.03	93.94
	Other	2	3.70	6.06	100.00
	Total	33		100.00	
Missing		21	38.89		
Total		54	100.00		

Year of work experience		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5	10	18.52	19.23	19.23
	5 to 15 years	21	38.89	40.38	59.62
	16 to 26 years	11	20.37	21.15	80.77
	27 to 37 years	8	14.81	15.38	96.15
	Above 37 Years	2	3.70	3.85	100.00
	Total	52		100.00	
Missing		2	3.70		
Total		54	100.00		
Year of experience in Mass Timber construction		**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	No experience at all	2	3.70	6.25	6.25
	1 to 5 years	15	27.78	46.88	53.13
	6 to 10 years	8	14.81	25.00	78.13
	10 to 15 years	5	9.26	15.63	93.75
	Above 15 Years	2	3.70	6.25	100.00
	Total	32		100.00	
Missing		22	40.74		
Total		54	100.00		

4 FINDINGS

4.1 Mass Timber Experience

Figure 1 illustrates the diversity of participants' experience across various elements of MT application. The questions posed to respondents aimed to determine whether they had experience in areas including the design and use of MT, MT architectural design, structural engineering of MT systems, construction, cost estimating, production, post-construction property management, and whether they currently occupy or work in MT buildings.

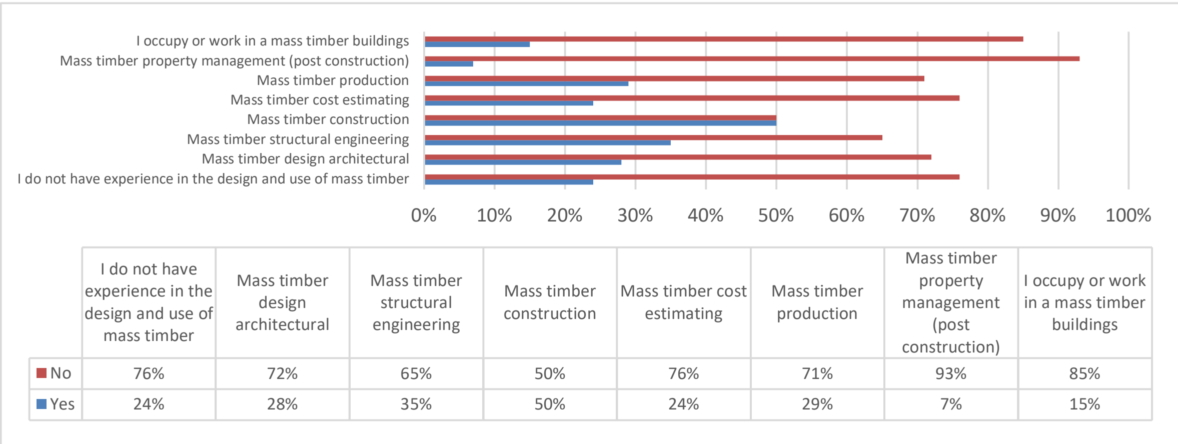

Figure 1: Range of Mass Timber Experience of Study Participants

According to Figure 1, more than half of the study participants reported not having the requisite experience in most of the MT-related elements identified. The results indicate that participants generally possess limited expertise across key aspects of MT, except for construction, where experience is more evenly distributed. The most notable gaps in experience are observed in post-construction property management and in the overall design and application of MT systems.

4.2 *Contribution of Mass timber to SDG3*

MT construction has the potential to contribute to SDG 3, which aims to ensure "Good Health and Well-being for all." The distribution of responses regarding its perceived contribution to this goal is presented in Table 2. Overall, the findings indicate that participants perceive MT construction as making a significant contribution to SDG 3, particularly in relation to health and well-being outcomes.

Table 2: Perceived Contribution of Mass Timber to Good Health and Well-Being for All - SDG 3

MT Contribution to SDG 3	Strongly disagree	Disagree	Unsure	Agree	Strongly agree	Mean Score
Mass Timber buildings provide a cosy living comfort and contribute to a positive mood SDG3	0.00%	0.00%	2.40%	29.30%	68.30%	4.66
Mass Timber products provide healthier indoor air quality by reducing the levels of volatile organic compounds compared to conventional building materials SDG3	0.00%	0.00%	9.70%	29.30%	61.00%	4.51
Mass Timber is made from sustainably managed forests, providing a renewable resource for building construction SDG3	0.00%	2.50%	0.00%	30.00%	67.50%	4.63
Mass Timber products store carbon for the life of a building, helping to mitigate the impacts of climate change SDG3	0.00%	2.40%	4.90%	17.10%	75.60%	4.66
Studies have shown that natural materials, such as wood, have a relaxing and calming effect on people and contribute to a sense of well-being SDG3	0.00%	0.00%	4.90%	26.80%	68.30%	4.63
Studies have shown that natural materials, such as wood, have a calming effect on people and contribute to productivity SDG3	0.00%	0.00%	9.80%	39.00%	51.20%	4.41
Mass Timber has a calming effect on people and contribute to increased productivity and enhanced creativity SDG3	0.00%	0.00%	9.70%	41.50%	48.80%	4.39
Composite mean score						**4.56**

According to Table 2, participants strongly agreed that MT buildings provide a comfortable and aesthetically warm indoor environment, contributing to positive mood states and enhanced psychological well-being. This perception aligns with SDG 3, which promotes mental health and well-being. Respondents also strongly agreed that MT positively influences IAQ, with a mean score of 4.51 indicating perceived reductions in volatile organic compound (VOC) emissions compared to conventional materials. Reduced VOC exposure is associated with improved indoor environmental conditions and lower respiratory health risks, thereby supporting SDG 3 objectives. Furthermore, participants strongly agreed that timber sourced from sustainably managed forests supports renewable material cycles (mean = 4.63) and that MT's carbon sequestration capacity contributes to climate change mitigation (mean = 4.66). These environmental benefits are perceived to indirectly enhance public health and community well-being. In addition, respondents reported strong agreement regarding relaxing and calming effects (mean = 4.63), increased productivity (mean = 4.39), and enhanced creativity (mean = 4.41) associated with MT environments, indicating perceived psychological and functional benefits. The composite mean score of 4.56 reflects an overall strong positive perception of MT's contribution to health and well-being, encompassing physical, psychological, and environmental dimensions. Overall, the findings suggest that participants perceive MT construction as broadly aligned with SDG 3 through its combined direct and indirect contributions to healthier and more sustainable built environments.

5 DISCUSSIONS

SDG 3 highlights the intersection between built environment practices and human health and well-being. Within this context, MT construction presents a compelling case, as it aligns with SDG 3 objectives by delivering both environmental and occupant-level benefits. From an environmental perspective, MT contributes to reduced carbon emissions through the substitution of high-emission materials such as steel and concrete, while also storing carbon throughout its lifecycle, thereby functioning as a carbon sink. This carbon sequestration potential has been estimated at approximately 500 kg of carbon per cubic meter of timber (Bracarense and Brancalion 2022), making it a measurable contribution to climate change mitigation efforts. Previous studies identify MT as an important carbon sequestration strategy in sustainable construction due to its capacity to store atmospheric carbon throughout the building lifecycle (Bracarense and Brancalion, 2022). Recent assessments further show that MT construction can offer lower environmental impacts than conventional concrete-based construction when assessed over the building life cycle (Torrie and Harvey, 2021). In addition to its environmental performance, MT offers several health-related and indoor environmental advantages. These include improved thermal comfort, sound insulation, enhanced IAQ, and the creation of warm, biophilic interior environments that may support psychological well-being. Collectively, these attributes contribute to living and working conditions that are consistent with the aims of SDG 3. While this study did not empirically test the relationship between MT construction and life expectancy, existing literature suggests that improved environmental and living conditions are associated with increased longevity. In this regard, sustainable building materials such as timber, alongside reduced carbon-intensive construction practices, may indirectly support long-term public health outcomes (México et al., 2018; Sarin and Balakrishna, 2018).

Despite these scientifically documented benefits, the adoption of MT in South Africa remains constrained by perception and institutional barriers. Internationally, MT has been validated through large-scale demonstration projects, including multi-storey timber buildings and smart city developments, which provide empirical evidence of its structural performance, fire safety, and occupant comfort. However, in the South African context, limited local demonstration projects and post-occupancy evaluations contribute to perceptions of uncertainty regarding its applicability. This perception gap is further reinforced by socio-cultural associations that position timber housing as inferior, often linked to informal or low-income construction typologies. In addition, engineering education and professional training in South Africa remain largely oriented towards conventional concrete and steel design, with limited exposure to mass timber systems and DfMA principles. As a result, MT is frequently treated as an emerging or conceptual "green building" solution rather than a mainstream structural alternative supported by practical design capability and local implementation experience.

This study is exploratory in nature and is subject to several limitations. The sample size was relatively small and included respondents with varying levels of familiarity and experience with MT construction. Furthermore, some participants possessed limited direct technical exposure to MT systems, meaning that the findings primarily reflect industry perceptions rather than verified technical performance assessments. The inclusion of international respondents may also limit the direct generalisability of findings to the South African construction industry.

6 CONCLUSIONS AND RECOMMENDATIONS

MT's contribution to SDG 3 is well supported in international literature and built environment case studies; however, its application in South Africa remains largely conceptual, with limited local empirical validation and a notable absence of post-occupancy evaluation studies. While the material demonstrates potential benefits for mental health, respiratory health, and overall indoor environmental quality, these advantages are not yet fully recognised within the South African construction context. This gap is further reinforced by cultural perceptions of timber housing and regulatory frameworks that do not adequately recognise MT as a primary structural system. To address these barriers, targeted public and institutional interventions are required. The South African government could support the development of flagship MT demonstration projects such as healthcare facilities or educational buildings to provide locally relevant benchmarks of performance, challenge prevailing perceptions associated with informal housing typologies, and build public confidence in engineered timber systems. In parallel, tertiary institutions should extend beyond theoretical instruction by integrating practical training in MT, fabrication, and construction methodologies. Furthermore, municipalities could consider fiscal incentives, such as tax rebates or development bonuses, for projects that demonstrate low-carbon performance and biophilic design principles, thereby helping to offset the current cost premium associated with MT construction.

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