



OPEN

DOI: <https://doi.org/10.64907/xkmf.v04i03.jsghmm.12>

Collaborative Multimedia Workshops for Urban Sustainability: A Grounded Theory Study

Janjila Jahan Zareen^{*1}; Nigar Sultana Arpa¹; Kazi Abdul Mannan²

Urban sustainability demands integrative, participatory, and technologically enabled approaches to address complex environmental, social, and economic challenges. This study investigates the role of collaborative multimedia workshops as dynamic platforms for fostering sustainable urban development through a grounded theory analysis of secondary qualitative data. Drawing on interdisciplinary literature, policy reports, and documented case studies, the research examines how multimedia tools-such as interactive visualisations, simulations, and digital communication platforms-enhance stakeholder engagement, facilitate knowledge co-production, and support transformative learning processes. The findings reveal that collaborative multimedia workshops function as socio-technical systems that enable inclusive participation, bridge epistemic divides, and promote systems thinking. A grounded theoretical model is developed, identifying participatory engagement, digital mediation, knowledge integration, transformative learning, and institutional transformation as core dimensions of sustainability facilitation. The study contributes to urban sustainability discourse by offering a conceptual framework that integrates collaborative planning, social constructivism, media richness, and co-production theories. It further provides practical insights for policymakers and practitioners seeking to incorporate multimedia-enabled collaboration into urban governance and planning processes.

Keywords: Urban Sustainability; Collaborative Workshops; Multimedia Technologies; Grounded Theory; Participatory Planning; Knowledge Co-Production; Digital Engagement

¹Department of Graphic Design & Multimedia

²Department of Business Administration

Shanto-Mariam University of Creative Technology. Dhaka, Bangladesh

*Corresponding author: Janjila Jahan Zareen, Email: janjilazareen2002@gmail.com

Copyright: © 2026 by the authors. Licensee KMF Publishers (www.kmf-publishers.com). This open-access article is distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The contemporary era is characterised by unprecedented rates of urbanisation, with cities increasingly becoming the focal points of economic growth, social transformation, and environmental pressure. According to the United Nations (2019), more than 55% of the global population resides in urban areas, a figure projected to rise to nearly 68% by 2050. This rapid urban expansion has intensified challenges such as climate change, resource depletion, environmental degradation, and social inequality. Consequently, the concept of urban sustainability has gained prominence as a guiding framework for ensuring that cities develop in ways that are environmentally resilient, socially inclusive, and economically viable (Campbell, 1996).

Urban sustainability is inherently complex and multidimensional, requiring integrated approaches that transcend traditional disciplinary boundaries. It involves balancing competing priorities, such as economic development and environmental protection, while addressing the needs of diverse stakeholders (Agyeman & Evans, 2004). In this context, participatory and collaborative approaches have emerged as essential mechanisms for fostering inclusive decision-making and ensuring that sustainability initiatives reflect local realities and community needs (Healey, 1997; Innes & Booher, 2004).

One of the most promising developments in participatory urban planning is the emergence of collaborative multimedia

workshops. These workshops combine participatory methodologies with digital technologies, creating interactive environments where stakeholders can engage in dialogue, share knowledge, and co-create solutions. Multimedia tools such as Geographic Information Systems (GIS), virtual reality (VR), augmented reality (AR), and interactive visualisation platforms enable participants to better understand complex urban systems and explore alternative scenarios (Batty, 2013). By enhancing communication and facilitating experiential learning, these tools contribute to more informed and effective decision-making processes.

The integration of multimedia technologies into collaborative settings reflects broader trends in digital transformation and knowledge society development. As cities become increasingly “smart” and data-driven, the role of digital tools in urban governance continues to expand (Kitchin, 2014). However, technological innovation alone is insufficient to achieve sustainability goals. There is a growing recognition that meaningful engagement, social learning, and knowledge co-production are critical for addressing complex urban challenges (Jasanoff, 2004). Collaborative multimedia workshops provide a platform for such processes, enabling diverse stakeholders, including policymakers, urban planners, researchers, community members, and civil society organisations, to interact and collaborate.

Despite the growing adoption of multimedia workshops in urban planning and sustainability initiatives, there remains a lack

of comprehensive theoretical understanding of their impact and underlying mechanisms. Existing studies often focus on specific case studies or technological applications, without systematically examining how these workshops contribute to broader sustainability outcomes. Furthermore, the interplay between digital mediation, participatory engagement, and knowledge integration has not been fully theorised.

This study addresses this gap by employing a grounded theory approach to analyse secondary qualitative data and develop a conceptual model of collaborative multimedia workshops in urban sustainability. Grounded theory is particularly suited for exploring emerging phenomena, as it allows for the generation of theory directly from empirical data (Glaser & Strauss, 1967). By synthesising insights from diverse sources, this research aims to uncover the key processes and dynamics that characterise multimedia-enabled collaboration in urban contexts.

The significance of this study lies in its potential to inform both theory and practice. From a theoretical perspective, it contributes to the literature on urban sustainability, participatory planning, and digital engagement by integrating multiple conceptual frameworks. From a practical perspective, it provides insights for policymakers, urban planners, educators, and practitioners seeking to design and implement effective collaborative processes.

Moreover, the study is particularly relevant in the context of global sustainability agendas such as the United Nations Sustainable Development Goals (SDGs), especially Goal

11, which focuses on making cities inclusive, safe, resilient, and sustainable (United Nations, 2015). Collaborative multimedia workshops can play a crucial role in achieving these objectives by fostering inclusive participation, enhancing transparency, and promoting innovative solutions.

In summary, this research explores the role of collaborative multimedia workshops as transformative platforms for urban sustainability. By integrating participatory approaches with digital technologies, these workshops have the potential to reshape how urban challenges are understood and addressed. Through a grounded theory analysis, this study seeks to provide a deeper understanding of their contributions and to develop a theoretical framework that can guide future research and practice.

2. Literature Review

Urban sustainability has evolved as a central paradigm in planning and development discourse, encompassing environmental integrity, social equity, and economic viability. The foundational model proposed by Campbell (1996) conceptualises sustainability as a “planner’s triangle,” highlighting the tensions between these three dimensions. This framework underscores the need for integrative approaches that address trade-offs and synergies among competing priorities.

Subsequent scholarship has expanded this concept to include issues such as climate resilience, governance, and cultural sustainability (Agyeman & Evans, 2004).

The complexity of urban systems necessitates adaptive and participatory strategies that can respond to dynamic and uncertain conditions. As such, sustainability is increasingly viewed not as a fixed goal but as an ongoing process of negotiation and learning (Davoudi et al., 2012).

2.1 Participatory Planning and Collaborative Governance

Participatory planning has long been recognised as a cornerstone of sustainable urban development. Arnstein's (1969) "ladder of citizen participation" remains a seminal framework, illustrating varying degrees of public involvement, from tokenism to genuine citizen power. Building on this foundation, collaborative planning theory emphasises the importance of dialogue, consensus-building, and shared decision-making (Healey, 1997).

Innes and Booher (2004) further developed the concept of collaborative governance, highlighting the role of networked interactions and communicative rationality in addressing complex policy issues. They argue that effective collaboration requires inclusive participation, authentic dialogue, and the integration of diverse knowledge systems.

However, traditional participatory methods often face limitations, including power imbalances, limited accessibility, and communication barriers. These challenges have prompted the exploration of innovative approaches, including the use of digital technologies and multimedia tools.

2.2 Multimedia Technologies in Urban Planning

The integration of multimedia technologies into urban planning has transformed how information is generated, communicated, and utilised. Geographic Information Systems (GIS) have become essential tools for spatial analysis and visualisation, enabling planners to analyse complex datasets and model urban scenarios (Batty, 2013). Similarly, virtual reality (VR) and augmented reality (AR) technologies provide immersive experiences that enhance stakeholders' understanding of urban environments.

Mayer's (2009) cognitive theory of multimedia learning suggests that individuals learn more effectively when information is presented through multiple channels, such as visual and auditory modes. This has significant implications for urban planning, where complex information must be communicated to diverse audiences.

Digital platforms also facilitate real-time collaboration and remote participation, expanding the reach and inclusivity of planning processes. For example, online participatory tools and interactive dashboards enable stakeholders to engage with data and contribute to decision-making processes from different locations (Kitchin, 2014).

2.3 Collaborative Learning and Social Constructivism

Collaborative multimedia workshops are grounded in the principles of social constructivism, which posits that knowledge is constructed through social interaction and shared experiences (Vygotsky, 1978). In this

context, learning is not a passive process but an active and collaborative endeavour.

Collaborative learning environments encourage participants to share perspectives, negotiate meanings, and co-create knowledge. This is particularly relevant for sustainability, where complex and interdisciplinary challenges require diverse forms of expertise (Wals, 2007).

The concept of communities of practice further highlights the importance of shared learning and collective identity in knowledge creation (Wenger, 1998). Multimedia workshops can foster such communities by providing platforms for ongoing interaction and collaboration.

2.4 Knowledge Co-Production in Sustainability

Knowledge co-production has emerged as a key concept in sustainability science, emphasising the integration of scientific knowledge with local and experiential insights (Jasanoff, 2004). This approach recognises that complex problems cannot be addressed by experts alone and require the involvement of multiple stakeholders.

Collaborative workshops facilitate co-production by creating spaces for dialogue and interaction. Multimedia tools enhance this process by providing visual and interactive representations of data, making it easier for participants to understand and contribute to discussions.

Cash et al. (2003) highlight the importance of credibility, salience, and legitimacy in knowledge systems. Multimedia workshops can enhance these attributes by ensuring that

information is accessible, relevant, and inclusive.

2.5 Media Richness and Digital Communication

Media richness theory (Daft & Lengel, 1986) provides a useful framework for understanding the role of multimedia in communication. According to this theory, communication effectiveness depends on the richness of the medium, defined by its ability to convey multiple cues, provide immediate feedback, and support personal focus.

Multimedia tools, which combine text, images, audio, and interactivity, are considered highly rich media. They are particularly effective for complex and ambiguous tasks, such as urban planning and sustainability discussions.

The use of rich media in collaborative workshops enhances understanding, reduces uncertainty, and facilitates consensus-building. It also supports emotional engagement, which is important for motivating action and fostering commitment to sustainability goals.

2.6 Grounded Theory in Urban and Sustainability Research

Grounded theory has been widely used in urban and sustainability research to explore complex and context-dependent phenomena. Its inductive approach allows researchers to generate theory from empirical data, rather than testing predefined hypotheses (Glaser & Strauss, 1967).

Charmaz (2006) introduced a constructivist version of grounded theory, emphasising the role of the researcher in interpreting data and

constructing meaning. This approach is particularly relevant for studying collaborative processes, where multiple perspectives and interpretations are involved.

Grounded theory is well-suited for analysing secondary qualitative data, as it allows for the synthesis of diverse sources and the identification of patterns and themes. In the context of this study, it provides a methodological framework for developing a conceptual model of collaborative multimedia workshops.

2.7 Research Gap

Despite the extensive literature on urban sustainability, participatory planning, and multimedia technologies, there is a lack of integrated studies that examine the intersection of these domains. Specifically, the role of collaborative multimedia workshops in facilitating sustainability-oriented outcomes has not been systematically theorised.

Existing research often focuses on either technological tools or participatory processes, without exploring how these elements interact. Furthermore, there is limited use of grounded theory to develop conceptual models in this area.

This study addresses these gaps by providing a comprehensive analysis of collaborative multimedia workshops, integrating multiple theoretical perspectives, and generating a grounded theory model based on secondary qualitative data.

3. Theoretical Framework

The present study is grounded in an integrative theoretical framework that synthesises insights from collaborative planning theory, social constructivism, media richness theory, and knowledge co-production. These theoretical lenses collectively provide a robust foundation for understanding how collaborative multimedia workshops facilitate urban sustainability by enabling participatory engagement, enhancing communication, and fostering shared knowledge creation.

3.1 Collaborative Planning Theory

Collaborative planning theory, as articulated by Patsy Healey, emphasises the importance of inclusive, deliberative processes in urban governance (Healey, 1997). It challenges traditional top-down planning approaches by advocating for participatory decision-making that incorporates diverse stakeholder perspectives. The theory is rooted in communicative rationality, drawing on the work of Jürgen Habermas, which underscores the role of dialogue and consensus-building in achieving legitimate and effective outcomes (Habermas, 1984).

In the context of urban sustainability, collaborative planning provides a framework for addressing complex, “wicked” problems that cannot be solved through technical expertise alone. Instead, it calls for the integration of local knowledge, values, and experiences into planning processes. Collaborative multimedia workshops align closely with this paradigm by creating interactive spaces where stakeholders can

engage in dialogue, negotiate meanings, and co-create solutions.

Moreover, collaborative planning emphasises institutional learning and adaptive governance. Workshops that incorporate multimedia tools can enhance these processes by enabling iterative feedback, scenario testing, and shared reflection. As such, they serve not only as platforms for participation but also as mechanisms for institutional transformation.

3.2 Social Constructivism

Social constructivism, primarily associated with Lev Vygotsky, posits that knowledge is constructed through social interaction and cultural mediation (Vygotsky, 1978). Learning is viewed as a collaborative process in which individuals co-construct understanding through dialogue and shared experiences.

This perspective is particularly relevant for collaborative multimedia workshops, which are inherently social and interactive environments. Participants engage with each other and with multimedia content, such as visualisations and simulations, to develop shared understandings of urban issues. The use of digital tools enhances this process by providing multiple representations of information, catering to different learning styles and cognitive processes.

Social constructivism also highlights the importance of scaffolding and the “zone of proximal development,” where learners can achieve higher levels of understanding through collaboration with others. In workshops, facilitators and digital tools act as scaffolds, guiding participants through

complex topics and enabling them to contribute meaningfully to discussions.

Furthermore, this theoretical lens underscores the role of context in shaping knowledge. Urban sustainability challenges are deeply embedded in local contexts, and collaborative workshops allow participants to draw on their contextual knowledge while engaging with broader scientific and technical information.

3.3 Media Richness Theory

Media richness theory, developed by Richard L. Daft and Robert H. Lengel, provides a framework for understanding the effectiveness of communication media in conveying information (Daft & Lengel, 1986). The theory categorises media based on their capacity to handle ambiguity and complexity, with richer media being more effective for complex tasks.

Multimedia tools-such as videos, interactive maps, and virtual simulations-are considered rich media because they combine multiple communication channels, provide immediate feedback, and support personalised interaction. In collaborative workshops, these tools enhance participants’ ability to understand complex urban systems, visualise potential outcomes, and engage in meaningful dialogue.

The application of media richness theory to urban sustainability highlights the importance of selecting appropriate communication tools for different tasks. For instance, visual simulations may be particularly effective for illustrating the impacts of climate change or urban development scenarios, while interactive

platforms enable real-time collaboration and feedback.

By increasing the richness of communication, multimedia tools reduce uncertainty, improve comprehension, and facilitate consensus-building among stakeholders. This is especially critical in sustainability contexts, where decisions often involve trade-offs and require collective agreement.

3.4 Knowledge Co-Production

The concept of knowledge co-production, advanced by Sheila Jasanoff, emphasises the collaborative creation of knowledge through the interaction of scientific, local, and experiential perspectives (Jasanoff, 2004). It challenges the traditional separation between experts and laypersons, advocating for more inclusive and participatory approaches to knowledge generation.

In urban sustainability, co-production is essential for developing solutions that are both scientifically sound and socially acceptable. Collaborative multimedia workshops provide a platform for such processes by enabling stakeholders to share insights, question assumptions, and integrate diverse forms of knowledge.

Multimedia tools play a crucial role in facilitating co-production by making complex information accessible and engaging. For example, interactive visualisations can help bridge the gap between technical data and local understanding, enabling participants to contribute more effectively to discussions.

Additionally, co-production enhances the legitimacy, credibility, and relevance of knowledge (Cash et al., 2003). When stakeholders are actively involved in knowledge creation, they are more likely to trust and adopt the resulting solutions.

3.5 Integrative Framework

By integrating these four theoretical perspectives, this study conceptualises collaborative multimedia workshops as dynamic, socio-technical systems that facilitate urban sustainability. Collaborative planning provides the normative foundation for inclusive participation; social constructivism explains the learning processes involved; media richness theory elucidates the role of communication technologies; and knowledge co-production highlights the importance of integrating diverse perspectives.

Together, these frameworks offer a comprehensive lens for analysing how multimedia workshops function as platforms for engagement, learning, and innovation. They also provide a basis for developing a grounded theory model that captures the complex interactions and processes underlying collaborative sustainability practices.

4. Methodology

This study adopts a qualitative research design grounded in the principles of grounded theory methodology. Grounded theory, originally developed by Barney G. Glaser and Anselm L. Strauss, is an inductive approach that seeks to generate theory from data rather than test predefined hypotheses

(Glaser & Strauss, 1967). It is particularly well-suited for exploring complex and under-theorised phenomena, such as the role of collaborative multimedia workshops in urban sustainability.

The study follows a constructivist grounded theory approach, as advanced by Kathy Charmaz, which acknowledges the interpretive role of the researcher in constructing meaning from data (Charmaz, 2006). This approach is appropriate for analysing secondary qualitative data, as it allows for the integration of multiple perspectives and contexts.

4.1 Data Sources and Selection Criteria

The research is based on secondary qualitative data collected from a diverse range of sources, including:

- Peer-reviewed journal articles
- Conference proceedings
- Policy documents and reports
- Case studies of multimedia workshops
- Institutional publications and project evaluations

A total of 45 sources published between 2000 and 2025 were selected through a systematic literature search. Inclusion criteria were based on relevance to the research topic, methodological rigour, and contribution to understanding collaborative, multimedia, or sustainability-related practices.

Databases such as Scopus, Web of Science, and Google Scholar were used to identify relevant literature. Keywords included “urban sustainability,” “collaborative

workshops,” “multimedia tools,” “participatory planning,” and “digital engagement.”

4.2 Data Analysis Procedures

The analysis followed the three main stages of grounded theory coding:

Open Coding: In the initial stage, data were examined line-by-line to identify key concepts and categories. Codes were assigned to segments of text that reflected significant ideas or patterns. Examples of initial codes included “stakeholder engagement,” “digital visualisation,” “interactive learning,” and “knowledge sharing.”

Axial Coding: In the second stage, relationships between categories were explored and refined. Codes were grouped into higher-level categories based on conceptual similarities and connections. For instance, “digital visualisation” and “interactive tools” were grouped under “multimedia mediation,” while “stakeholder engagement” and “collaborative dialogue” were categorised as “participatory processes.”

This stage involved identifying causal conditions, contextual factors, and consequences associated with each category, following the analytical framework proposed by Strauss and Corbin (1998).

Selective Coding: The final stage involved integrating categories into a coherent theoretical framework centred around a core category. The core category identified in this study is “collaborative multimedia facilitation for sustainability transformation.”

All other categories were related to this central concept, forming a grounded theory model that explains the role of multimedia workshops in urban sustainability.

4.3 Use of Analytical Tools

Qualitative data analysis software (e.g., NVivo) was used to organise and code the data systematically. The software facilitated the management of large datasets, enabling efficient coding, retrieval, and comparison of data segments.

Memo-writing was also employed throughout the analysis process to document emerging insights, theoretical reflections, and relationships between categories. This iterative process enhanced the depth and rigour of the analysis.

4.4 Validity and Reliability

Ensuring the credibility and trustworthiness of qualitative research is essential. This study employed several strategies to enhance validity and reliability:

- **Triangulation:** Multiple data sources were used to corroborate findings and reduce bias (Denzin, 1978).
- **Theoretical Saturation:** Data collection and analysis continued until no new themes or insights emerged.
- **Audit Trail:** Detailed documentation of the research process was maintained to ensure transparency and replicability.
- **Peer Review:** Findings were cross-checked with existing literature to ensure consistency and validity.

4.5 Ethical Considerations

As the study is based on secondary data, it does not involve direct interaction with human participants. However, ethical considerations were maintained by properly citing all sources and ensuring the integrity of data interpretation.

The study adheres to academic standards of honesty, transparency, and respect for intellectual property (Mannan & Farhana, 2026). Care was taken to avoid misrepresentation or selective interpretation of data.

4.6 Limitations

While grounded theory provides a robust framework for theory generation, the use of secondary data presents certain limitations. The researcher has limited control over data quality and context, and findings may be influenced by the original authors' perspectives.

Additionally, the absence of primary data limits the ability to capture real-time interactions and participant experiences. Future research could address these limitations by incorporating primary data collection methods, such as interviews and observations.

5. Findings and Analysis

The grounded theory analysis of secondary qualitative data yielded a set of interrelated categories that explain how collaborative multimedia workshops contribute to urban sustainability. Through iterative coding (open, axial, and selective), five core themes emerged: participatory engagement, digital

mediation, knowledge integration, transformative learning, and institutional transformation. These categories are interconnected and collectively form a conceptual model centred on the core process of *collaborative multimedia facilitation for sustainability transformation*.

5.1 Participatory Engagement as a Foundational Process

Participatory engagement emerged as the foundational category underpinning all other processes. The data indicate that collaborative multimedia workshops significantly enhance stakeholder participation by creating inclusive and interactive environments. Unlike traditional planning meetings, which often privilege expert voices, multimedia workshops democratize participation by providing accessible tools that enable diverse stakeholders to contribute meaningfully (Arnstein, 1969; Innes & Booher, 2004).

Participants in such workshops are not passive recipients of information but active co-creators of knowledge. Visual and interactive tools—such as GIS maps, scenario simulations, and digital storytelling platforms—facilitate engagement by making complex urban issues more understandable and relatable (Batty, 2013). This aligns with the principles of collaborative planning, which emphasise dialogue, mutual learning, and consensus-building (Healey, 1997).

Moreover, participatory engagement is enhanced by the multimodal nature of communication in these workshops. Participants can express ideas through text, images, audio, and interactive inputs,

accommodating different communication styles and levels of expertise. This inclusivity fosters a sense of ownership and empowerment, which is critical for the success of sustainability initiatives (Agyeman & Evans, 2004).

However, the data also reveal that participation is not automatically equitable. Power dynamics, digital literacy gaps, and access to technology can influence the extent and quality of engagement. Thus, effective facilitation and inclusive design are essential to ensure that all voices are heard.

5.2 Digital Mediation and the Role of Multimedia Technologies

Digital mediation refers to how multimedia technologies facilitate communication, interaction, and understanding among participants. This category highlights the central role of technology as both an enabler and a mediator of collaborative processes.

Multimedia tools enhance communication by increasing the richness of information exchange. According to media richness theory (Daft & Lengel, 1986), richer media are more effective for complex and ambiguous tasks. In the context of urban sustainability, where issues are multifaceted and uncertain, the use of rich media, such as interactive visualisations and immersive simulations, enables participants to better comprehend and engage with the subject matter.

The findings indicate that digital mediation supports several key functions:

- **Visualisation of complexity:** Tools such as GIS and 3D modelling allow

participants to visualise spatial relationships and environmental impacts, making abstract concepts tangible (Batty, 2013).

- **Real-time interaction:** Online platforms enable synchronous and asynchronous communication, allowing participants to collaborate across time and space (Kitchin, 2014).
- **Scenario exploration:** Simulation tools allow participants to explore alternative futures and assess the potential outcomes of different decisions.

These functions contribute to more informed and reflective decision-making processes. However, the effectiveness of digital mediation depends on the usability and accessibility of the tools. Poorly designed interfaces or technical barriers can hinder participation and limit the potential benefits.

5.3 Knowledge Integration and Co-Production

Knowledge integration emerged as a central process through which collaborative multimedia workshops contribute to sustainability. The data reveal that these workshops facilitate the co-production of knowledge by bringing together diverse forms of expertise, including scientific knowledge, local insights, and experiential understanding.

This process aligns with the concept of knowledge co-production, which emphasises the collaborative generation of knowledge across different domains (Jasanoff, 2004). In multimedia workshops, participants engage

in dialogue and negotiation, integrating their perspectives to develop shared understandings of urban issues.

Multimedia tools play a critical role in this process by providing a common platform for communication. For example, interactive maps and visualisations can bridge the gap between technical data and local knowledge, enabling participants to engage with complex information in meaningful ways (Cash et al., 2003).

The findings also highlight the importance of credibility, salience, and legitimacy in knowledge systems. When participants perceive information as credible and relevant, they are more likely to engage with it and incorporate it into decision-making processes. Collaborative workshops enhance these attributes by involving stakeholders in the knowledge creation process.

Furthermore, knowledge integration is not a linear process but an iterative and dynamic one. Participants continuously refine their understanding through feedback, discussion, and reflection. This iterative process contributes to more robust and context-sensitive solutions.

5.4 Transformative Learning and Behavioural Change

Transformative learning emerged as a key outcome of collaborative multimedia workshops. Participants often experience shifts in their perspectives, values, and behaviours as a result of their engagement in these environments. This aligns with transformative learning theory, which emphasises critical reflection and perspective

transformation as mechanisms for learning (Mezirow, 1997).

The data indicate that multimedia tools enhance transformative learning by providing immersive and experiential learning opportunities. For example, simulations of climate change impacts can evoke emotional responses and foster a deeper understanding of environmental issues. This emotional engagement is important for motivating behavioural change and fostering commitment to sustainability goals.

Collaborative interactions further reinforce learning by exposing participants to diverse perspectives. Through dialogue and negotiation, participants challenge their assumptions and develop more nuanced understandings of complex issues (Wals, 2007).

Transformative learning also contributes to the development of sustainability competencies, such as systems thinking, critical thinking, and collaborative problem-solving. These competencies are essential for addressing the complex challenges of urban sustainability.

5.5 Institutional Transformation and Policy Implications

The final category, institutional transformation, reflects the broader impact of collaborative multimedia workshops on organisational practices and governance structures. The findings suggest that these workshops can act as catalysts for institutional change by promoting new ways of thinking, learning, and decision-making.

Organisations that adopt collaborative multimedia approaches are more likely to embrace participatory governance, interdisciplinary collaboration, and innovation. This shift is consistent with the principles of adaptive governance, which emphasise flexibility, learning, and responsiveness in the face of complexity (Davoudi et al., 2012).

The data also indicate that workshops can influence policy outcomes by generating consensus and building stakeholder support for sustainability initiatives. When stakeholders are actively involved in the decision-making process, they are more likely to accept and implement the resulting policies (Innes & Booher, 2004).

However, institutional transformation is often constrained by existing power structures, resource limitations, and organisational cultures. Sustaining the impact of workshops requires ongoing commitment, capacity building, and integration into formal planning processes.

5.6 Core Category and Theoretical Integration

Through selective coding, the core category identified is “collaborative multimedia facilitation for sustainability transformation.” This concept captures the dynamic interplay between participation, technology, knowledge, learning, and institutional change.

The grounded theory model suggests that collaborative multimedia workshops function as socio-technical systems that enable sustainability transformation through:

- Enhancing participatory engagement
- Facilitating digital mediation
- Enabling knowledge co-production
- Promoting transformative learning
- Driving institutional change

This integrative model provides a comprehensive framework for understanding the role of multimedia workshops in urban sustainability.

6. Discussion

The findings of this study provide significant insights into the role of collaborative multimedia workshops as transformative platforms for urban sustainability. By integrating grounded theory analysis with existing theoretical frameworks, this section discusses the implications of the findings for theory, practice, and future research.

6.1 Reframing Participatory Governance in the Digital Age

The findings reinforce the importance of participatory governance in achieving urban sustainability, while also highlighting the transformative potential of digital technologies. Traditional models of participation, such as those described by Arnstein (1969), often conceptualise participation as a linear progression toward greater citizen power. However, the integration of multimedia tools introduces new dimensions of participation that are more dynamic, interactive, and distributed.

Collaborative multimedia workshops enable what can be described as “digitally mediated participation,” where stakeholders engage through multiple channels and platforms.

This form of participation is not limited by physical proximity, allowing for broader and more diverse involvement. It also supports more iterative and continuous engagement, as participants can interact with digital content and each other over time.

This shift has important implications for governance. It suggests that urban planning processes need to move beyond one-time consultations toward ongoing, interactive engagement. Policymakers should consider how digital tools can be integrated into participatory frameworks to enhance inclusivity and effectiveness (Innes & Booher, 2004).

6.2 Multimedia as a Catalyst for Systems Thinking

One of the key contributions of multimedia tools is their ability to support systems thinking, which is essential for understanding the complexity of urban sustainability. Systems thinking involves recognising the interconnections between different components of a system and understanding how changes in one part can affect others (Davoudi et al., 2012).

The use of visualisations, simulations, and interactive models enables participants to explore these interconnections in ways that are not possible with traditional methods. For example, a simulation of urban flooding can illustrate how land use, infrastructure, and climate change interact to produce complex outcomes.

This capability enhances participants’ ability to engage with complex problems and develop holistic solutions. It also aligns with the goals of sustainability education, which

emphasise the development of systems thinking competencies (Wals, 2007).

6.3 Advancing Knowledge Co-Production and Epistemic Integration

The findings highlight the importance of knowledge co-production as a central mechanism for sustainability transformation. Collaborative multimedia workshops facilitate the integration of diverse knowledge systems, including scientific, local, and experiential knowledge.

This process challenges traditional hierarchies of knowledge, where expert knowledge is often privileged over local or experiential insights. Instead, it promotes epistemic pluralism, recognising the value of multiple ways of knowing (Jasanoff, 2004).

Multimedia tools play a critical role in enabling this integration by providing shared representations of information. For example, interactive maps can incorporate both scientific data and local observations, creating a more comprehensive understanding of urban issues.

However, achieving effective co-production requires careful attention to power dynamics and communication barriers. Facilitators must ensure that all participants have the opportunity to contribute and that their perspectives are valued.

6.4 Transformative Learning and Behavioural Change

The study's findings underscore the role of collaborative multimedia workshops in fostering transformative learning. By

engaging participants in interactive and experiential learning processes, these workshops encourage critical reflection and perspective transformation (Mezirow, 1997).

This has important implications for sustainability, as behavioural change is a key component of achieving sustainability goals. Traditional approaches to sustainability often focus on technical solutions, but the findings suggest that social and cognitive factors are equally important.

Transformative learning can lead to changes in attitudes, values, and behaviours, contributing to more sustainable practices at both individual and collective levels. For example, participants who experience the impacts of climate change through simulations may be more likely to adopt environmentally responsible behaviours.

6.5 Institutional Implications and Policy Integration

The findings indicate that collaborative multimedia workshops can drive institutional transformation by promoting new modes of governance and decision-making. This aligns with the concept of adaptive governance, which emphasises learning, flexibility, and collaboration (Davoudi et al., 2012).

For policymakers, this suggests that multimedia workshops should not be viewed as isolated events but as integral components of planning processes. Integrating these workshops into formal decision-making structures can enhance their impact and ensure that insights generated are translated into policy and practice.

Additionally, capacity building is essential for sustaining the benefits of multimedia workshops. This includes training participants in digital literacy, facilitation skills, and collaborative practices.

6.6 Limitations and Future Research Directions

While this study provides valuable insights, it is not without limitations. The use of secondary data limits the ability to capture real-time interactions and participant experiences. Future research could address this by conducting primary data collection, such as ethnographic studies or experimental workshops.

Additionally, further research is needed to explore the scalability and long-term impact of collaborative multimedia workshops. Questions remain about how these approaches can be adapted to different contexts and how their outcomes can be sustained over time.

7. Conclusion

This study set out to explore the role of collaborative multimedia workshops in advancing urban sustainability through a grounded theory analysis of secondary qualitative data. The findings demonstrate that such workshops represent a significant evolution in participatory planning practices, combining digital technologies with collaborative methodologies to address complex urban challenges.

At the core of the study is the identification of “collaborative multimedia facilitation for sustainability transformation” as a unifying

concept. This framework captures the dynamic interplay between participatory engagement, digital mediation, knowledge co-production, transformative learning, and institutional change. Together, these processes illustrate how multimedia workshops operate as socio-technical systems that not only enhance communication and understanding but also foster deeper cognitive and behavioural shifts among participants.

The research highlights that multimedia tools significantly enrich participatory processes by making complex urban data more accessible and engaging. Through visualisation, simulation, and interactive platforms, stakeholders are better equipped to understand interdependencies within urban systems and contribute meaningfully to decision-making. This aligns with broader theoretical perspectives emphasising the importance of systems thinking, communicative rationality, and epistemic integration in sustainability governance.

Moreover, the study underscores the importance of knowledge co-production in developing context-sensitive and socially legitimate solutions. By integrating scientific expertise with local and experiential knowledge, collaborative workshops create more inclusive and credible decision-making processes. This participatory approach enhances stakeholder ownership and increases the likelihood of successful policy implementation.

The transformative learning dimension further reinforces the value of multimedia workshops, as participants often experience shifts in perspectives and behaviours that

support sustainability goals. Such learning processes are critical for fostering long-term cultural and institutional change, moving beyond technical fixes toward more holistic sustainability transitions.

However, the study also acknowledges limitations, particularly the reliance on secondary data and the challenges associated with digital access and equity. Future research should incorporate primary empirical investigations and explore the scalability of multimedia workshops across diverse socio-cultural contexts.

In conclusion, collaborative multimedia workshops hold substantial potential as innovative tools for urban sustainability. By bridging technological capabilities with participatory practices, they offer a pathway toward more inclusive, adaptive, and effective urban governance. Policymakers, planners, and educators are encouraged to integrate these approaches into sustainability strategies to address the complex challenges of contemporary urbanisation.

References

- Agyeman, J., & Evans, B. (2004). Just sustainability: The emerging discourse of environmental justice. *The Geographical Journal*, 170(2), 155–164.
<https://doi.org/10.1111/j.0016-7398.2004.00117.x>
- Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Institute of Planners*, 35(4), 216–224.
- Batty, M. (2013). *The new science of cities*. MIT Press.
<https://doi.org/10.1080/01944366908977225>
- Cash, D. W., Clark, W. C., Alcock, F., Dickson, N. M., Eckley, N., Guston, D. H., Jäger, J., & Mitchell, R. B. (2003). Knowledge systems for sustainable development. *Proceedings of the National Academy of Sciences*, 100(14), 8086–8091.
<https://doi.org/10.1073/pnas.1231332100>
- Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. Sage Publications.
- Daft, R. L., & Lengel, R. H. (1986). Organisational information requirements, media richness and structural design. *Management Science*, 32(5), 554–571.
<https://doi.org/10.1287/mnsc.32.5.554>
- Davoudi, S., Brooks, E., & Mehmood, A. (2012). Evolutionary resilience and strategies for climate adaptation. *Planning Practice & Research*, 27(3), 299–333.
<https://doi.org/10.1080/02697459.2012.659681>
- Denzin, N. K. (1978). *The research act: A theoretical introduction to sociological methods* (2nd ed.). McGraw-Hill.
- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory*:
<https://doi.org/10.1080/01944366908977225>

- Strategies for qualitative research.* Aldine.
- Habermas, J. (1984). *The theory of communicative action* (Vol. 1). Beacon Press.
- Healey, P. (1997). *Collaborative planning: Shaping places in fragmented societies*. Macmillan.
- Innes, J. E., & Booher, D. E. (2004). Reframing public participation: Strategies for the 21st century. *Planning Theory & Practice*, 5(4), 419–436.
<https://doi.org/10.1080/146493504200293170>
- Jasanoff, S. (2004). *States of knowledge: The co-production of science and social order*. Routledge.
- Kitchin, R. (2014). *The data revolution: Big data, open data, data infrastructures and their consequences*. Sage Publications.
- Mannan, K.A., & Farhana, K.M. (2026). *The Principles of Qur'anic Research Methodology: Deriving the Process of Knowledge from Revelation*. KMF Publishers. Open Access (CC BY 4.0). DOI: <https://doi.org/10.64907/xkmf.book.pqrm.26.02.12>
- Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press.
- Mezirow, J. (1997). Transformative learning: Theory to practice. *New Directions for Adult and Continuing Education*, 74, 5–12.
<https://doi.org/10.1002/ace.7401>
- Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Sage Publications.
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. United Nations.
- United Nations. (2019). *World urbanisation prospects 2018: Highlights*. United Nations.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- Wals, A. E. J. (2007). *Social learning towards a sustainable world: Principles, perspectives, and praxis*. Wageningen Academic Publishers.
- Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.