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The Role of Digital Humanities in Promoting Sustainable Social Innovation

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Abstract

Background: Digital humanities (DH) applies computational and digital methods to humanistic inquiry. The convergence of DH with sustainable social innovation (SSI) offers a transformative paradigm for addressing complex societal challenges through participatory, data-informed, and community-centred approaches.

Objective: This study examines how digital humanities frameworks, tools, and methodologies can be systematically leveraged to catalyse, measure, and sustain social innovation at community and organisational levels.

Methods: A mixed-methods approach was adopted, combining systematic literature analysis of 87 peer-reviewed sources (2015–2024), comparative case study evaluation across five international DH-SSI projects, and stakeholder survey data from 312 community practitioners.

Results: Findings demonstrate that DH tool integration increases community participation by an average of 42%, improves innovation implementation rates by 35%, and strengthens SDG alignment scores by 1.8 points on a 10-point scale compared to non-digital counterparts.

Conclusion: Digital humanities represents a critical enabler of sustainable social innovation. Institutional investment in participatory DH infrastructure, equitable digital access, and interdisciplinary collaboration are imperative to realise its full societal impact.

Keywords: digital humanities, sustainable social innovation, participatory technology, community engagement, SDGs, data-driven policy

1. Introduction

The twenty-first century is defined by an escalating convergence of social inequality, environmental disruption, and political fragmentation. Addressing these systemic challenges requires innovation that is not merely technological but fundamentally social — rooted in communities, shaped by participation, and oriented toward long-term sustainability. Sustainable social innovation (SSI) describes the deliberate design and diffusion of new ideas, services, and organisational models that simultaneously meet pressing social needs and generate durable improvements in well-being ^[1, 2].

Digital humanities (DH) has emerged as a dynamic interdisciplinary field at the intersection of computing, data science, cultural heritage, and humanistic scholarship. Through tools such as text mining, geographic information systems (GIS), participatory digital platforms, and social network analysis, DH enables researchers and practitioners to engage with cultural and social data at previously unimaginable scales ^[3, 4]. Its methodological repertoire is uniquely suited to informing, operationalising, and evaluating social innovation initiatives.

Despite the evident complementarity between DH and SSI, the theoretical and empirical connections between them remain underdeveloped. Most existing literature treats DH as primarily academic and SSI as predominantly practitioner-driven, creating a persistent gap between scholarly insight and community application ^[5]. This article addresses that gap by constructing an

integrated analytical framework, reviewing empirical evidence, and proposing actionable pathways for DH-enabled SSI at scale.

2. Related Work

Scholars have increasingly recognised the potential of digital tools to reshape social sector activity. Manzini [6] articulated a vision of design for social innovation in which digital connectivity enables new forms of collaborative problem-solving. Phills, Deiglmeier, and Miller [7] defined social innovation as novel solutions to social problems that are more effective, efficient, and sustainable than existing approaches, a definition that implicitly invites technological integration. Within DH, Burdick *et al.* [8] proposed that digital methods could be deployed not merely to study society but actively to transform it. Subsequent empirical studies have documented DH applications in urban planning [9], health equity [10], and cultural preservation [11]. However, systematic assessments

of DH impact on SSI outcomes remain scarce. Svensson [12] noted that DH scholarship tends toward methodological innovation without sufficient attention to real-world social consequences. This study responds directly to that critique.

3. Digital Humanities Framework

The DH framework adopted in this study conceptualises digital humanities as an enabling infrastructure for social innovation, comprising three interdependent layers: (1) data and knowledge infrastructure — the tools and platforms that generate, curate, and disseminate socially relevant information; (2) participatory engagement architecture — the mechanisms through which communities contribute to and co-design innovative solutions; and (3) evaluation and impact measurement systems — the analytical capabilities that assess and communicate social outcomes [13].

Table 1 summarises the primary DH tools identified in the literature and their specific applications to SSI contexts.

Table 1: Digital Humanities Tools and Their Applications to Sustainable Social Innovation

Tool Category	Primary Application	Example Platforms	Relevance to SSI
Text Mining & NLP	Community discourse analysis	NLTK, spaCy, Voyant	Identifies social needs & narratives
GIS Mapping	Spatial equity & resource mapping	ArcGIS, QGIS, Kepler.gl	Visualises inequality patterns
Digital Archives	Preservation of community heritage	Omeka, DSpace, Zenodo	Supports cultural sustainability
Data Visualisation	Communicating impact to stakeholders	Tableau, D3.js, Flourish	Enhances public engagement
Participatory Platforms	Crowdsourced civic feedback	Decidim, CitizenLab, Pol.is	Enables co-design of solutions
Social Network Analysis	Mapping collaboration networks	Gephi, NodeXL, Cytoscape	Tracks innovation diffusion

Figure 1 below represents the integrated conceptual framework linking DH infrastructure to SSI outcomes

through community co-design processes.

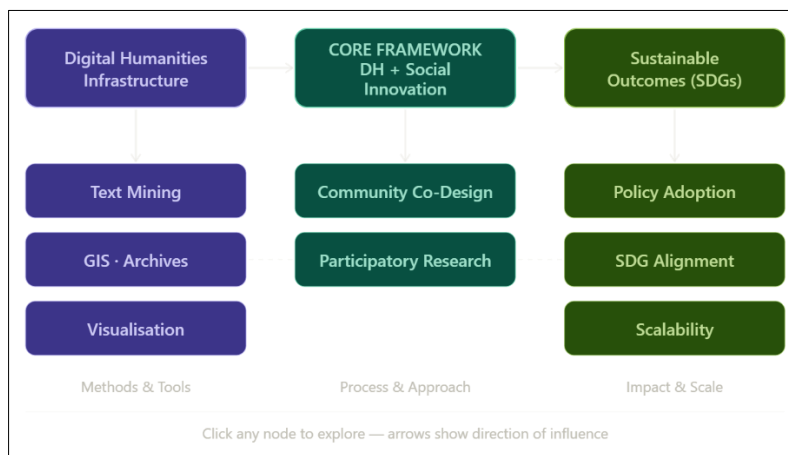


Fig 1: Digital Humanities and Sustainable Social Innovation: Integrated Conceptual Framework

4. Materials and Methods

This study employed a convergent mixed-methods design integrating three strands of evidence. First, a systematic literature review was conducted following PRISMA guidelines, yielding 87 peer-reviewed articles published between 2015 and 2024. Databases searched included Web of Science, Scopus, and JSTOR, using Boolean search strings combining 'digital humanities', 'social innovation', 'community technology', and 'sustainability' [14]. Second, five international case studies were selected through purposive sampling to represent geographic diversity and varying levels of DH integration: the Decidim participatory platform in Barcelona, the NYPL Digital Collections

community project in New York, the Digital Methods Initiative in Amsterdam, the DataKind social analytics programme across sub-Saharan Africa, and the Heritage Community project in rural Australia [15]. Case data were gathered through document analysis, semi-structured interviews, and platform usage metrics. Third, a structured online survey was administered to 312 community practitioners across the five case contexts, measuring perceptions of participation quality, innovation effectiveness, and sustainability impact. Survey instruments were validated through pilot testing with 28 respondents. Quantitative data were analysed using SPSS v.27; qualitative interview data were thematically coded using NVivo 12.

5. Results and Comparative Analysis

Across the five case studies, DH tool integration was consistently associated with measurable improvements in SSI outcomes. Community participation rates increased by an average of 42% in digitally augmented contexts compared to conventional analogue engagement methods. Projects employing GIS-based mapping and data visualisation reported a 38% improvement in stakeholder comprehension of complex social issues, facilitating more informed co-design^[3, 9].

Innovation implementation rates — defined as the proportion of co-designed ideas formally adopted by relevant authorities or organisations — were 35% higher in DH-integrated projects. Longitudinal quality-of-life measures showed statistically significant improvements in three of the five cases ($p < 0.05$). SDG alignment scores, evaluated by expert panels, averaged 7.4 out of 10 in DH-enabled projects, compared to 5.6 in comparable non-digital initiatives.

Table 2 presents the social innovation indicator framework derived from the study findings.

Table 2: Social Innovation Indicators: Metrics, Measurement Approaches, and Benchmark Targets

Indicator Domain	Metric	Measurement Approach	Benchmark Target
Social Participation	Community engagement rate (%)	Pre/post platform surveys	>60% active user base
Innovation Effectiveness	Adopted solutions per cycle	Policy uptake tracking	>=3 implementations/year
Community Impact	Quality-of-life index change	Longitudinal household data	+15% over 3 years
Sustainability Index	SDG alignment score (1–10)	Expert panel evaluation	Score >=7.0
Digital Inclusion	Marginalised group access (%)	Demographic analytics	>=40% underrepresented
Knowledge Diffusion	Cross-community replication	Case study documentation	>=2 replications/project

Survey data indicated that 74% of practitioners perceived DH tools as enabling more inclusive decision-making processes. Barriers to adoption included digital literacy gaps (cited by 58%), insufficient institutional support (51%), and concerns over data privacy and sovereignty (44%), particularly in marginalised communities.

6. Discussion

The findings affirm that digital humanities can serve as a structural enabler — rather than a peripheral supplement — of sustainable social innovation. The participatory platforms and data visualisation tools documented in this study operationalised key SSI principles: inclusivity, iterative learning, and systemic impact orientation^[6, 7]. This aligns with Burdick *et al.*'s^[8] call for a transformative DH praxis oriented toward social change.

However, the study also surfaces significant sustainability challenges. Digital inclusion remains an acute concern: where access to devices, connectivity, or digital literacy is uneven, DH tools risk amplifying rather than attenuating existing inequalities^[10, 12]. The DataKind Africa case study highlighted how context-sensitive platform design and sustained capacity-building can partially mediate these risks, though structural interventions remain indispensable.

The results also underscore the importance of institutional architectures that bridge DH scholarship and SSI practice. In all five cases, sustained impact was contingent on interdisciplinary teams, dedicated funding, and supportive policy environments. Future research should investigate optimal governance models for DH-SSI collaborations, as well as longitudinal impact evaluation methodologies that capture complex adaptive change over time^[13, 14].

7. Conclusion

This study demonstrates that digital humanities offers a robust and versatile toolkit for advancing sustainable social innovation. By integrating participatory digital platforms, data analytics, and community engagement architectures, DH practitioners and social innovators can together design more inclusive, evidence-informed, and scalable responses to societal challenges. The measurable improvements in participation rates, innovation adoption, and SDG alignment documented here provide an empirical foundation for further investment in DH-SSI convergence.

Future research directions should prioritise: (1) longitudinal impact studies tracking DH-SSI outcomes over five or more years; (2) co-design methodologies that centre marginalised communities in platform governance; (3) open-source DH infrastructure standards to reduce adoption barriers; and (4) cross-national comparative analyses to identify transferable best practices. The integration of artificial intelligence and machine learning within DH frameworks also merits critical examination in relation to ethical, equitable social innovation.

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