

Digital Approaches in Humanities Toward Sustainable Human Capital Development: A Synthesis of Multidisciplinary Research Program

Songphan Choemprayong^{1,2*} and Sakchai Lunlaporn³

¹ Department of Library Science, Faculty of Arts, Chulalongkorn University, Thailand

² Office of Academic Resources, Chulalongkorn University, Thailand

³ Department of English and Linguistics, Faculty of Humanities, Ramkhamhaeng University, Thailand

* Corresponding author email: songphan.c@chula.ac.th

Abstract

This review article synthesizes the outcomes of the research program “Digital Approaches in Humanities toward Sustainable Human Capital Development,” which brought together 15 projects organized into three thematic clusters: mapping out research frameworks for Thai digital humanities (DH), developing innovative tools and methodologies, and critically reflecting on digital phenomena. The program aimed to address Thailand’s unique challenges in integrating digital technologies with humanities scholarship to foster sustainable human capital development. The review highlights how this interdisciplinary initiative created opportunities for collaboration across traditionally siloed fields, bridging gaps between humanities and technology. It discusses key advancements, such as ontology-based search engines and data visualization tools, which enhanced access to and analysis of cultural data. Simultaneously, the program underscored the enduring role of humanities in fostering critical thinking, ethical reflection, and cultural critique in a rapidly digitalizing society. The review also explores challenges, including the fragmentation of DH in Thailand, disciplinary divides, and the complexity of aligning global methodologies with local contexts. By emphasizing the need for scalable infrastructure, interdisciplinary collaboration, and culturally attuned approaches, this article reflects on the broader potential of DH to contribute to human capital development. By synthesizing the lessons learned from this program, the review advocates for a balanced integration of technological innovation with humanistic inquiry to advance inclusive and sustainable societies while preserving and promoting distinct cultural identities.

Keywords: Digital humanities, Human capital development, Interdisciplinary collaboration, Research synthesis, Digital scholarship

1. Introduction

The rapid advancements in digital technologies have brought unprecedented changes to society, compelling nations to adapt and innovate across various sectors. In this context, Thailand's ambition to position itself as a digital leader faces challenges, particularly in human capital development. As highlighted in 2017 APEC report (AlphaBeta, 2017), Thailand ranked among the lowest in the Asia-Pacific region for digital leadership, largely due to an insufficient skilled workforce and limited innovation. While technical skills are essential, leading technologists and scholars worldwide emphasize that technological proficiency alone cannot drive innovation. Instead, the critical thinking and analytical skills fostered by humanities education are essential for developing creativity and leadership in the digital age (Berridge, 2017; Brynjolfsson & McAfee, 2017).

The intersection of humanities and digital technology presents a unique opportunity to address these challenges. As an interdisciplinary field, digital humanities (DH) merges digital technologies with humanities research to deepen our understanding of human experiences and cultural phenomena (Gardiner & Musto, 2015; Hughes et al., 2016). This integration not only enhances access to and analysis of humanities data but also provides innovative frameworks for examining the complex relationship between humans and technology in the digital era.

This concern is particularly relevant given Thailand's educational challenges. According to the 2018 Programme for International Student Assessment (PISA) results, Thai students' reading proficiency was below the OECD average, with only 0.2% achieving high proficiency levels compared to the global average of 8.7% (Organisation for Economic Co-operation and Development, 2019). Moreover, this trend has shown a declining trajectory both in short- and long-term analyses, presenting a significant challenge to Thailand's aspirations for digital leadership.

In response to these challenges and opportunities, a comprehensive research program titled "Digital Approaches in Humanities Towards Sustainable Human Capital Development" was initiated in 2020 (Choemprayong, 2024a). The program encompasses three major research clusters: (1) Digital Humanities Approaches in Thailand: Frameworks and Directions

(Choemprayong, 2024b; Choemprayong & Arsa, 2025), (2) Innovative Methods in Digital Humanities: Development and Application (Aroonmanakun, 2023), and (3) Reflections on Digital Ways of Life: Turning Insights into Competency in the Digital Age (Wijitsopon, 2024).

The program pursues four primary objectives: first, to integrate digital technologies into the development and extension of humanities knowledge for enhancing human capital development; second, to critically examine and synthesize the current state of DH in Thailand; third, to explore and prototype digital methods and tools that enhance the capabilities of humanities scholars and the general public in analyzing humanities data; and fourth, to critically reflect on humanities experiences and phenomena within the context of digital society and culture (Choemprayong, 2024a). Originally planned as a three-year project scheduled to conclude in 2023, the program's timeline was extended due to disruptions caused by the COVID-19 pandemic.

This paper reviews the outcomes of this ambitious research program, examining both its achievements and challenges. Through this review, we seek to identify key insights gained from the integration of humanities and digital technologies in the Thai context, while also highlighting ongoing concerns and providing recommendations for future research directions (Terras, Nyhan, & Vanhoutte, 2013). This analysis is particularly timely and relevant as Thailand continues to navigate its digital transformation journey, seeking to strengthen its position in the global digital landscape while nurturing sustainable human capital development.

2. Orchestrating Digital Humanities Research: Lessons from Thailand's Multi-institutional Program

Despite the growing global prominence of DH, its development in Thailand has remained largely peripheral to mainstream international discussions. While digital approaches to humanities research exist within Thai academia, they have historically manifested as isolated efforts rather than as part of a cohesive scholarly movement. Prior to 2020, DH activities in Thailand were limited to a small number of research laboratories, sporadic publications, and occasional conference sessions, lacking the institutional framework and scholarly community necessary for DH to establish itself as a recognized discipline.

A preliminary survey of Thai academic work identified numerous research initiatives that, while not explicitly identified as DH, incorporated the integration of digital methodologies into humanities scholarship. These efforts, though promising, remained disconnected from one another, which limited their potential impact and the development of shared methodological

frameworks. This fragmentation highlighted the need for a coordinated approach to DH development in Thailand.

In response to this challenge, the “Digital Approaches in Humanities Towards Sustainable Human Capital Development” program was established in 2020 (Choemprayong, 2024a). This initiative represents the first large-scale, structured attempt to coordinate DH research across Thai institutions. The program is organized into three interconnected research clusters, each addressing distinct aspects of Thailand’s DH development. Within these clusters, 15 research projects have been strategically grouped to align with shared research objectives and theoretical paradigms. These projects were solicited through scholarly networks to ensure a diverse spectrum of research interests, backgrounds, and expertise, thus fostering meaningful collaboration and ensuring broad coverage of DH-related areas. Rather than being pre-assigned to clusters, researchers independently proposed their projects, after which the principal investigators and the project advisors categorize them into thematic clusters. The resulting structure ensures that each cluster comprises projects that share common goals, methodologies, and ideological foundations, ultimately contributing to a holistic synthesis of DH research in Thailand. Figure 1 presents a network map illustrating the three research clusters in this program.

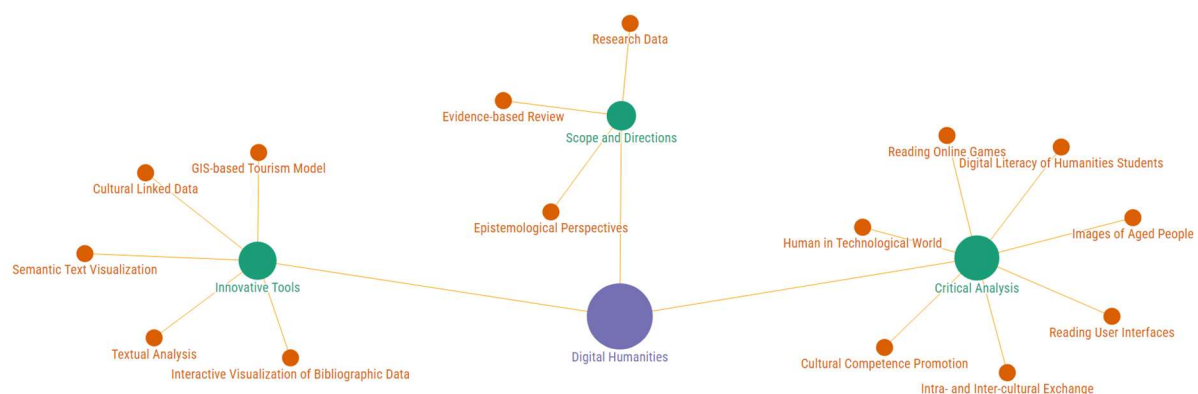


Figure 1 Network map of the research clusters and associated projects

The first cluster, “Digital Humanities Approaches in Thailand: Frameworks and Directions” (Choemprayong, 2024b), consists of three projects focused on establishing theoretical foundations and mapping the landscape of DH in Thailand. The findings and implications of these projects, which have expanded our understanding of the scope and direction of Thai DH, will be discussed in the next section on redefining DH in the Thai context.

The second cluster, “Innovative Methods in Digital Humanities: Development and Application” (Aroonmanakun, 2023), comprises five projects dedicated to developing practical tools and methodologies. The technological innovations and methodological advancements from these projects will be explored in detail in the section on tools, methods, and applications.

The third cluster, “Reflections on Digital Ways of Life: Turning Insights into Competency in the Digital Age” (Wijitsopon, 2024), encompasses seven projects examining the societal implications of digital technologies through a humanities lens. The outcomes of these projects, particularly their contributions to critical reading practices and human capital development, will be addressed in the final two sections of this paper.

The implementation of this comprehensive research program built upon existing informal scholarly networks. Prior to the program’s establishment, discussions about DH in Thailand primarily took place through bilateral and informal exchanges between researchers whose work occasionally intersected. Leveraging these preexisting connections, the program successfully brought together 20 researchers from seven leading Thai research institutions, representing a wide range of academic disciplines including linguistics, literature, library and information science, business administration, computer science, anthropology, and geography. This interdisciplinary collaboration, formalized through 15 distinct research projects, has generated valuable insights into the challenges and opportunities of developing DH research at scale within the Thai context.

Despite delays caused by the COVID-19 pandemic, which necessitated an extension of the program beyond the original three-year timeline, the initiative has successfully transformed these informal networks into structured collaborative relationships between humanities scholars and digital technology specialists, while laying the groundwork for a more cohesive DH community in Thailand.

This systematic approach to expanding DH research capacity represents a significant departure from previous fragmented efforts. By formalizing and expanding informal scholarly networks into a coordinated research program, the initiative has begun to cultivate the sense of community and shared purpose necessary for establishing DH as a recognized field of study in Thailand. The following sections will analyze in detail how each research cluster has contributed to this transformation and its implications for the future of DH in Thailand.

3. Redefining Digital Humanities: From Global Discourse to Local Practices and Perspectives

Recent Thai scholarship offers a nuanced perspective of DH, challenging global narratives by illuminating how technological methods intersect with local academic traditions. Three interconnected research projects explore the complex landscape of DH development, demonstrating how scholarly inquiry transcends traditional disciplinary boundaries.

Three distinct yet complementary research projects examine how DH is conceptualized and practiced within Thailand's academic landscape, collectively highlighting the interplay between disciplinary boundaries, data practices, and epistemological frameworks. Choemprayong & Chintakovid's (2024) study delineates the field's evolution by mapping thematic trends and methodological approaches between 2010 and 2019, suggesting that Thai DH has been shaped by institutional priorities and technological constraints. This structural mapping contrasts with Klunghanaboon (2024), whose research foregrounds the pragmatic and cultural dimensions of DH scholarship, revealing that data-sharing practices among Thai scholars are shaped by the fluid and often subjective nature of humanities data. Her project challenges the notion of standardized data management within a field that values interpretative complexity over quantifiable datasets. In contrast, Chavanayan's (2024) philosophical inquiry reframes DH as a contingent and culturally embedded intellectual practice, arguing against essentialist definitions and advocating for a localized conceptualization of the field. Together, these studies expose tensions between global and local influences in DH scholarship, where technological methodologies intersect with institutional structures, data practices reflect deeply ingrained scholarly traditions, and theoretical frameworks challenge universalist assumptions. This synthesis underscores the need for context-sensitive approaches that integrate technological innovation with critical humanistic inquiry, ensuring that DH in Thailand evolves in ways that are both globally connected and locally meaningful (Choemprayong & Arsa, 2025).

Choemprayong and Chintakovid's (2024) research suggests a technology-driven trajectory in Thailand's DH landscape from 2010 to 2019. Their initial findings indicate that the field's development may be influenced by institutional dynamics and technological methodologies. The study identifies potential gaps in DH scholarship, particularly in areas such as software studies grounded in Science and Technology Studies approaches. While their project documents substantial DH work in memory institutions through digitization and data

annotation projects, it also notes a lack of documentation, potentially due to limited publication venues and scholarly communication practices.

Klungthanaboon's (2024) research on data sharing practices adds depth to this understanding by exposing the distinctive cultural dimensions of Thai humanities scholarship. The study raises fundamental questions that echo Borgman's (2009) seminal inquiry: What constitutes data in the humanities? What are the sources, and how are they made, shared, valued, used, and reused? While Klungthanaboon's approach primarily focuses on individual scholar's perspectives, her research reveals a complex relationship with data, where many researchers perceive humanities data as "alive" and "timeless", a perspective that both complicates and enriches our understanding of knowledge production in the humanities.

Chavanayarn's (2024) philosophical investigation provides a critical breakthrough by arguing that if DH is to be considered part of the humanities, it must inherit the fundamental characteristics and values of humanities scholarship. Central to this argument is the importance of localization, recognizing that scholarly practices are deeply embedded in cultural contexts and cannot be universally applied across different academic ecosystems. This perspective repositions DH from a technological framework to a sophisticated intellectual practice that respects and reflects localized scholarly traditions.

For further discussions, the emerging landscape of DH in Thailand necessitates a multifaceted approach to scholarly development. Researchers must prioritize creating comprehensive theoretical frameworks that account for local academic environments, enhance documentation practices, and foster interdisciplinary dialogues. This requires moving beyond mere technological implementation toward contextually sensitive approaches that respect both traditional humanities values and innovative methodological practices, ultimately advancing the understanding of DH as a dynamic, culturally attuned intellectual endeavor.

4. Technological Innovation in Thai Digital Humanities: Tools, Methods, and Applications

The integration of technology into DH in Thailand has resulted in a significant reshaping of its methodologies and practices. Technological advancements have played a dominant role, where computational tools are central to managing, analyzing, and presenting humanities data. The unique cultural and linguistic contexts of Thailand have necessitated the

development of specialized tools and applications, reflecting the intersection of global DH trends with localized academic and cultural practices.

One of the pivotal projects in this area was the development of an ontology-based platform for cultural data. This initiative aimed to integrate metadata from 31 repositories managed by the Princess Maha Chakri Sirindhorn Anthropology Centre, resulting in a comprehensive metadata integration framework. The project also developed an ontology-based search engine and a recommender system, to facilitate access to cultural data. While the project successfully enhanced data accessibility and standardization, it remains in a pilot phase. Challenges related to scaling and interoperability across institutions have yet to be addressed, underscoring the need for substantial support in these areas (Buranarach et al., 2022).

Another significant effort focused on interactive visualization of bibliographic data from Thai libraries. By creating dashboards and visual interfaces, the project provided researchers with tools for analyzing bibliographic metadata and textual content. While this approach improved exploratory data analysis, it may be insufficient for in-depth humanities research, which requires analytical depth and interpretive capabilities. Furthermore, the lack of annotated data remains a major hurdle. Building adequate datasets for meaningful analysis demands significant effort and resources, which are currently limited (Ruchikachorn, 2024).

A third initiative sought to advance text visualization through the development of semantic grouping techniques. Moving beyond conventional word clouds, this project integrated natural language processing and computer vision to cluster semantically related terms, improving comprehension of Thai textual content. Despite its innovative contributions, the reliance on advanced computational methods raised accessibility and usability concerns, particularly for non-technical users. Moreover, its effectiveness in supporting nuanced humanities research remains underexplored (Rutherford, 2024).

In another domain, computational methods were employed to analyze linguistic complexity in Thai texts. By using machine learning algorithms, the project classified texts based on difficulty levels, demonstrating potential applications in education and content development. However, the limited scope of available datasets constrained the generalizability of these methods, highlighting the need for broader dataset inclusion to improve algorithmic performance (Aroonmanakun, 2023).

The use of agent-based modeling to analyze tourist behavior in Thailand exemplified another application of digital tools in the humanities. By integrating Geographic Information

Systems (GIS) with agent-based models, the project simulated the spatial decision-making processes of tourists in six provinces. While the findings provided valuable insights into tourism planning, the model's reliance on predefined parameters raises questions about the adaptability to dynamic real-world scenarios. Moreover, further discussions are needed to clarify how tourism studies align with or diverge from traditional humanities research. Engaging with the cultural and sociological dimensions of tourism may help bridge these conceptual gaps (Panbamrungkij & Vannametee, 2023).

An overall critique of these projects reveals several critical observations. First, there is a lack of integration between these clusters of research, despite their potential for interconnection. Stronger collaboration and more integrative efforts are essential to building a cohesive DH ecosystem in Thailand. Additionally, while the linked data initiative holds promise, its scalability and sustainability require greater institutional and technical support to achieve broader applicability. For projects focused on data visualization and bibliographic metadata, the emphasis on visualization alone may not adequately meet the demands of deep humanities analysis. Exploring these works' content in greater depth could yield richer insights, but achieving this would require overcoming the significant challenge of limited annotated datasets. Developing such resources entails considerable investment of time and resources.

A comparative analysis of these projects reveals both strengths and critical gaps in the current trajectory of technological innovation in Thai DH. The ontology-based cultural data platform and bibliographic visualization initiatives emphasize data accessibility and exploration but struggle with deeper analytical applications required for interpretive humanities research. Similarly, projects utilizing semantic text visualization and linguistic complexity analysis demonstrate the power of computational methods but are constrained by limited datasets and the challenge of making such tools accessible to humanities scholars unfamiliar with advanced computational techniques. Moreover, while agent-based modeling in tourism studies provides valuable insights into spatial behaviors, its relevance to the broader humanities discourse remains ambiguous, underscoring the ongoing tension between quantitative modeling and humanistic inquiry. Collectively, these projects highlight a fragmented yet promising landscape, where technical advancements are evident, but cross-project integration, dataset expansion, and interdisciplinary dialogue remain pressing needed. To advance, Thai DH must prioritize the convergence of these efforts, fostering a research

environment that enhances technological capabilities while deepening the interpretative and critical dimensions crucial to humanities scholarship.

Looking forward, there is a critical need to develop robust DH infrastructure in Thailand. This includes not only physical and technological resources but also intellectual and collaborative frameworks that foster innovation and interdisciplinary integration. Developing such infrastructure would enable the scaling of projects, facilitate data sharing and reuse, and provide the foundational support for Thailand to emerge as a significant contributor to global DH scholarship. Addressing these challenges would not only advance the field but also ensure that Thailand's unique cultural and linguistic heritage is well-represented and preserved in the digital age.

5. Critical Reading in Thai Digital Space: Emerging Approaches and Cultural Perspectives

Digital technology has fundamentally transformed the nature of texts, evolving from traditional print to digital formats. Hayles (2012) argues that this transition has enhanced accessibility, accelerated research processes, and broadened dissemination. The rise of digital media has enabled texts to encompass diverse forms, including e-books, podcasts, video games, and interactive interfaces. This shift not only expands the definition of a "text" but also alters its societal and cultural functions, reflecting the increasingly complex relationship between the humanities and technology.

One of the most significant developments in digital textuality is the emergence of hypertext, which enable non-linear, multidimensional navigation, granting readers the autonomy to create their own pathways through linked content. This evolution disrupts the traditional, linear reading model and transforms readers from passive recipients to active participants in meaning-making. Lang (2012) describes this phenomenon as a hybridization of traditional and digital formats, promoting greater complexity and flexibility in textual engagement.

As digital technology advances, the objects that scholars read and critique have become increasingly diverse and challenging. For instance, Pamakho (2024) examines video games as texts, analyzing how their interactivity and immersive environments enable players to shape narratives and critique embedded ideologies. Such texts require scholars to engage with player interactions and design elements to uncover power structures and cultural messages. Similarly, Holasut (2024) focuses on user interfaces, such as infinite scrolling and one-click

purchases, revealing how their design reinforces capitalist ideologies and manipulates user behavior. These interfaces challenge traditional modes of reading by blending aesthetic simplicity with economic motives, necessitating a critique that incorporates design, intent, and user interaction.

Beyond interactive and visual texts, the rise of DH methodologies have expanded the scope of textual analysis to include large corpora and datasets. Wijitsopon (2025) employs close reading techniques to examine a corpus of news articles to investigate representations of aging across Thai and global media. Her work combines linguistics, discourse analysis, and cultural studies, demonstrating the complexities of reading data-driven textual representations. As these corpora grow in size and diversity, digital tools for analyzing large datasets have become essential, enabling scholars to critique patterns and trends that would otherwise be imperceptible in traditional reading.

While the complexity of these objects necessitates novel methodologies, Sumetikul (2024), building on Don Ihde's postphenomenological framework, emphasizes the inseparability of technology from human experience. They highlights the co-constitutive relationship between humans and technology, emphasizing that digital tools are not merely passive instruments but active mediators that shape and are shaped by human interactions. He also argues that technology mediates interactions with these objects in various ways, such as embodiment relations, wherein digital tools such as screens or gaming environments extend human perception. This framework underscores the extent to which digital technologies transform not only the texts themselves but also the methods and experiences of textual engagement.

Despite the rise of hypertextuality, interactivity, and large datasets, close reading continues to be an essential methodology in the digital age. Hayles (2012) asserts that the analytical depth of traditional close reading methods remains crucial for interpreting the complexity of digital texts. By integrating close reading with digital tools, scholars can uncover hidden ideologies and cultural narratives embedded within these texts, whether in games, interfaces, corpora, or expansive datasets.

As we expand our critical perspectives on digital texts and tools, it becomes crucial to consider the specificity of the Thai digital space. To what extent does the digital landscape in Thailand align with or diverge from global trends? Do video games, user interfaces, and news corpora in Thailand operate under similar ideological and structural frameworks as their global counterparts? Or do they carry distinct cultural, social, and political nuances that require a

localized critical lens? Addressing these questions is essential in determining whether Thai DH scholars should adapt global frameworks or develop tailored methodologies to address these unique contexts. By engaging with the particularities of Thai digital objects and their cultural environments, we can develop a more context-sensitive critique that resonates with both local and global audiences.

A synthesis of these emerging approaches, once again, reveals a dynamic interplay between global DH methodologies and the unique socio-cultural dimensions of Thailand's digital ecosystem. The exploration of video games (Pamakho, 2024) and user interfaces (Holasut, 2024) as textual objects underscores a broader shift toward multimodal critique, where interactivity, user engagement, and embedded ideologies are central to interpretation. This aligns with international trends in DH, yet the Thai context presents distinct challenges, such as the localization of game narratives or the socio-economic implications of digital consumer behaviors, that require a culturally nuanced analytical framework. Similarly, Wijitsopon's (2025) examination of news corpora through close reading and discourse analysis highlights the increasing reliance on large-scale digital textual analysis, reflecting the broader methodological shift of humanities research toward the data-driven researcher. However, Sumetikul's (2024) postphenomenological approach challenges the assumption that digital reading is purely technical; he argues digital tools not only shape just texts but also redefine the act of reading itself. Bridging this gap requires an integrative approach, one that balances computational analysis with humanistic critique, embraces both close and distant reading strategies, and foregrounds the socio-political dimensions that define the Thai digital experience.

6. Digital Humanities and Human Capital: Charting a Course for Sustainable Development

Human capital development is pivotal to social and economic progression across various levels, including institutional, national, regional, and global contexts (Ha & Chuah, 2023). Rooted in the principles of human capital theory, as articulated by scholars such as Becker (1993) and Schultz (1961), this concept emphasizes investments in individuals—particularly in education and skill development—as critical drivers of both individual and societal benefits. Sweetland (1996) notes that education consistently emerges as the primary investment, contributing not only to economic growth but also to health improvements, enhanced civic participation, and a higher quality of life. Traditionally, human capital has been defined in

terms of formal education and professional skills; however, the rapid advancement of digital technology has transformed society and the economy into a digital-based paradigm—a process often referred to as digitalization. This transformation has had a profound impact on human capital development in multiple dimensions. For instance, the proliferation of information, the emergence of new job roles, the expansion of internet and technological applications, the necessity for continuous training and education, the acquisition of new skills, increased automation, enhanced communication, and a focus on innovation and productivity (Sima et al., 2020). Concurrently, human capital plays an increasingly vital role in the digital society and economy, as the development of digital skills becomes essential for adapting to technological advancements (Tuguskina et al., 2019).

Human capital development also plays a substantial role in emerging discourses on sustainability (Rana & Pragati, 2022). In their systematic review based on the context of Industry 4.0, Sima et al. (2020) explore the profound implications of the digital transformation on human capital development and its intersection with sustainability. They highlight that the advent of advanced technologies, such as artificial intelligence and the Internet of Things (IoT), is transforming traditional economic structures into a “post-economy of artificial intelligence,” characterized by new energy sources and social communication technologies. Despite challenges, technological advancements present opportunities to address resource mismanagement and enhance human well-being. However, the shift towards digital transformation also introduces risks, particularly social risks such as job displacement due to automation. Sima et al. (2020) emphasize that these social risks can be mitigated through the requalification of human capital, highlighting the critical role of continuous education and training in equipping the workforce with the necessary skills to thrive in a digitalized environment. Furthermore, they note that the complex nature of digitalization and collaborative consumption presents new challenges for human behavior and business practices. By leveraging advanced technologies in teaching and learning, it is possible to cultivate future qualified human resources that embody sustainable behavior, thereby reinforcing the integral relationship between human capital development and sustainability.

The following sections synthesize the interconnections among human capital development, sustainability, digital methodologies, and the humanities, primarily drawing on insights from the 15 research projects within the ‘Digital Approaches in Humanities Towards Sustainable Human Capital Development’ program.

6.1 The Role of Digital Humanities in Sustainable Human Capital Development

The integration of digital technology with the humanities and other disciplines has broadened the landscape of education and skill development, making technological literacy and adaptability essential competencies. Today, digital skills, such as proficiency in artificial intelligence, data analysis, and digital communication, are as crucial as traditional educational qualifications. A key outcome of this program is to ensure that its benefits extend beyond researchers, actively reaching future generations of scholars and the broader public, aligning with the core principle of human capital development. By critically and ethically incorporating digital methodologies and tools, this research program aims to enhance human capabilities across various contexts and dimensions. However, true sustainability in the digital era can only be achieved when these competencies are firmly rooted in critical thinking.

At the core of DH is the cultivation of critical thinking—an essential skill for navigating the complexities of the digital age, as previously discussed. Chintakovid (2024) underscores the role of DH in fostering critical engagement with digital texts, tools, and technologies. By equipping individuals with the ability to analyze, critique, and interpret digital media, DH prepares them to confront misinformation, engage in ethical decision-making, and contribute meaningfully to digital societies. This intellectual rigor aligns closely with the principles of sustainable human capital development, which aim to nurture not only economically productive individuals but also socially responsible and culturally aware citizens.

Beyond its intellectual contributions, DH also plays a pivotal role in developing digital competencies through the use of digital objects and collections. Sriborisutsakul and Dissaman (2024) highlight how digital archives and tools enhance educational experiences, promoting cross-cultural understanding and digital literacy. For instance, curated collections of rare books, artifacts, and historical texts, presented through digital platforms, serve a dual purpose: preserving cultural heritage while equipping learners with essential skills such as data analysis, information retrieval, and critical interpretation—competencies that are increasingly demanded in the modern workforce.

Moreover, DH's integration of digital transformation with sustainable development principles underscores its broader impact on education, cultural preservation, and responsible technological engagement. By leveraging digital tools to enhance knowledge accessibility, safeguard cultural heritage, and facilitate interdisciplinary collaboration, DH contributes to a more inclusive and sustainable global knowledge economy. This alignment between technological advancements and humanistic inquiry ensures that digital innovations serve not

just economic growth but also social and cultural enrichment. Ultimately, the transformative potential of DH lies in its ability to bridge the gap between digital proficiency and humanistic insight. As the digital landscape continues to evolve, ensuring that these competencies are grounded in critical thinking and ethical awareness will be essential for fostering a more informed, equitable, and sustainable society.

6.2 Bridging Humanities, Technology, and Human Capital

The integration of DH into human capital development presents challenges, as these domains have traditionally operated in silos. Human capital theory, as Sweetland (1996) notes, has been primarily associated with economic analysis and workforce policy, while DH has focused on cultural and academic inquiry. Bridging these areas requires recognizing the shared value of knowledge creation and transfer. By leveraging cultural insights and critical thinking embedded in DH, human capital development can be broadened to include cultural and intellectual competencies alongside technical skills.

A key contribution of this research program lies in its structured approach to bridging humanities, technology, and human capital through three interconnected research clusters. One cluster focuses on technology development to support humanities research, another examines critical readings of technology-based phenomena, and a third investigates the identity of DH as a field. The outcomes of these clusters demonstrate the possibility of linking humanities, technology, and human capital through interdisciplinary discussions, collaborations across institutions, and the integration of theoretical discourse with practical applications. This is particularly evident in the program's emphasis on education and pedagogy, where research findings contribute to curriculum design and teaching methodologies that foster both digital literacy and critical thinking.

Schroeder (2016) underscores this potential by positioning DH as cultural capital, emphasizing its role in fostering intellectual and ethical growth. DH methodologies such as distant reading and textual analysis enable the examination of extensive datasets, ranging from historical texts to contemporary news corpora. These approaches not only generate new knowledge but also equip individuals with analytical skills essential for cultural preservation and economic innovation.

While this research program does not claim to be exhaustive, nor does it position itself as the first DH initiative in Thailand, its primary objective is to create new opportunities for emerging scholars and foster broader public engagement in scientific and humanistic inquiry. Public participation is particularly crucial for ensuring the sustainability of human

capital development, as it fosters collective knowledge-building, encourages diverse perspectives, and strengthens societal investment in education and technological adaptation. By opening doors for citizen science and participatory research, the program seeks to ensure that DH serves not only academic communities but also the wider public, enriching both cultural understanding and digital competencies across society.

6.3 Localizing the Contribution of DH in Thailand

In the Thai context, the integration of DH into human capital development must consider the unique characteristics of the local digital landscape. Thai digital objects and collections, such as indigenous knowledge archives, literary corpora, and historical texts, reflect cultural narratives distinct from those in global DH projects. Localizing DH practices involves developing tools and frameworks that are responsive to these specificities while also aligning with global standards of technological innovation and critical inquiry.

A foundational element of this research program's success is data. In the humanities, data often takes the form of manuscripts, literary works, and historical records. In digital technology, data can stem from transactional records collected through various computational and analytical methods. As this project bridges humanities and digital technology, the significance of local data in all its forms is further heightened. Recognizing the importance of domestic digital data, there remains a challenge in their availability and usability. While Thailand has various sources of local digital data, these resources are often scattered, fragmented, and, in many cases, inaccessible. Even when accessible, they may not be structured in machine-readable or machine-learnable formats, limiting their integration into computational research.

This limitation is particularly evident in areas such as optical character recognition (OCR) for historical Thai manuscripts and handwriting, where significant improvements are still required. Thai, as a language and cultural resource, is often considered minor in the global digital landscape, resulting in less technological development and support for text digitization, natural language processing, and computational analysis. Advancements in OCR technology, particularly for older and more complex scripts, are necessary to ensure that Thai texts are accurately digitized and analyzed. Furthermore, ensuring interoperability between data sources is crucial for facilitating cross-institutional research, enabling seamless integration of diverse datasets, and fostering a more robust digital research ecosystem.

Beyond data, ways of thinking and interpreting digital information are also shaped by cultural contexts. This research program sheds light on how Thai users engage with and

interpret the digital space. While Western perspectives have significantly influenced digital literacy and critical engagement with technology, there is an ongoing need to cultivate localized perspectives that reflect Thai cultural, social, and historical experiences. Developing research questions and analytical frameworks that arise from within Thai society can lead to a deeper understanding of digital technology's role in local contexts, particularly in its development, consumption, and socio-cultural impact.

The importance of a localized critical lens becomes evident when addressing disparities in digital literacy and access. While global DH projects often emphasize advanced computational techniques, Thailand's digital space may benefit from initiatives that prioritize foundational skills, such as critical engagement with digital news or cultural texts. By embedding DH into local education and community programs, Thailand can harness the interdisciplinary strengths of DH to build sustainable human capital that is both globally relevant and locally grounded.

6.4 Toward a Sustainable Future

The intersection of DH and human capital development presents a transformative opportunity to align cultural and intellectual contributions with broader economic and social objectives. By integrating DH methodologies with human capital theory, a more holistic framework for sustainable development emerges—one that values not only the economic utility of education but also the cultural, intellectual, and ethical dimensions of human progress. As Schroeder (2016) argues, DH as cultural capital has the potential to redefine how investments in people are perceived, ensuring that human capital development prioritizes the preservation of shared cultural heritage alongside economic growth.

While digital transformation is often associated with advancements in business and industry, its role in humanities research and education aligns closely with the Sustainable Development Goals (SDGs) established by the United Nations (2024). Digital methodologies enhance inclusivity, knowledge equity, and long-term cultural preservation, supporting efforts to bridge disparities in access to education and resources. Digital tools contribute to sustainability by fostering equity in knowledge dissemination, enabling interdisciplinary collaboration, and promoting cultural preservation (Arts, 2017). In this regard, DH supports SDG 4 (Quality Education) by democratizing access to learning materials through open-access digital archives, online learning platforms, and collaborative digital scholarship (Arthur & Hearn, 2020). However, challenges such as digital literacy gaps and uneven internet access persist,

underscoring the need for sustainable policies to address these inequalities (Jinghong & Sanmugam, 2021).

Beyond education, DH contributes significantly to SDG 11 (Sustainable Cities and Communities) through the preservation of cultural heritage. Digital technologies such as 3D scanning, artificial intelligence, and blockchain are increasingly employed in archiving and restoring historical artifacts, manuscripts, and oral traditions (Abia et al., 2023). These efforts reduce reliance on physical resources, minimize environmental footprints, and protect cultural knowledge from threats such as political instability, environmental disasters, and economic crises. Additionally, the digitization of linguistic and literary traditions plays a crucial role in sustaining endangered languages and cultural practices, reinforcing the broader role of DH in cultural sustainability.

Ethical concerns surrounding digital transformation must also be addressed to ensure sustainability in DH. The increasing reliance on digital methodologies raises critical questions regarding data privacy, intellectual property rights, and algorithmic biases in artificial intelligence applications (Wrzesinski, 2023). Ethical DH initiatives must prioritize inclusive and transparent practices to prevent the exploitation of marginalized communities and reinforce knowledge equity. Megdad et al. (2024) highlights the need for sustainable digital practices that align with SDG 16 (Peace, Justice, and Strong Institutions) by promoting ethical guidelines and responsible technological governance.

Interdisciplinary collaboration is another essential aspect of sustainable DH research. Increasingly, DH research intersects with environmental sustainability, urban studies, and data science to address global challenges. Geographic Information System (GIS) mapping and digital storytelling tools, for example, have been used to document climate change impacts on local communities, offering human-centered insights into environmental sustainability (Geraldo et al., 2023). These projects exemplify how DH can contribute to sustainable development by integrating cultural, historical, and technological perspectives into scientific and policy discussions.

Although human capital has been discussed for centuries, its conceptualization has evolved significantly, leading to widespread adoption across multiple disciplines, including economics, sociology, education, and public policy. This broad interdisciplinary engagement has resulted in diverse interpretations and applications of human capital, making a unified approach to its development and sustainability impossible. The complexity of human capital

theory, combined with its adaptability across various fields, suggests that any effort to integrate it with DH must be flexible, context-aware, and open to multiple methodologies.

Despite the growing body of work in this area, there is no single solution or definitive approach to sustainable human capital development. The literature on this topic remains fragmented, with research scattered across disciplines and lacking a unifying framework. Addressing these gaps requires dedicated studies that examine sustainable human capital development from multiple perspectives, incorporating insights from DH, economics, education, and social policy. Future research should explore how DH methodologies can systematically contribute to sustainability in human capital development, particularly in contexts with diverse cultural and technological landscapes.

Ultimately, the integration of digital transformation and sustainable development principles in the humanities underscores the field's critical role in shaping a more inclusive and sustainable knowledge economy. By leveraging digital tools to enhance knowledge accessibility, safeguard cultural heritage, and encourage interdisciplinary collaboration, DH contributes to a global movement that values both technological progress and humanistic inquiry. Moving forward, sustainable DH frameworks must prioritize open-access policies, digital preservation standards, and responsible AI practices to maintain the integrity of DH scholarship while maximizing its societal benefits.

7. Conclusion

The “Digital Approaches in Humanities toward Sustainable Human Capital Development” initiative highlights the potential of integrating DH to address Thailand’s developmental challenges. A key accomplishment of the program was fostering collaboration among experts from diverse fields, despite the challenges of bridging disciplines with distinct methodologies and traditions. While this interdisciplinary effort made progress in connecting fragmented research practices, it also opened avenues to explore how digital and humanistic knowledge might complement each other in addressing complex societal issues.

Key challenges included navigating disciplinary silos, where scholars from the humanities and technical fields often lacked a shared language or framework for collaboration. Additionally, the fragmentation of DH in Thailand, marked by isolated projects and a lack of cohesive infrastructure, posed significant barriers to scaling efforts. Lessons from these challenges highlight the importance of fostering a shared vision, building collaborative platforms, and prioritizing policy support to sustain interdisciplinary initiatives.

The program also underscored that building digital literacy and critical thinking skills must go hand-in-hand with addressing systemic barriers such as limited access to data and tools.

The initiative balanced technological innovations with cultural and intellectual insights. On one hand, tools such as ontology-based platforms and bibliographic visualizations enhanced the accessibility and analysis of cultural data. On the other hand, the program's critical reflections emphasized the enduring value of humanistic inquiry, including ethical reflection, cultural critique, and critical literacy in a rapidly digitizing society. These efforts underscored that technological advancements alone cannot drive progress; they must be informed by humanistic principles to ensure meaningful and ethical applications.

Future directions should focus on sustaining this balance by continuing to integrate humanities perspectives into digital innovations. Scaling the tools and methods developed during the program, creating shared data infrastructures, and strengthening education initiatives will be essential. Equally, fostering critical, ethical, and culturally attuned approaches will ensure that the DH remain a vital force in shaping a more inclusive and sustainable society.

This program serves as a powerful example of how DH can contribute to human capital development in ways that respect cultural diversity, promote ethical reflection, and build intellectual capacity. By uniting technology with humanistic inquiry, the initiative offers a pathway for addressing global challenges while preserving and advancing local knowledge and values.

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