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Future directions for context in ICT4D: A systematic literature review

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Abstract

The digital divide between the Global South and North has been a major concern for researchers from various fields in the past two decades. This divide has led to an increased focus on research related to information and communication technology for development (ICT4D) and other relevant disciplines. Given the prevalence of dominant paradigms that often lead to aggregated and context-free observations, this paper emphasizes the role of context in ICT4D while advocating for more nuanced, context-specific approaches in research and policy formulation. Through a systematic literature review, it proposes a conceptual framework that captures the psycho-social and the structural dimensions of context in ICT4D as well as their impact on success of related projects. The paper highlights the need for tailored theories addressing often overlooked elements such as language, ethnicity, religion, government change, political instability, and legal frameworks in the context of ICT4D. The proposed framework offers a roadmap for researchers to navigate the complex context of ICT4D, especially in the realm of emerging technologies.

Keywords

ICT4D, developing countries, context, development, success

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Introduction

Over the last two decades, there has been a growing body of literature emphasizing the need for unique social, cultural, and economic contexts in which information systems are developed and implemented (Leonardi et al., 2016; Samoilenko and Osei-Bryson, 2018). This perspective challenges the notion of context-free technology alongside universalistic theories. This literature has been critical in recognizing the need for more context-aware research in the field of Information System (IS), especially in relation to developing countries, where effective and sustainable IS solutions are required (Hong et al., 2014; Sahay et al., 2017). The awareness of context is of paramount importance to prevent the reproduction of solutions that have been designed for developed countries (Gómez and Heeks, 2016) and to establish context-sensitive approaches to IS research (Davison and Martinsons, 2016). Contextual research, rooted in the surrounding circumstances and conditions of a phenomenon, explores factors such as social parameters, linguistic settings, historical backdrop, and cultural milieu (Murer et al., 2015; Parks et al., 2022). Its primary goal is a profound grasp of a given phenomenon by understanding its encompassing context and the interplay of its elements (Wu et al., 2020). Such research underlines the pivotal role of context in moulding human interactions, decisions, and the success of interventions (Burleson and Chipidza, 2017).

By definition, ICT4D refers to initiatives that promote growth and prosperity in underdeveloped countries through technology (Khene and Masiero, 2022; Omotola et al., 2023). While the importance of contextual research in ICT4D is acknowledged

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(Davison and Martinsons, 2016; Samoilenko and Osei-Bryson, 2018), the extent of its integration into practice remains inconsistent. Inadequate attention to contextual research means that unique challenges and opportunities specific to a particular context may go unrecognized and undermine the development of IS solutions that are effective and sustainable in diverse settings. This issue is referred to as the design-reality gap (Ayoung and Abbott, 2021), i.e., the imposition of solutions that do not align with the local socio-economic, cultural, and political dynamics, which often leads to suboptimal outcomes and, in some cases, project failures (Heeks, 2011). To address this problem, there is a need for a more concerted effort within the ICT4D literature to emphasize and institutionalize contextual research. This involves not only recognizing the design-reality gap but also actively engaging in comprehensive studies that unpack the complexities of the context in which ICT4D initiatives are situated. The goal of this study is to fill in this gap by conceptualizing the dimensions of context in the field. Failure to fully grasp the various dimensions of ICT4D contexts (such as social, cultural, and political factors) might result in the application of unsuitable theoretical frameworks, which in turn might lead to biased outcomes and flawed recommendations. Additionally, given that underexplored contextual dimensions can present challenges to both internal and external validity in research (Fischer and Karlan, 2015), a more precise conceptualization of the ICT4D context turns out to be crucial. The present study resorts to a systematic literature review (SLR) approach to investigate the following research questions:

Q1: Between 2010 and 2023, what are the contextual dimensions that have received consistent attention in ICT4D research?
Q2: Which contextual dimensions have been pinpointed as vital for the success of ICT4D projects in developing nations for the given timeframe?

The past decade has been a transformative period for ICT4D. Rapid advancements have significantly expanded its scope and potential across diverse contexts (Heeks, 2020). This era has witnessed an exponential growth in academic research, policy discussions, and real-world applications of technology for development. Our study contributes to this dynamic field by proposing a framework for analysing and understanding context in ICT4D research. This framework is specifically designed to assist researchers in the Global South in conducting context-sensitive research. It serves as a practical tool for identifying key contextual dimensions and factors that can influence the success of ICT4D projects in developing countries. By success, we adopt Chipidza and Lenidner's (2019) definition, which encompasses increased freedom, expanded inclusion, economic growth, and improved well-being. Alternatively, success in ICT4D can be viewed as the effective and sustainable use of ICTs to address development challenges and contribute to positive changes within communities (De et al., 2018).

Background

According to Burke (2022), context is a foundational, yet complex, concept that threads its way through various academic arenas and real-world scenarios. From psychology, where it moulds perception and decision-making, to sociology, which rests on the socio-cultural and historical considerations of human engagement, the importance of context is palpable. In this section, we define context based on its dimensions and domains of application. We conclude the section by stressing on the necessity of conducting a systematic literature review (SLR) focusing on the contextual aspects within the field of ICT4D, as indicated by our preliminary literature review (see section The need for a systematic literature review of context in ICT4D).

Multidimensionality of context

To truly grasp the vast expanse of context, it is imperative to delve into its core terminologies and concepts, as detailed in Table 1. These interconnected facets, when pieced together, offer a holistic view of context and its omnipresence across disciplines and human experiences.

Context in specific domains

Context resonates across a plethora of domains, reflecting its adaptability and influence. One such vital domain, where context is deeply embedded, is healthcare. Context in healthcare refers to the understanding and awareness of the user's environment, activities, relationships, and capabilities (Gubert et al., 2020). In this domain, context is crucial as it helps analyze and handle large amounts of data related to a

Table 1. Diverse dimensions of context.

Dimensions	Authors	Definition
Cognitive context	Parker and Hollister (2014)	Cognitive mechanism of the human psyche, which involves establishing relationships between various fragments of information.
Cultural context	Fox et al. (2017)	Cultural factors that influence an individual's beliefs, values, and behaviors.
Environmental context	Gifford (2014)	The physical and social surroundings in which individuals interact and how these environments influence their behavior and well-being.
Historical context	Obrusnikova and Block. (2020)	Background and circumstances in which events or ideas occur while providing a framework for understanding their significance.
Political context	Corcoran et al. (2011)	Structural factors and institutions within a country that shape political processes and outcomes.
Social context	Mirza et al. (2021)	Environment or setting in which individuals interact and engage in behaviors, such as families, schools, workplaces, and communities.

person's healthcare (Roy et al., 2016). In education, context refers to the environment or framework in which learning takes place (Crawley et al., 2008). It includes the social, political, economic, and cultural factors that influence teaching and learning (Gebre and Polman, 2020; Keddie, 2019). In contemporary educational discourse, there is increasing acknowledgment of the role played by active contextualization, whereby learners actively participate in and influence their learning environments with context regarded as an ongoing, interactive learning endeavor fostered by a learner agency (Harris and Jones, 2018). In digital development, context refers to the environment in which the development of digital services takes place (Khannur, 2021). This environment comprises stakeholders with varying interests and backgrounds. Therefore, recognizing these varied perspectives is paramount for effective design (Magableh and Barrett, 2012; Nesi et al., 2020). da Cunha Mattos et al. (2014) define context in business and organizational behavior as information concerning events and their specificity that affects the design and flexibility of business processes. This understanding aligns with findings showing that context influences a range of organizational outcomes, such as internationalization behavior, firm performance, mergers and acquisitions (Härtel, 2014).

Context can play a fundamental role in explaining human behavior and decision making (Agarwal, 2018; Brownstein et al., 2022). Navigating the dynamic and evolving nature of context turns out to be a ubiquitous issue in various scholarly and practical domains. Context is not static (Luo et al., 2022), it evolves with societal shifts, technological progress, and changing perspectives. Addressing this dynamism requires a flexible and adaptive approach that acknowledges the ever-changing factors that shape context (Wildfeuer and Pollaroli, 2018). ICT4D Researchers and practitioners must remain vigilant and update their understanding of context to ensure its accurate interpretation and application. This includes actively monitoring changes in socio-cultural norms, emerging technologies, and global events, all of which can constantly redefine the contextual landscape.

The need for a systematic literature review of context in ICT4D

We conducted a literature search to identify systematic literature reviews on ICT4D using "ICT4D" AND "systematic review " OR "research review" OR "research synthesis" OR "research integration" OR "systematic overview" OR "systematic research synthesis" OR "integrative research review" OR "integrative review" (Gall and Pigni, 2022) as our search keywords. Multiple reviews on different aspects of ICT4D such as development, policy, adoption, collaboration, participation and the use of capability approach have been conducted. These reviews enabled us to illustrate how our study contributes to this stream of research. In Table 2, there are four systematic reviews that cover various aspects of ICT4D. However, none of these reviews primarily focuses on the conceptualization of context within the field. Ramadani et al.'s (2018) systematic literature review (SLR) emphasizes the need for a comprehensive and inclusive approach to ICT4D research. The authors propose leveraging appropriate theoretical frameworks to study the complex nature of contextual factors. The study narrows its focus to three specific research streams in ICT4D: social-embedded research,

Table 2. The scope of existing reviews of ICT4D.

Review	Scope	Conceptual components	Systematic
Abdulrashid et al. (2019	Capability	Empowerment, context, development, inclusion	Yes
Chipidza and Leidner (2019)	ICT4D	Success, context, cooperation, power	No
De et al. (2018)	ICT4D	Social change, economic change, context, use, adoption, post-colonialism, local	No
Kante and Ndayizigamiye (2022)	Adoption	Theory, contextualization	Yes
Kim and Lee (2023)	Participation	Western discourse, globalization, tension, context, access, empowerment	Yes
Ordóñez (2015)	Policy	Context, needs, processes, planning, monitoring, Action research	No
Ramadani et al. (2018)	ICT4D	Context, contextualism, technology-transfer, social-embeddedness, transformation	Yes
Sein et al. (2019)	Development	Holistic, transformative process, ICT, theory, ICT Artefact, context	No
Singh and Flyverbom (2016)	Participation	Societal inclusion, power, top-down, bottom-up, conflict, cooperation, stakeholder, context, governance	No
Strand et Hatakka (2020)	Development	Theory, corruption, process, context	Yes
Tshivhase et al. (2016)	Capability	Development, impact, outcomes, theory	No
Walsham (2017)	Collaboration	Development, digital inclusion, e-governance, ICT-enabled social and economic empowerment	No
Zheng et al. (2018)	Development	Dimensions, perspectives, conceptions of artifacts, social change	No

transformative ICT4D and technology-transfer studies. It analyzes the unique characteristics, strengths, and challenges associated with each stream. One major critique of this paper is the fact that the analysis is based on a relatively small sample size of 48 articles. This small sample size may limit the generalizability of the findings and may not capture the full breadth of ICT4D research during the specified timeframe.

Abdulrashid et al. (2019) explored the capability approach (CA) within the ICT4D domain by scrutinizing its application and the interconnectedness of its concepts. Their research underscored the need for deeper contextual understanding of the CA concerning mobile phone use and empowerment in ICT4D. However, the study is marred by its vague articulation of development goals within the CA framework. Additionally, the paper's methodology for the SLR falls short in clarity and depth, particularly concerning their criteria for article selection. This methodological approach may inadvertently omit crucial studies, and by exclusively featuring qualitative research, it might restrict the findings' generalizability. The SLR by Strand and Hatakka (2020) aimed to understand the theoretical approaches used to analyze the contribution of ICTs to anti-corruption efforts in developing countries. The study suggests that the field of ICT4D should engage in informed borrowing of theories and generate novel approaches to enhance understanding of ICTs' role in anti-corruption efforts. However, the lack of transparency in the search strategy raises concerns about the comprehensiveness and reliability of the review, as there may be a possibility of missing out on important studies. Kante and Ndayizigamiye (2023) examined articles from 2015 to 2019 to map ICT4D adoption research in developing countries. This study highlights the importance of contextualizing ICT4D theories to equip policymakers and stakeholders with a practical understanding of the foundational frameworks that drive impactful actions. While the authors recognize the study's constraints—potentially overlooking key articles and analysis gaps—they advocate for qualitative investigations to adresss these gaps, though without detailing methodological directives or pinpointing the areas of concern.

The lack of a systematic review regarding the context of ICT4D is pertinently clear. The first step in all contextual research in ICT4D implementations consists of determining what context means and how it will influence the success or failure of ICT4D project (Chandwani et De, 2015). The objective of

our research is to contribute to the existing literature on ICT4D by offering a detailed and structured analysis of contextual dimensions in the field. One of the primary distinctions of this research lies in its systematic approach to reviewing and categorizing these dimensions. This approach results in a holistic framework that provides a nuanced understanding of ICT4D in developing countries. While previous papers have touched upon specific aspects of the ICT4D context, this study aims to go beyond by synthesizing a wide array of sources and aligning them within a systematic thematic analysis. It fills a gap in the existing literature, as there is a lack of systematic reviews that examine ICT4D contextual aspects. In essence, this study provides a novel and structured lens through which to view ICT4D context while making a significant departure from the fragmented approach often seen in the existing literature.

Methodology

In alignment with the methodology advocated by Gall and Pigni (2022), we adopt the structured three-step approach delineated by Webster and Watson (2002). This procedure involves: (1) sourcing significant contributions from journal databases both within the IS discipline and from related fields; (2) retracing the bibliographies of articles acquired during the initial phase to capture preceding seminal works; and (3) moving forward by recognizing subsequent publications that have referenced the articles discerned in the prior stages.

Search process

To capture the scope of the ICT4D literature, we initiated the first step by searching a range of databases. Given the emerging nature of the ICT4D field, we prioritized the inclusion of multiple databases to ensure that no pertinent papers were overlooked. The databases accessed for this research, as influenced by Gall and Pigni (2020) and Basty et al. (2023), involved ACM Digital Library, AISeL, EBSCOhost, Google Scholar, IEEE Xplore, Science Direct, Springer Link, Web of Science, and Wiley Online Library (see Figure 1). These databases often host high-quality, peer-reviewed journals and conference proceedings. They include research from various geographical locations, which are important when studying context. By considering these databases, we also account for the fact that ICT4D is a multidisciplinary field (De et al., 2017). Hence, articles included in the review are from different disciplines such as computer science, information technology, information system, social sciences, and international development.

Our search strategy used key terms such as "ICT4D," "Context," "Development," "Success," and "Failure." These keywords were derived both from a preliminary systematic literature review on ICT4D (see Table 2). They collectively form a well-rounded search strategy and are chosen in order to capture the literature that explores the broader development goals and outcomes associated with ICT interventions (Thapa and Sæbø, 2014). We identified studies that discuss successful cases, challenges, pitfalls, and shortcomings in ICT4D implementations in different contexts (e.g., Diniz et al., 2014). To accommodate the nuances of each database, minor adjustments were made to the search string while retaining the core keywords (refer to the first line of Figure 1). In some database the keywords are in the abstract, while for others we considered both the full text and the abstract (see Figure 1). This search yielded a total of 647 articles across all databases. For efficient management and subsequent analysis, the retrieved data were systematically organized in Endnote and Excel. The criteria we used for inclusion and exclusion during the filtration and quality assessment phases are detailed in sections Filtering to Inclusion.

Filtering

In the initial stages of refining the scope, the first criterion of exclusion involved a meticulous filtering process aimed at sieving out undesirable elements (Rowe, 2014). This entailed the extraction of articles bearing irrelevant topics through careful scrutiny of each title. Additionally, duplicates and abstracts were expunged to maintain a streamlined dataset. A detailed assessment of abstracts followed, focusing on keywords like ICT4D, context, success, failure, and development. Articles in which these keywords were either absent or tangential to the core topic were systematically removed (see Table 3). This curation helped ensure the subsequent analysis honed in on the most pertinent and valuable research contributions. At this stage, 341 records were excluded, leaving 283 articles in the database. The second stage of exclusion centers on a diverse array of scholarly contributions. This includes workshops proceedings, ongoing research,

reports, distinct sections of books, chapters within books, entire books, as well as theses, dissertations, and editorials. By excluding these forms of academic output, the focus narrows to refined and completed works, allowing for a more targeted and in-depth exploration of established knowledge, theories, and methodologies in the field of ICT4D. During the process, we excluded 108 works, leaving 198 articles. Afterwards, we merged all the databases, which led us to the third round of exclusion where we removed all the duplicates and short papers (less than 5 pages) with 162 articles left for quality assessment (see Figure 1).

Quality assessment

In a systematic review, quality assessment ensures the inclusion of only high-quality studies (Gall and Pigny, 2022; Rowe, 2014). We used several criteria to assess the relevance and rigour of the papers included in the study (Basty et al., 2023; Çakar, 2023). The screening measure was operationalized using the Likert scale 0-7, where 0 is completely disagree to completely agree. For example, the paper gets a score of 3 or 4 for context if it does not specifically mention ICT4D context, but discusses a topic which can be considered within the context of ICT4D while containing at least one dimension of context as discussed in section 2.1. (e.g., Huang et al., 2014). However, we gave a score of 2 to papers that do not present empirical data or conduct experiments, but focusing more on presenting a model or offering reflections and discussions on the effectiveness of the ICT4D (e.g., Supriya et al., 2014; Walsham, 2020).

Inclusion

Following the quality assessment, we included all the papers which average score for all the criteria is 5 or above (See Appendix, Table A1). We excluded 5 papers that meet this criterion but do not focus on developing countries. A paper that has a minimum score of 5 on average highlights the importance of understanding the implementation of context of the ICT4D projects, focuses on a developing country or developing countries in general, clearly identifies the research gap, provides an outstanding review of the literature. Papers in this category present a clear methodology and have empirical data, discuss the results of the findings, have a conclusion and provide a research agenda or suggest research on a specific area. This review included a total of 95 articles [P1] to [P95], consisting of 67 journal articles and 28 conference papers (See Appendix, Tables A2 and A3). Only 31% of the papers have a score of 5 or below for the literature review section (e.g., [P14], [P24]). Even though the literature is not extensively discussed, these papers provide some background

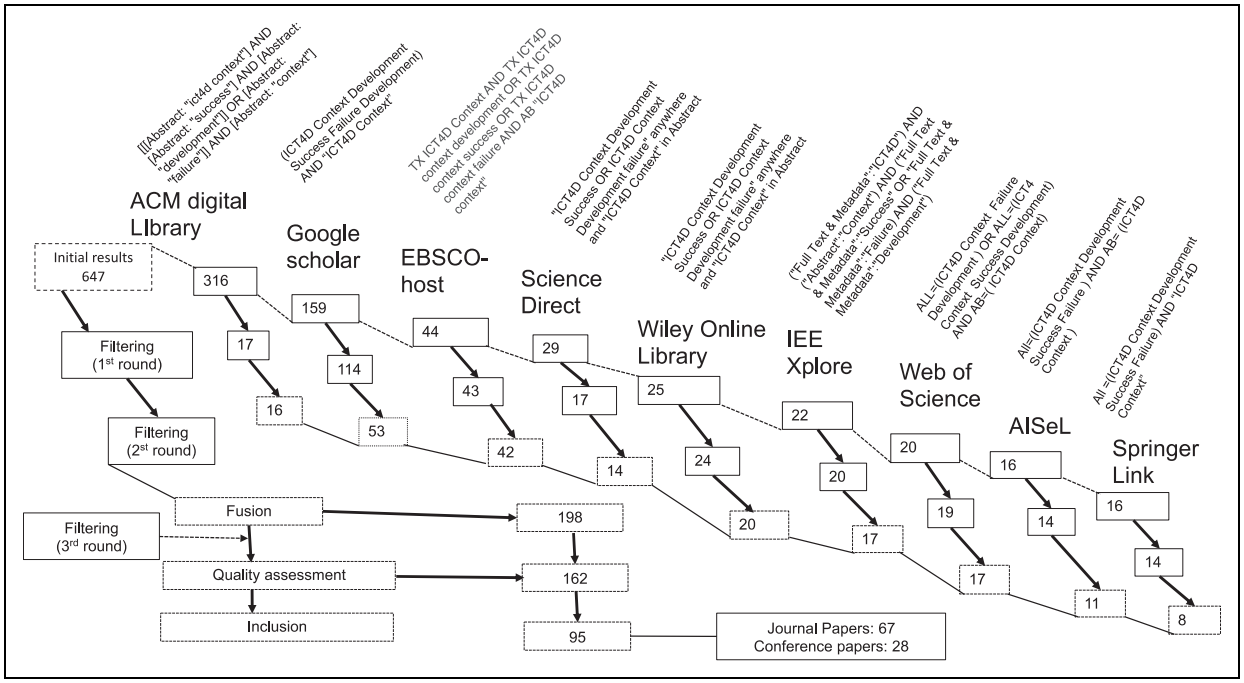

Figure 1. Systematic literature review process.

information in references to support the topic being discussed. By the same token, 26% received a score of 5 or below for the method section (e.g., [P13], [P65]). These papers briefly mention methodology without given detailed explanation or the steps followed to get to their results. Based on our strict inclusion criteria and the screening process, we deemed this set of publications to be an appropriate and representative sample of the ICT4D literature. Table 3 provides an overview of the research process.

Content analysis

Our primary goal was to identify and categorize key contextual dimensions that influence the success of ICT4D projects. To initiate the process, we developed a coding scheme in alignment with this goal (Tuckett, 2005), using Atlas.ti to analyze and categorize these contextual dimensions. During this process we focused on the "what" and the "how". We systematically coded the 95 papers in the dataset. This process involved coding specific passages of text that are related to meaningful themes (how) and dimensions (what) in the ICT4D context (see Appendix, Table A4). With the identified themes and dimensions in hand, we transitioned to thematic categorization following the guidelines proposed by Braun and Clarke (2022). At this stage, our aim was to organize the diverse themes into a cohesive framework that aligns with our research objectives. The clarity and relevance of each theme were deemed crucial to ensure the framework's effectiveness.

To systematically structure the framework, we acknowledged the hierarchical nature of the identified themes and the contextual dimensions. This hierarchical arrangement provided a structured and comprehensive approach to investigating the multifaceted ICT4D context (see Figure 3). To reinforce the credibility and reliability of our thematic framework, following Braun and Clarke's guidelines (2022), we implemented a rigorous validation process. Recognizing the importance of external perspectives, we actively sought feedback from peers in accordance with the recommendations by Nowell et al. (2017).

Table 3. Inclusion and exclusion criteria for records.

Identification	Inclusion	Exclusion	Rationale
Filtering (1rst round)	• Papers published in English between 01/2010-06/2023 • Abstract containing the key words and synonyms "ICT4D", "Context" "Development, "Success" OR "ICT4D", "Context" "Development", "Failure"	• Papers that do not contain key terms related to the research questions • Duplicates, letters, notes, corrections	Sieving out unwanted elements
Filtering (second round)	• Conference papers from recognized conferences • Open-access papers to ensure accessibility, Journal articles	• Non-peer-reviewed articles • Thesis, book chapters, books, book reviews Workshop proceedings	Targeting established knowledge, theories, and methodologies in the field of ICT4D
Filtering (third round)	• Articles from all the databases combined (ACM digital LIbrary, Google scholar, EBSCO-host, Science Direct, Wiley Online Library, IEE Xplore, Web of Science, AISeL, Springer Link) • All the peer-reviewed articles that are at least 6 pages long based on the layout and the character size.	• Duplicated and short articles • Literature reviews	Eliminating redundant content and ensuring the inclusion of substantial and relevant research
Quality Assessment	• Papers focused on the context of ICT4D in developing countries. • Papers presenting a clear theoretical lens, when relevant • Papers with a clear methodological approach	• Papers deemed to be of poor quality based on a set of evaluation criteria • Papers on developing countries with minimal emphasis on context	Maintaining the review's quality, accuracy, and relevance

This iterative feedback process played a pivotal role in confirming that our thematic analysis accurately portrayed the diverse contextual factors impacting the success of ICT4D projects and that we had reached a point of saturation where no new themes emerged.

Results

From the initial set of 647 studies, we selected 95 papers [P1]–[P95] on ICT4D context for inclusion in this review (see Appendix for more details). In this section, we explore the realm of ICT4D spanning the past 12 years. Our inquiry is structured to present critical dimensions of context studied in the field of ICT4D and how they influence success.

Research trend in ICT4D context from January 2010 to June 2023

A surge in contextual ICT4D research is evident in the literature over the past twelve years (see Figure 2) with 64% of the studies published after 2015. Examining the impact of context on ICT4D success reveals a geographically skewed research focus. Africa dominates the field, accounting for 52% of the studies. Asia holds a middle ground at 27%, while Latin America remains relatively underexplored at 8%. Within regions, specific countries attract more attention. South Africa and India emerge as focal points in Southern Africa and South Asia respectively, which indicates specific areas of interest in ICT4D research.

We have systematically categorized ICT4D artifacts into nine distinct groups, each representing a crucial facet of technology's impact on development. Under "Hardware and Devices" (HD), we included core technologies such as tablets [P4], computers [P69], biometric recognition [P79], and cellphones [P76]. In "Software and Applications", we considered transformative platforms like e-learning software [P9] and mobile banking applications [P65]. Artifacts like social media platforms [P2], [P35] and web-based tools [P7], [P51] are included in "Communication and Information Sharing". Within the category of "Connectivity and Facilities", we included internet connectivity and telecenters [P5], [P85]. "E-Governance Solutions" highlight the integration of ICT in the transformation of Government, with ICT-enabled e-governance [P13] and e-Procurement system [P32]. We created the "Healthcare and Medical Services" featuring critical artefacts like electronic medical records [P3], teleconsultations and distance learning services [P84]. "Business Models" encompass innovative approaches like digital start-ups [P33] and ICT solutions [P34]. Lastly, "Financial Inclusion and Banking Services" incorporate ICT-related services like mobile banking services, correspondent banking models, and mobile money transfers [P12], [P20], [P28]. Not all the papers explicitly defined the IT artefact (see Figure 3, top), 24% of them focus on the deployment of ICT4D projects rather than discussing specific technologies (e.g., [P16], [P51]). While Hardware and Software are relatively well-explored within ICT4D context research, accounting for 15% of the studies, the SLR also points out a research gap about IT artefacts related to cybersecurity and data protection (CSDP), which accounts for only 1% of the sample.

Based on our SLR, we categorized the theoretical lenses into distinct disciplines, such as "Information Systems and Technology", "Design and Technology Innovation", "Management and Strategy", "Sociology and Anthropology", to pinpoint the interdisciplinary theoretical underpinnings of contextual research in ICT4D (see Figure 3, bottom). We created one other category labelled "not specified" to take into account the percent of papers that do not use any theory in their studies and another one labelled "Triangulation" to

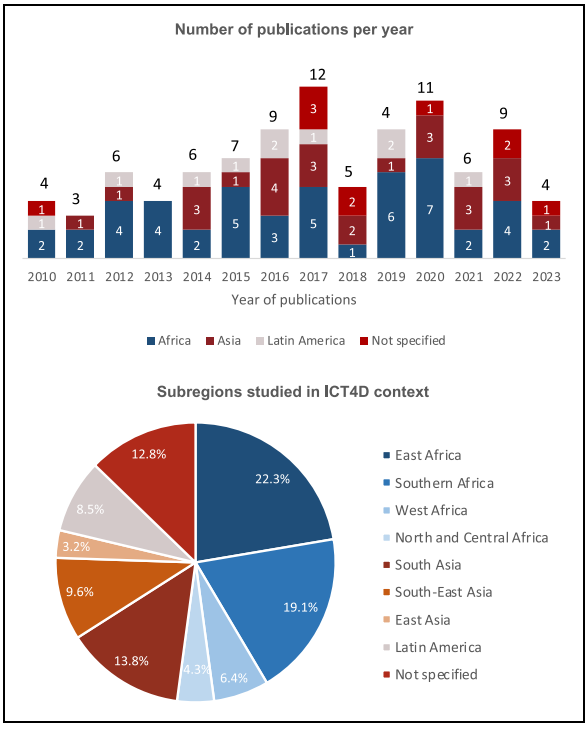

Figure 2. Distribution of papers by year of publications and regions studied.

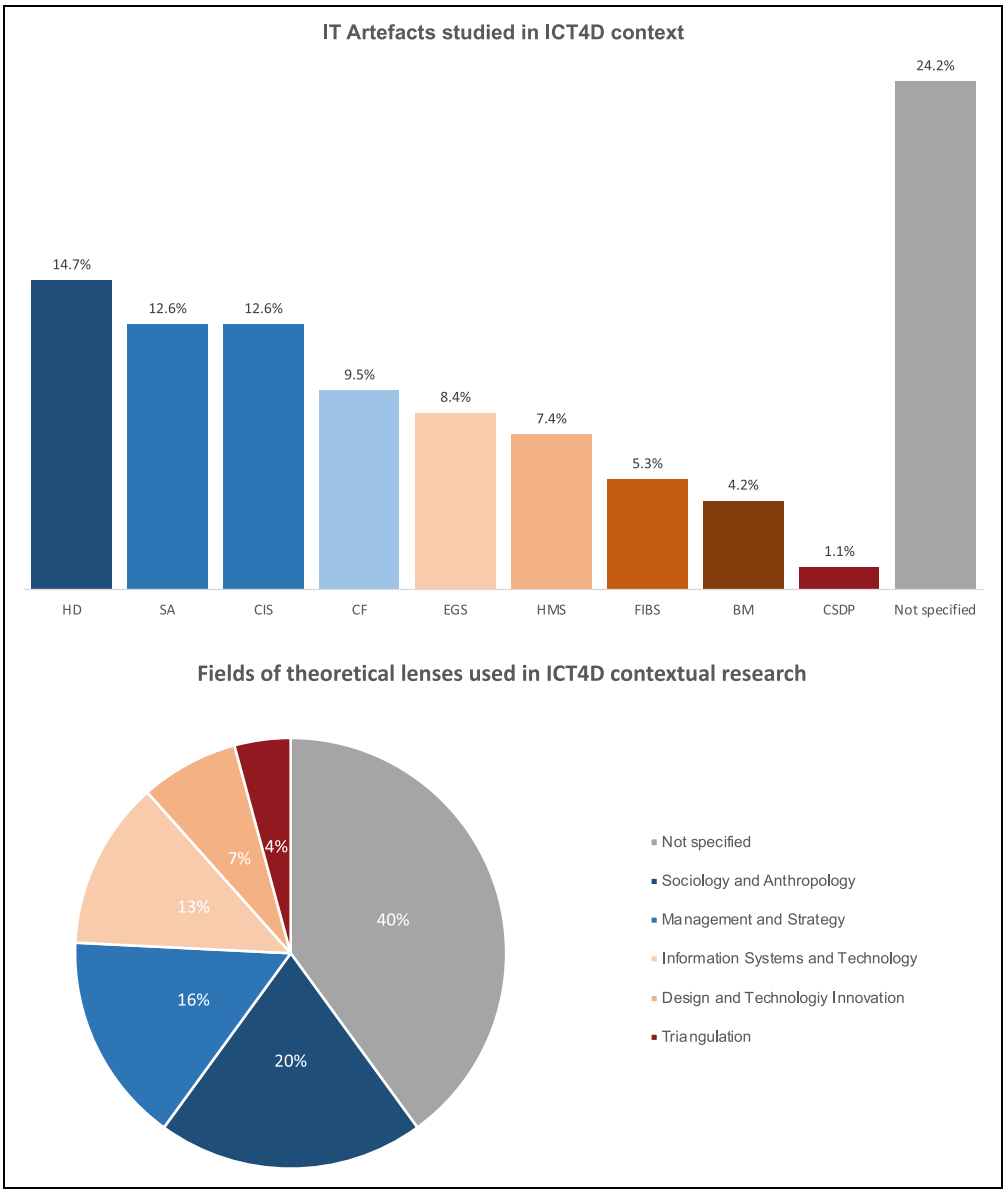

Figure 3. It artefacts studied and field of theoretical lenses used.
Note. HD: Hardware and devices; SA: Software and application; CIS: Communication and information sharing; CF: Connectivity and facilities; EGS: E-governance solutions, HMS: Health and medical services; FIBS: Financial inclusion and banking services; BM: Business models; CSDP: Cybersecurity and data protection.

take into account the papers that integrate multiple theoretical frameworks to enrich their analyses and interpretations. For instance, [P43] exemplifies this approach by using both institutional theory and the capability approach, allowing for a nuanced analysis of ICT4D interventions by considering the social and institutional factors at play. [P88] combined the affordance actualization, self-determination theory, and sustainability framework to analyze the data and evaluate the success of e-Government projects in Nigeria and Rwanda. With 20% of the theoretical lenses used, theories borrowed from the fields of Sociology, Anthropology and Management are highly dominant in ICT4D research. However, 40% of the paper did not specify a theoretical lens in their study, underlining a gap in the literature (Figure 3).

Contextual dimensions in ICT4D context from January 2010 to June 2023

To highlight the trend in ICT4D contextual research over the past twelve years, we established two

primary categories for the dimensions of context studied in the existing literature based on the definitions provided in Table 1 (background section). First, we created the "psycho-social" or the human factor dimension to include the social, cultural, demographic, ethnic, emotional, cognitive, and linguistic factors. Second, we created the "structural" dimension, further subdivided into the "systemic" and "politico-legal" sub-dimensions. The systemic sub-dimension includes the technological, developmental, infrastructural, organizational, geographical, and environmental factors. The politico-legal sub-dimension comprises the institutional, economic, financial, political, historical, and legal factors. In the psycho-social dimension (see Table 4), roughly 80% of the studies focused on the social factors and 73% on the cultural factors of ICT4D context. However, only 5%, 4%, and 2% of the papers considered ethnic, emotional, and linguistic factors, respectively. In the structural dimension, specifically within the systemic sub-dimension, the technological factors, explored in 81% of papers, are prominent in ICT4D contextual research, in contrast to the environmental factors (in the ecological sense of the term) considered in just 6%. In the politico-legal sub-dimension, researchers primarily emphasize the institutional factors, with over 50% of the papers covering this aspect. Nevertheless, the legal and historical dimensions remain relatively unexplored, receiving attention in only 9% and 10% of the studies, respectively. This discrepancy highlights a research gap in understanding the legal and historical aspects within the ICT4D context.

The contextual dimensions and ICT4D success

Understanding the contextual dimensions is critical for ICT4D project success in developing countries. These dimensions cover two integral components: the contextual factors, representing the "what," and

Table 4. Percent of the contextual dimensions covered in the literature.

Category	Dimensions	Percent covered
Psycho-social	Social	◉◉◉◉◉◉◉◉◉◉ (89%)
	Cultural	◉◉◉◉◉◉◉◉ (65%)
	Demographic	◉◉◉◉◉ (41%)
	Ethnic	◉ (5%)
	Emotional	◉ (4%)
	Cognitive	◉ (4%)
	Linguistic	◉ (2%)
Structural: Systemic	Technological	◉◉◉◉◉◉◉◉◉◉ (84%)
	Developmental	◉◉◉◉◉◉◉◉ (60%)
	Infrastructural	◉◉◉◉ (36%)
	Organizational	◉◉◉ (30%)
	Geographical	◉◉ (24%)
	Enviromental	◉ (5%)
Structural: Politico-legal	Institutional	◉◉◉◉◉◉ (55%)
	Political	◉◉◉◉ (40%)
	Economic	◉◉◉◉◉ (46%)
	Financial	◉◉ (18%)
	Historical	◉ (10%)
	Legal	◉ (9%)

Source: Authors' count (see Appendix, Table A5)

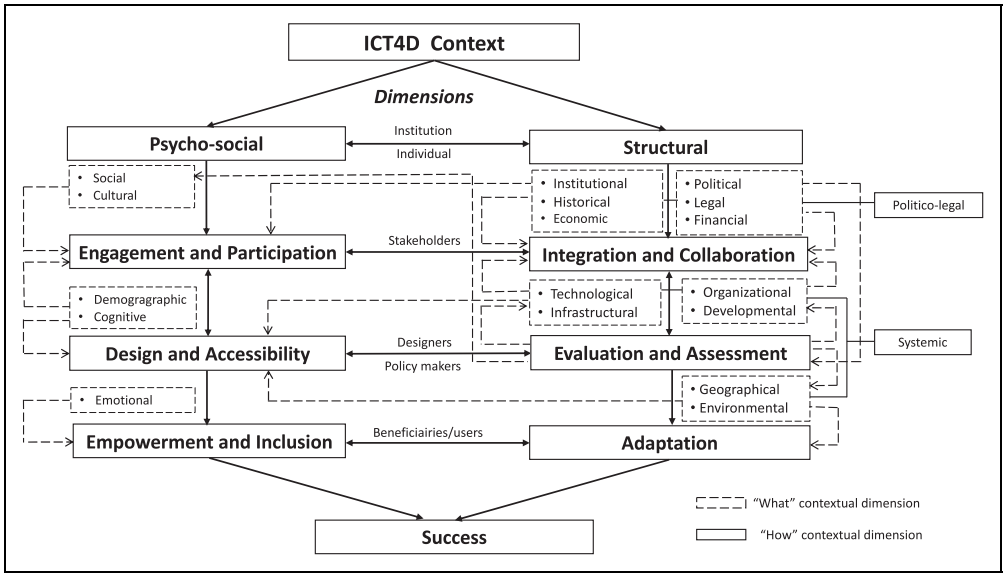

Figure 4. A conceptual framework for ICT4D context in developing countries.

the themes, encapsulating the "how" of the dimensions (see Figure 4). On one hand, the contextual factors serve as intrinsic elements outlining the diverse aspects that shape the environment in which ICT4D projects unfold. On the other hand, the themes unravel the "how" by which these factors impact the trajectory and outcomes of these projects. In essence, the contextual factors represent the static elements of the environment, while the themes bring dynamism by revealing the operational aspects—how these factors actively influence the success of ICT4D projects. This dual perspective, examining both the "what" and the "how," allowed us to present a framework to study context in ICT4D projects.

The psycho-social dimension of context in ICT4D. The psycho-social dimension influences the following components, "engagement and participation", "design and accessibility", "empowerment and inclusion", each one of which represents a "how" in our analysis.

Engagement and Participation. Given the role of participative development as a fundamental approach in ICT4D projects [P66], the social and cultural context influence engagement and participation in the sense that they contribute to the understanding of the role of communities and marginalized populations in the implementation of ICT4D initiatives [P4] [P13] [P49] [P66]. "*While many disadvantaged had the knowledge and skills to use mobile technologies, they did not have the means to leverage digital technologies (e.g., ICT, social media, and mobile technologies) to foster citizen engagement and participation*" [P95, p. 17]. The concept of user-centered design, recurrent in understanding the social context [P5] [P20], indicates that perceptions of success can differ based on an individual's social status [P4] [P9]. Hence, the literature advocates for the localization and customization of ICT solutions to address developmental needs while ensuring sustainability and cultural sensitivity [P90] [P48]. When it comes to "Design and Accessibility," demographic and cognitive factors must be addressed.

Design and accessibility. The demographic context shapes the design and accessibility of ICT4D initiatives. It influences how technology is tailored and made available to diverse population segments [P8] [P10] [P15] [P49] [P59]. "*There was no scope to update the systems through trial and error and incorporating context specific needs. This resulted in inappropriate systems design for this zone and consequently, in Haor, the information system services were not as useful as it was in the other two zones*" [P93, p.285]. Studies like [P52] support a targeted approach through specialized vocational education programs for low-literate, oral, and novice village users in rural India. Additionally, unique challenges faced by specific demographics, such as the riverine community in Marajó Island in [P54], with its low population

density and transportation difficulties, called for tailored design considerations to ensure effective accessibility. Gender-specific considerations are also essential, as emphasized by the study focusing on rural women [P72], underlining the need for gender-sensitive approaches in ICT4D initiatives. In short, incorporating demographic variables in the analysis, as shown in [P90], offers insights into their impact on the relationship between psychological empowerment and well-being while guiding the design of more effective initiatives.

Empowerment and inclusion. The emotional factors provide a clear understanding of individual success in ICT4D initiatives through empowerment and inclusion, "*Traditionally ICT4D research focuses on women as users and beneficiaries, not as co-creators… The need to ensure greater continuity between design and implementation to integrate women more fully into mainstream development activities*" [P72, p. 140]. Observations and interactions with users allow design teams to grasp nonverbal cues, effectively highlighting emotional responses, whether they convey delight or frustration in the ICT4D context [P8] [P73]. The perception of success in ICT4D initiatives, particularly in disadvantaged areas, often includes intangible benefits such as a sense of hope and perceptions of a transformed life, which features the emotional aspects within this domain [P9]. Digital access and use [P15], instances of emotional experiences, including frustration and inadequacy, may arise due to challenges in engaging with sophisticated digital applications, particularly among older participants. On a more positive note, emotional interactions facilitated through ICT platforms were found to have the potential to decrease feelings of isolation among rural citizens an contribute to an overall improvement of China's rural communities wellbeing [P56].

The structural dimension of ICT4D context. Within the structural dimension, encompassing the politico-legal and systemic sub-dimensions, the analysis identified three distinct categories. The politico-legal sub-dimension affects "integration and collaboration" (first category), whereas the systemic sub-dimension influences "Adaptation" (second category). "Evaluation and assessment" emerges as a theme that highlight the importance of these subdimensions in the whole process.

Integration and collaboration. Integration and collaboration are impacted by the institutional, legal, political, historical, economic and financial factors. Considering the institutional factors, the success of ICT4D projects depends on the alignment between the institutional logic of the project and the existing institutional logics in the context of the developing country, as illustrated by the implementation of TRADENET in the Kenyan Customs [P1]. Therefore, collaboration and partnership are seen as pivotal to ensure that the ICT4D solution aligns with the institutional needs [P29] [P82] [P31] and achieve sustainability and resilience [P91], "*From the clinicians' contributions, the adoption of the telemedicine for clinical collaboration and knowledge sharing, like the intranet and ePatient systems, was mainly driven by a top-down approach, and did not fully account for the needs of the clinicians, the core users*" [P31, p. 540]. The literature emphasizes the need for creating an enabling legal environment through appropriate legal frameworks, regulations, and policies to foster the success of ICT4D projects [P24] [P92] [P94]. Well-established regulations and standards promote interoperability, facilitate partnerships, build trust and confidence among stakeholders, hence enabling seamless integration and collaboration. Political will and leadership play a vital role in driving collaboration between different stakeholders, including government agencies, local communities, and development partners [P4] [P64]. The political context can impact the allocation of resources and funding for ICT4D projects, which can affect the level of integration and collaboration. Political stability and governance structures also influence the sustainability and long-term success of ICT4D initiatives, as they determine the continuity of support and maintenance of implemented projects [P69] [P92].

Historical institutions may enable certain forms of institutionalization while resisting others. This situation can lead to conflict and contested processes in integrating and collaborating on IT artifacts [P40]. While legacies of colonization and marginalization can shape power dynamics and relationships between different stakeholders in the project, negative experiences of marginalized communities can affect their trust and willingness to engage in collaborative efforts [P16] [P21] [P48]. Economic and financial factors, such as affordability and access to financial services, play a significant role in determining the success and sustainability of ICT4D projects [P11] [P20] [P15] [P81]. Lack of financial resources can impede the implementation of training and support programs, which are essential for promoting

collaboration and knowledge sharing in ICT4D projects [P30].

Evaluation and assessment. The Evaluation and assessment theme highlights how the contextual dimensions affect the success of ICT4D projects, "*the information needs assessment in these communities is complex because a wide array of factors affects why certain groups want certain types of information more than others. It was evident that gender, class, and status play important roles in determining why certain types of information are considered important*" [P83, p.305]. The literature enriches our understanding of evaluation processes through diverse frameworks grounded in contextual dimensions. These frameworks provide insights into the interplay between ICT4D projects and their social systems, sustainability aspects, as well as their impact on rural development. By incorporating Ubuntu philosophy and autopoiesis, [P60]'s evaluation of ICT4D projects in Soweto (South Africa) sheds light on the complexities of the social systems and sustainability factors involved. Ubuntu philosophy, rooted in African culture, emphasizes the interconnectedness and interdependence of individuals within a community. By applying this lens, the paper assesses the social and cultural aspects of the projects while portraying how community members support each other to benefit from the ICT learning centers. [P61] uses the capability approach as a conceptual framework to evaluate the impact of ICT4D projects on sustainable rural development in Bangladesh. This study stresses the importance of the organizational context in ICT4D research by examining the interplay between user capabilities and the functionalities delivered by technologies. Furthermore, it highlights the significance of understanding market structures and the role of public-private partnerships for successful implementation. Similar to the work by [P19] which assessed the impact of rural telecentres through the lens of intangible benefits like hope and aspirations, this research approach acknowledges the emotional context alongside the technical aspects of ICT4D initiatives.

Drawing on a pragmatic approach, [P34] evaluates the outcome and impact of the Siyakhula Living Lab in South Africa. This approach favors an iterative process, where action and knowledge inquiry inform each other. This approach takes into account the social, political, cultural, and economic context of the rural environment in which the ICT4D project is implemented. By using the requirements elicitation methodology, [P50] emphasizes the importance of considering high-level social development goals, environmental constraints, and input from end-users regarding their specific needs and socio-cultural context to address the shortcomings in gathering and defining software requirements for ICT4D projects. An analytical decision layer model is proposed in [P30] to assess the impact of ICT4D projects in healthcare delivery in Uganda. Financial and infrastructural limitations were considered as factors that influence healthcare delivery and the potential benefits of ICT in this country. Given these considerations, the infrastructural context in ICT4D stands out as a fundamental factor influencing the successful implementation and efficiency of ICT initiatives, particularly in rural areas (as supported by [P26], [P27], [P66], and [P82]). The importance of accessible ICT solutions for resource-constrained rural communities pinpoints the need to prioritize infrastructure development and readily available support mechanisms, as discussed in [P24], [P50], and [P52].

Adaptation. Adaptation emerges as a theme that explains how the systemic sub-dimension influences the success of ICT4D projects, considering the geographical and environmental factors, "*The complex context of developing countries, change processes are often slow, taking place over several years, and unstable political contexts can impede or delay maturing of projects*." [P44, p.883]. The geographical context in ICT4D is a factor with a substantial impact on adaptation strategies (Walsham, 2020). It takes into consideration the physical location, infrastructure availability, and regional challenges related to technology access for tailored approach [P15] [P88]. Projects like the design of a tablet application for rural Cambodians [P8], the implementation of e-learning strategies in disadvantaged areas of Cape Town [P9], and internet of things implementation in Kenya [P39] underline how understanding and adapting technology to the specific geographical setting is pivotal for success. For instance, the geographical challenges faced by specific populations, such as the riverine population of Marajó Island in Brazil, highlights the importance of considering low population density and transportation difficulties [54] as challenges related to the implementation of ICT4D initiatives. These nuances in geographical contexts reveal the necessity of tailoring ICT4D interventions to operate

within the geographical realities and limitations of specific zones [P33] [P94] [P80]. Additionally, the socio-technical nature of ICTs demands that these interventions are aligned with the specific needs and resources of the local communities, as discussed in [P4], [P44], [P49], and [P72]).

Discussion

Using a systematic literature review (SLR) conducted in July 2023, we identified, categorized, and scrutinized studies relevant to the ICT4D context. We reviewed 95 studies, comprising 67 journal papers and 28 conference papers. This review extends its scope beyond previous research that primarily concentrates on singular ICT artifacts or specific facets of ICT4D, as observed in prior works like Singh and Flyverbom (2016), Strand and Hatakka (2020). Remarkably, the majority of the reviewed papers (64%) were published after 2015, which ensures a more recent perspective of the literature. Our systematic review has unveiled two distinct categorizations of contextual dimensions, the psycho-social dimension and the structural dimension, further divided into the politico-legal and the systemic sub-dimensions. Both dimensions are characterized in the literature by a persistent lack of clarity, potentially giving rise to misinterpretations. The contextual factors within these dimensions frequently intersect. This complicates the overall comprehension of their collective influence on the success of ICT4D initiatives. For instance, the definitions of the economic and financial contexts suffer from a lack of precision, occasionally leading to their interchangeable usage and resulting in a degree of ambiguity. This imprecise terminological usage leads to varying interpretations, which spans the spectrum from perceiving these contextual factors as benefits to viewing them as challenges (Leonardi et al., 2016). The same goes for the institutional and the organizational contexts, which are not easily discernible in the literature. The environmental aspect often refers to the broader context represented by the components of the politico-legal dimension. Very few studies consider the environmental context as incorporating elements related to pressing issues like climate change or exposure to natural disasters. Given the inherent complexity of interpreting these contextual factors, a more refined analysis of their impact on ICT4D projects is essential.

To bridge this gap in understanding, we devised a conceptual framework through a meticulous coding process (See Figure 4). Within this framework, we pointed out six distinct themes that shed light on how the contextual dimensions impact the success of ICT4D projects. Engagement and participation are influenced by social, economic and cultural factors, which emphasize the link between the technology and its adoption within a community (Malaquias and Albertin, 2019). These factors along with the demographic and cognitive factors also affect "Design and Accessibility", emphasizing the importance of tailoring technological solutions to suit diverse populations (Yap et al., 2023). Emotional factors can help measure the degree of empowerment and inclusion of beneficiaries (Dasuki et al. 2014). These contextual factors altogether are part of the psycho-social dimension. Considering the structural dimension, on one hand the politico-legal sub-dimension can enable or hinder integration and collaboration; on the other hand the systemic sub-dimension can present challenges to the adaptation of the ICT4D artefacts. What sets this conceptualization apart is its hierarchical organization of contextual dimensions within the ICT4D context. It provides insights into the specific elements of context that come into play at each level.

The success of ICT4D projects in developing countries extends beyond mere adoption and usage of IT artifacts. It incorporates broader impacts at both the individual and community levels (Cibangu and Hepworth, 2016; Dasuki et al., 2014; Sahay et al., 2017). The psyco-social and structural dimensions play critical roles in explaining this success. On the psyco-social front, success in information systems, particularly within the context of ICT4D, is deeply entwined with the transformative potential of ICTs in fostering progress and positive change. Studies like [P11] and [P49] advocate for increased accessibility of ICT in rural areas while aligning with broader developmental goals. In the same vein, initiatives designed to enhance financial literacy among rural populations [P8] not only contribute to economic development but also address socio-cultural aspects by empowering individuals through knowledge and skills acquisition. Understanding the politico-legal and systemic sub-dimensions is also critical for explaining the success of ICT4D projects. The availability and functionality of infrastructure, the technological and institutional contexts play a vital role in determining the effectiveness and sustainability of ICT interventions. For example, [P56] highlights ICT as a potent tool to address critical issues faced in rural settings, such as information deficits and

ineffective communication. The role of the contextual dimensions in shaping development processes is emphasized in [P65] by introducing context as an evolving and interpretive entity. This recognition of both dimensions underscores the need to align ICT interventions with the existing socio-cultural and economic realities in order to ensure that the ICT4D projects are not only adopted but also lead to tangible positive outcomes in the community.

Nevertheless, Ramadani et al. (2018) emphasized the need for more attention to be directed toward the social context, our findings present a contrasting perspective. We observed that the social context in ICT4D has been extensively explored in the literature. These discrepancies between the two studies may be attributed to variations in sample size, database inclusivity, or the evolving context of ICT4D research over time. While existing literature identifies relevant contextual factors for evaluating ICT4D projects, a crucial gap remains in understanding how these dimensions actually influence the evaluation process itself (e.g., Kelly, 2018). For example, the interplay between governance structures, policies, and power dynamics within the political environment can dramatically alter how project success is measured (Kelly, 2018). Similarly, geographical factors such as location, climate, and existing physical infrastructure can shape the evaluation process.

Research agenda

Context plays a considerable role in the success of ICT4D initiatives, and many IS researchers have been calling for more context-aware theorizing in ICT4D research (Andoh-Baidoo, 2017; Avgerou, 2017; Chipidza and Leidner, 2019; Ramadani et al., 2018). From a research perspective, this systematic review reveals promising opportunities to explore further within the ICT4D context, particularly concerning five areas.

Addressing cybersecurity and data protection challenges in ICT4D projects

(1) The review highlights a crucial issue in the ICT4D context concerning the limited exploration of IT artefacts focused on cybersecurity and data protection. In an era dominated by rapid technological advancements (e.g., Artificial intelligence) and an exponential rise in digital data (e.g., Big data), safeguarding sensitive information and ensuring cybersecurity are paramount. ICT4D projects often involve the collection, storage, and transmission of substantial data, ranging from personal information to critical socio-economic data. Neglecting to explore IT artifacts that address cybersecurity and data protection implies that the literature fails to propose context-specific strategies that can help mitigate technology-related risks such as privacy breaches, identity theft, and cyberattacks (Hui et al., 2017). Addressing these concerns is not only essential for the successful deployment of ICT4D projects but also vital for building trust and confidence in technological solutions tailored for developing countries.

Establishing strong theoretical foundations for ICT4D research

(2) A substantial portion of the studies (40%) lacks a strong foundation in established theories. This oversight in theoretical grounding has implications for contextual research in the ICT4D domain. A robust theoretical framework is crucial for guiding research, shaping hypotheses, and interpreting findings (Avgerou, 2017). Without a clear theoretical basis, research efforts may lack coherence, fail to address critical aspects of the context, and struggle to offer meaningful insights for practical application (Andoh-Baidoo, 2017). The SLR highlights a need for more scholarly endeavors in ICT4D to engage with and integrate established theories from various relevant disciplines by providing a structured and theoretically informed foundation for future research and practice. On a positive note, a smaller fraction of studies (4%) adopted a more sophisticated approach by using triangulation i.e., two or more theories simultaneously to frame their study within the ICT4D context. Triangulation offers promising prospects for advancing contextual research in ICT4D (Tibben, 2015). By drawing on multiple theories researchers might have a deeper understanding of the complex ICT4D context while integrating diverse perspectives and accounting for varying dimensions of the context (Andoh-Baidoo, 2017).

Exploring critical components of the psycho-social dimension in ICT4D

(3) The SLR revealed that within the psycho-social dimension, aspects such as emotions, language, ethnicity and cognition constitute critical

components, yet they have been underexplored in the literature. This underexploration holds meaningful implications for the ICT4D context, as these factors influence technology adoption (Supriya et al., 2014), community engagement (Parks et al., 2022), and the success of ICT4D initiatives (Kim and Lee, 2023). Therefore, understanding ethnicity, emotional responses, linguistic nuances, and cognitive processes within diverse societal contexts is crucial for implementing ICT4D initiatives that resonate with the target populations and align with their cultural and individual values (Bhebhe, 2023). Furthermore, an examination of the articles for any consideration of religion as a contextual factor revealed a similar gap. Religion can influence societal norms, beliefs, and behaviors, thereby exerting substantial influence on the adoption and implementation of ICT4D initiatives in certain regions.

Exploring critical components of the structural dimension in ICT4D

(4) By analysing the structural dimension, featuring the systemic and politico-legal dimensions, a similar pattern emerges. Our analysis revealed an underrepresentation of the environmental context in the systemic sub-dimension. Given the urgency of addressing environmental sustainability in contemporary times, this gap hinders a holistic comprehension of ICT4D success. Moreover, within the politico-legal dimension, historical and legal factors were found to be underexplored. These factors have implications for policy formulation, governance frameworks, and the long-term viability of ICT4D interventions. The lack of focus on historical trajectories and legal underpinnings within the ICT4D context could potentially limit the scalability, sustainability, and appropriateness of ICT4D initiatives within diverse geopolitical contexts (da Silva and Fernández, 2016).

(5) Our examination of the political factors revealed a focus primarily from a policy-centric perspective. While policy frameworks are undoubtedly important for shaping ICT4D context, our analysis highlighted a gap pertaining to broader political dynamics. Critical aspects such as government changes, social upheaval, and political instability, prevalent in many developing nations, were absent in the reviewed literature as contextual factors impacting ICT4D initiatives. The absence of these dimensions in the discourse of ICT4D research implies a limited understanding of the complex interplay between political, social, and cultural elements in the success or failure of ICT4D projects. A more nuanced investigation into these factors is crucial for researchers and practitioners to design contextually relevant and effective ICT4D interventions that can navigate the complex terrain of political dynamics and cultural influences. In line with the gaps mentioned in (2),

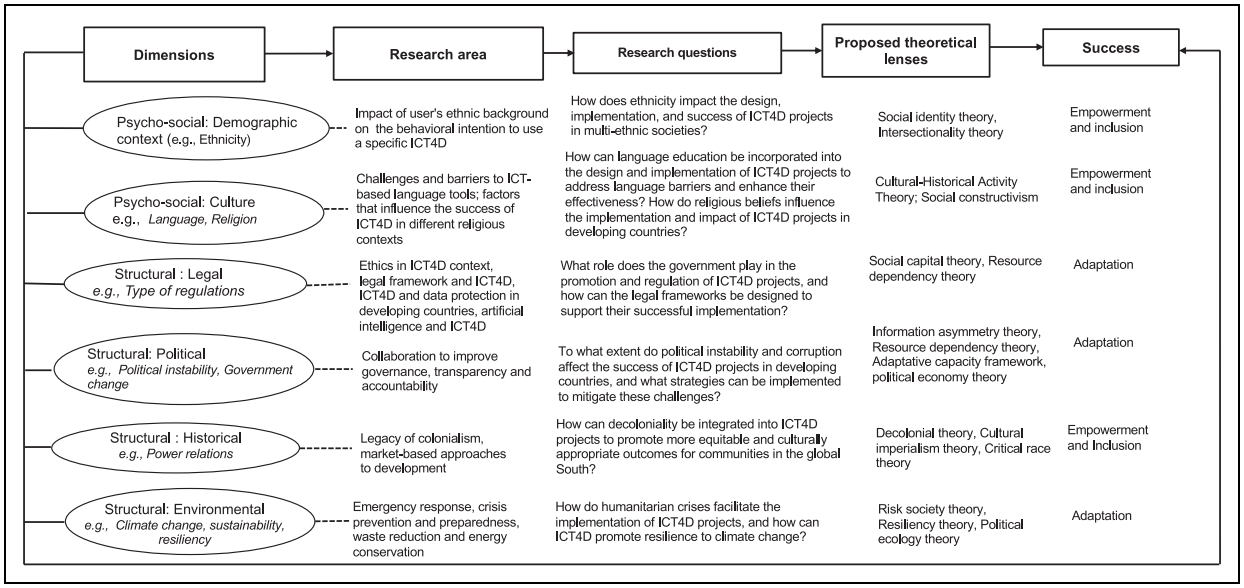

Figure 5. Avenue for contextual research in ICT4D based on the literature gaps.

(3), (4), and (5), we propose in Figure 5 an avenue for contextual research in ICT4D.

Limitations

We are aware that conducting a systematic review involves addressing several potential limitations to ensure the reliability and comprehensiveness of the research (Grant and Booth, 2009). To mitigate these challenges, we start the review process with the formulation of well-structured research questions. These research questions provided a clear framework for selecting relevant studies and reducing publication bias by including studies that are about ICT4D context. To address the limitations related to the variation of the quality of included studies, we established quality assessment criteria (Gall and Pigni, 2022) to ensure that only high-quality research is retained. We set specific inclusion and exclusion criteria to minimize selection bias and ensure that studies are chosen based on their relevance to the research questions rather than personal preferences (Rowe, 2014). Finally, to overcome the limitation of a limited scope, we used multiple databases for the search process in order to broaden the scope and capture studies from diverse sources (Rowe, 2014).

Research contributions and implications

The framework proposed in this paper can be used by ICT4D researchers to develop new theories and research methods that address the complexity of the ICT4D context. In line with the recommendations of Sein et al. (2019), the framework emphasizes the importance of considering multiple levels of analysis related to the ICT4D context and offers a holistic approach to addressing the diverse range of contextual factors that can impact the success of ICT4D projects. Building on this, policy makers can consider the various dimensions and components presented in the framework to develop more effective and sustainable ICT4D solutions that address the needs and context of the intended users and communities.

Conclusion

ICT4D is an interdisciplinary field of research dedicated to promoting economic, social, and political development in developing countries through the adoption of technology (Walsham, 2017). Due to the complexity and heterogeneity of contexts in which ICT4D initiatives are implemented (Leonardi et al., 2016), context-specific theorizing has become increasingly important in advancing knowledge in the field (Andoh-Baidoo, 2017; Avgerou, 2017). The development of theoretical frameworks that are specific to particular contexts is valuable, as it enables researchers to clearly identify relevant factors and provide better explanations for phenomena in those contexts. Such frameworks also lead to improved theory development in the broader field of information systems. This paper presented a systematic literature review-based framework for analyzing the ICT4D context. Although many ICT4D studies touch upon various dimensions of context, there is a gap in the literature regarding the extent to which these contextual factors have been accounted for in studies about the factors influencing the success of ICT4D projects. Researchers interested in the field should pay attention to the impacts of factors such as ethnicity, language, religion, government change, political instability, and the legal framework on ICT4D success. Given our findings, we recommend that ICT4D researchers focus on developing more context-specific theories that place greater emphasis on these contextual factors while exploring new research methods. We believe that the conceptual framework for analyzing the ICT4D context presented in this paper will provide researchers and policy makers with insights when exploring the diverse contextual factors that are likely to affect the success of ICT4D initiatives in developing countries.

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Supplemental material

Supplementary material or Appendix for this article is available online at https://serval.unil.ch/resource/serval:BIB_02F98632E9FA.P001/REF.

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