Information and communication technology for development (ICT4D) evaluation: Examining its foci, gaps, challenges, and associations with other areas to strengthen the field's conceptual underpinnings

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Abstract

Information and communication technology for development (ICT4D) evaluation: Examining its foci, gaps, challenges, and associations with other areas to strengthen the field's conceptual underpinnings

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The effectiveness of information and communication technology for development (ICT4D) projects has been deeply questionable over the past decades, despite the much attention paid to ICTs among academics and practitioners as a possible catalyst in the betterment of people's lives in the Global South. Significant failures during the early phases of ICT4D era led to increased attention to evaluation of the projects—the lessons from which can contribute toward increased potential of successful and sustainable ICT4D initiatives. However, ICT4D evaluation is yet to be seen as a field with a clear global consensus on what it constitutes. In this setting, the study aims to identify the major foci, gaps, and challenges of ICT4D evaluation and explore ways to strengthen its conceptual elements and resolve prevailing issues. To address the above research

problem, content analysis of journal articles and aid/development agency reports on ICT4D evaluation and interviews of ICT4D researchers in academic and practitioner spheres were conducted. Moreover, to identify and strengthen the field's conceptual elements, the study refers to the three areas of evaluation with a long history of rich discourse and/or strong foundation of models, theories, and approaches—program evaluation, information systems/information technology (IS/IT) evaluation, and aid/development evaluation. The study finds that: there have been changes in foci in ICT4D evaluation in terms of development notions, research or evaluation approaches, and methods; challenges exist in terms of structural, stakeholder, and methodological issues; there have been associations between ICT4D evaluation and the three evaluation fields but with limitations; and that more discussion is needed on areas such as sustainability, participatory evaluation design, and ethical considerations of researchers. Also, the study argues for the significance of socio-technical lens and development notion–impact connection in addressing the current challenges, and that domain-oriented consolidation of knowledge in ICT4D evaluation among the researchers may help facilitate engagement with decision makers. The study can serve as a ground for facilitating discussions on how the field can be improved and how it can accommodate various perspectives and interests of the ICT4D community.

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Chapter 1. INTRODUCTION

1.1 BACKGROUND AND STATEMENT OF THE PROBLEM

Information and communication technologies (ICTs) have received much attention among academics and practitioners as a possible catalyst in the betterment of people's lives in the Global South[1], as it allows information and knowledge sharing in various forms with enhanced speed and much volume of content. However, the effectiveness of ICT for development (ICT4D) projects has been deeply questionable. Significant failures of "quick, off-the-shelf" ICT solutions, such as telecenters during the early phases of ICT4D era, led to increased attention on the need for "objective impact evaluation" (Heeks, 2008: 27)—the lessons from which can contribute toward increased potential of successful and sustainable ICT4D initiatives.

With the attention, researchers[2] have suggested a range of ICT4D evaluation frameworks by adapting and applying models, theories, methods, and approaches from various disciplines (e.g. Gomez & Pather, 2012; Gomez et al., 2013; Heeks & Molla, 2009; Kleine, 2013; Mthoko & Khene, 2017; Pade-Khene & Sewry, 2011; Pandey & Gupta, 2017; Uys, 2015). However, ICT4D evaluation is yet to be seen as a field with a clear global consensus on what it constitutes—due to the complexity involved in identifying causal relationships between information and development, challenges in gathering relevant data, the lack of (internationally agreed) impact indicators, and the need to take into account diverse contexts of projects (Gomez & Pather, 2012; Pade & Sewry, 2009 cited in Mthoko & Khene, 2017).

[1] In this study, the terms "the Global South" and "developing countries" will be used interchangeably.
[2] In this study, the term "ICT4D researchers" encompasses those in academic and practitioner spheres in ICT4D (evaluation) field.

This study is motivated by *the need to identify the major foci, gaps, and challenges of ICT4D evaluation and explore ways to strengthen its conceptual elements and resolve prevailing issues—to enhance its standing as a field of its own, to which researchers can be aware of its expected criteria and practice in a broad sense*. I say "in a broad sense" having in mind the multidisciplinary or interdisciplinary nature of ICT4D and dynamic development context, all of which demand ICT4D evaluation to accommodate disciplinary variety and situational diversity.

To identify and strengthen the field's conceptual elements, I choose to refer to the three areas of evaluation which have a long history of rich discourse and/or strong foundation of models, theories, and approaches that can help clarify and enrich the conceptual underpinnings of ICT4D evaluation—program evaluation, information systems/information technology (IS/IT) evaluation, and aid/development evaluation. The rationale behind referring to program evaluation comes from understanding ICT4D as a social program which "aim[s] to positively influence the social conditions within a community to achieve outcomes that people desire." (Mthoko & Khene, 2017: 8 citing Rossi et al., 1999) The area of IS/IT evaluation pertains to assessing technology as a means to achieve development (Mthoko & Khene, 2017). Mthoko and Khene (2017; citing Gomez & Pather, 2012) state that the difficulties in assessing productivity and impact of ICT also applies in the setting of ICT4D.

In addition to program evaluation and IS/IT evaluation, I also refer to aid/development evaluation. This relates to examining the context where ICT4D operates, i.e. development setting which generally indicates the Global South context. Understanding pertinent elements to be considered in assessing ICT initiatives in the developing countries context is significant, as the setting largely entails characteristics of uncertainty (e.g. in terms of politics, policy impact), resource constraints ("money, skills, technology, etc[.]"), inequality (in terms of "the distribution

of material resources", "power and control with, for example, more hierarchical structures within organisations and society"), institutional differences (in terms of "languages and cultural norms and values"), and localism (tendency to "rely more on closer connections") (Heeks, 2018: 17)—which all potentially influence ICT adoption and use, and its impact.

In this setting, research questions (RQs) are stated as below. The study is intended to make conceptual contribution to the field of ICT4D evaluation by: identifying the field's major foci and areas which need further conceptual refinement, and drawing from theories and practices of program evaluation, IS/IT evaluation, and aid/development evaluation to help enrich and strengthen ICT4D evaluation's conceptual underpinnings.

RQ1-1. What have been at the major foci of ICT4D evaluation?

RQ1-2. Have there been changes in the major foci of ICT4D evaluation over time?

RQ2. What have been the associations between ICT4D evaluation and

(a) program evaluation, (b) IS/IT evaluation, and (c) aid/development evaluation?

RQ3. What conceptual elements can be suggested from the three evaluation fields' (and others') theories and practices to help enrich the conceptual elements of ICT4D evaluation?

As a conceptual framework which guide addressing the research questions, I refer to the *six questions of ICT4D evaluation* suggested by Heeks (2018: 126). The questions inform the areas of 'foci' in ICT4D evaluation that I can examine. The six questions of ICT4D evaluation are: (1) "What is the rationale for evaluation?"; (2) "Who is the intended audience for the evaluation?"; (3) "What is to be measured?"; (4) "How are the selected indicators to be measured?"; (5) "At what point in the ICT4D project lifecycle are indicators to be measured?"; and (6) "How are evaluation results to be reported, disseminated and used?" (Heeks, 2018: 126) They essentially

address “Why”, “For whom”, “What”, “How”, and “When” aspects in ICT4D evaluation (Heeks, 2018: 126).

Regarding the purpose of the research questions, answers to RQ1-1 and RQ1-2 would allow us to understand what areas have been regarded as significant and crucial to be addressed in ICT4D evaluation by the researcher community. Also, we would be able to examine if there have been shifts in major foci over time.

Addressing RQ2 mostly concerns identifying how conceptual elements from each of the three evaluation fields *have been* referred to in the ICT4D evaluation field. This can be explored by examining how frequently the conceptual elements of the three fields have been mentioned and how they have been applied in academic journal articles and aid/development agency reports on ICT4D evaluation. The conceptual elements of the three fields subject to examination will be identified and explained in the literature review of this study (Chapter 2).

Addressing RQ1-1 and RQ1-2 would enable us to identify the areas considered as major foci of ICT4D evaluation which need further conceptual refinement. Addressing RQ2 would allow us to understand what elements of the three evaluation fields *can potentially* help conceptually refine ICT4D evaluation’s major foci—but which have not yet been fully explored or utilized. This leads us to RQ3, finding out how the components of the three evaluation fields (or others) can potentially strengthen and enrich the notions of ICT4D evaluation.

The research questions were addressed mainly by content analysis of academic journal articles and aid/development agency reports and interviews of ICT4D researchers in academic and practitioner spheres. Moreover, there was a feedback session on the preliminary findings of this study which illuminates responses to this study from the academia. More details on methodology is discussed in Chapter 3.

The potential contributions of this study on a broader scope and in the long-term can be facilitating discussions among the major stakeholders of ICT4D—including academics, practitioners, policy or decision makers (mostly donors), and project participants in the Global South—in generating a shared understanding of what have been at the foci of ICT4D evaluation and how the field can be strengthened in the future. The completed study can serve as a reference to bring the key stakeholders to the table and identify where the gaps and challenges lie, and how these can be addressed in collaboration. Also, the work may support discussions among the stakeholders to accommodate various perspectives and interests of the ICT4D community in defining what constitutes ICT4D evaluation.

After briefly going over major terms, we will begin with literature review on ICT4D and ICT4D evaluation to identify existing gaps in the literature (Chapter 2). We will then examine program evaluation, IS/IT evaluation, and aid/development evaluation, to identify key concepts, themes, issues, and categorizations (Chapter 2). The review will help deriving areas for coding in the content analysis. After the methodology of this study is explained (Chapter 3), findings (Chapter 4), discussion (including the limitations of the study; Chapter 5) and conclusion (Chapter 6) will be presented.

1.2 TERMINOLOGY

Before moving on to the literature review, let us clarify what this study means by *program, IS/IT*, and *aid/development*.

First, *program* can be defined as "an organized collection of activities designed to reach certain objectives" where "a series of planned actions…are designed to solve some problem" and as a consequence, may "have…an impact upon the program participants" (Royse et al., 2001: 5).

This study follows the view that program is composed of smaller units of *projects* (Cook et al., 1985 cited in Shadish et al., 1991). For convenience, the study will phrase as "ICT4D projects" which essentially indicates "ICT4D projects and programs".

Second, *IS* and *IT* can be distinguished from each other as the following: "IT is a collection of [technological] devices, software and accessories [that deliver and produce information], which when combined might provide a part or all of the delivery mechanism for any IS that uses this mechanism…IS is what emerges from the usage and adaptation of the IT" (Paul, 2007: 194-195; words in [] parentheses added to the original source, and the same applies to direct quotes hereafter). This implies that IS involves not just "technological activity" but the workings of IT in "social, organizational, and human" context (Smithson & Hirschheim, 1998: 162).

Lastly, I adopt the definition of *development* as "a process of change to what is…a more 'advanced' state" (Harriss, 2014: 35). I intentionally concur with the broad conceptualization for this study, to accommodate different views toward development. Yet, I state that my personal views are inclined toward the notion of human development based on Capability Approach (further explained in Chapter 2.1.1). The broad conceptualization of *aid* can be described as "all resources—physical goods, skills and technical know-how, financial grants (gifts) or loans (at concessional rates)—transferred by donors to recipients" for multiple purposes and interests (Riddell, 2007: 17). This study pays attention to aid as a part of development effort but also taking into consideration that discussions on development evaluation has taken place—especially at the international level—with reference to aid effectiveness.

Chapter 2. LITERATURE REVIEW

2.1 ICT4D EVALUATION

2.1.1 *ICT4D*

I clarify that this study uses the terms ICT(s) *for* development (ICT4D) and ICT(s) *and* development (ICTD) interchangeably. This follows the views of Richard Heeks—whose works have significantly contributed to conceptualizing and theorizing the field of ICT4D—as he argued in his recent book that researchers are now using the terms with little distinction (Heeks, 2018). However, I also recognize and respect dissenting views. To illustrate, partly referring to Sterling and Rangaswamy's (2010) conceptualization, Dearden and Tucker (2016: 37) distinguish the two terms, arguing that ICTD indicates "studies of the processes and consequences of technology adoption" whereas ICT4D implies "devising technologies and establishing (socio-)technical interventions to contribute toward development." Therefore, whenever references to previous works have been made in this study, I have tried to consistently refer to the specific term that the author(s) of original work has used, to avoid the possibility of neglecting their intention to differentiate the two terms (although in many cases this is not explicit in the works).

This study employs the definition of ICTs as "devices or techniques that apply knowledge in order to process or communicate [mostly digital] data", which might specifically include radios, computer (softwares), mobile (smart)phones, the Internet, and apps (Heeks, 2018: 9). Correspondingly, ICT4D can be defined as "the application of any entity that processes or communicates [mostly] digital data in order to deliver some part of the international development agenda in a developing country" (Heeks, 2018: 10).[3] More simply, ICT4D is about exploring "how

[3] In the original source of ICT4D definition, Heeks (2018: 9) more narrowly defines the scope of ICT concerned as "digital ICT" (e.g. "smartphones, laptops, computer software, apps, the Internet, etc."), rather than broader

information and communication technologies (ICTs) can be used to help poor and marginalised people and communities make a difference to their lives." (Unwin, 2009: 1)

The literature informs us that the ICT4D field has gone through major shifts in foci. Key points are that, over time, the core concern moved away from technology per se to ICT utilization by target population, and that the approaches changed from 'working *for* the poor' ("pro-poor") to 'working *with* the poor' ("para-poor") to 'working *by*, or *empowerment* of, the poor' ("per-poor") (Heeks, 2008: 29-30, 2018: 28). Moreover, along with changes in development paradigms over time, views toward ICTs shifted. Dominant views on development have moved away from knowledge transfer and economic growth oriented concepts to locally defined and human-oriented interpretation (Heeks, 2018). Along with this, understanding of ICTs changed, from the *key driver* of modernization to an *enabler* of development (Gomez & Pather, 2012) with possible socio-economic risks attached.

ICT4D has been described as a multidisciplinary (Burrell & Toyama, 2009; Ghosh et al., 2015; Marathe et al., 2016; Thapa & Sæbø, 2014; Walsham, 2012, 2017) or interdisciplinary (Patra, Pal, & Nedevschi, 2009) field—the former meaning "people from different disciplines working together, each drawing on their disciplinary knowledge" and the latter implying "integrating knowledge and methods from different disciplines, using a real synthesis of approaches" (Jensenius, 2012 citing Stember, 1991). The associated disciplines with the field include: computer science, information systems, information science, informatics, communication studies, science and technology studies, development studies, anthropology, design science, economics, organization/management studies, governance, political science, sociology, electrical engineering,

"electrical ICT" (e.g. digital ICT plus "analogue technologies like radio and TV"). In comparison, this study refers to "electrical ICT" as concerned ICT4D medium, while recognizing the current predominance of digital ICT.

geography, public health, and possibly others (Ghosh et al., 2015; Heeks, 2018; Thapa & Sæbø, 2014; Walsham, 2012, 2017).

Partly due to its multidisciplinary nature, conceptualizing, theorizing, and scoping of ICT4D have not been easy tasks. Above all, there is largely an implicit agreement that there is no single best theory or framework that can fully explain ICT4D practice and research—supposedly reflecting the significant role and influence of *context* to where the projects or programs are situated in (Pandey & Gupta, 2017) which in turn demands different theoretical foci by case. Accordingly, this study agrees with the view of Avgerou (2017: 10): "…the challenge for ICT4D research is to draw creatively from existing theoretical debates and to construct analytical routes and theoretical propositions suitable for the complex phenomena of ICT and development." From these discussions, we can derive that ICT4D research faces challenges coming from 'theoretical ambiguity' amidst its 'conceptual complexity and richness', largely due to its multidisciplinary roots.

Also of note is the attention to reflexivity or ethical concerns among scholars in the field. This chiefly stems from the postcolonial debate surrounding ICT4D. Nederveen Pieterse (2010: 170) expresses concerns surrounding ICT4D as "the imposition of development model" and argues that placing "technological transformation and market expansion" at the center of ICT4D "recycles conventional modernization thinking" and presents "development naivety". For ICT4D researchers who mostly come from and spend most of their time in the Global North, this implies that they carry the risk of imposing their own socio-cultural and technological lens, which may not truly reflect the needs and values of partners they work with. Similarly, Dearden and Tucker (2016: 37) explain that researchers in the field usually come from "Western, industrialized, educated, rich, and democratic (WEIRD) parts of the world" which can be significantly different from the settings

of ICT4D. They strongly criticize typical practices where the researchers pay short visits to the sites for preliminary studies, return home for deriving solutions, and go back for prototyping and further implementation—describing this as "bungee research" (Dearden & Tucker, 2016: 37). The authors chastise current ICT4D practices which lack meaningful engagement of researchers to understand participants' views and which neglect the need to take a reflexive stance. Burrell and Toyama (2009: 89) suggest reflexive analysis in the field as "thoughtfully considering one's normative assumptions about health, education, technology access, equality, family roles, etc." and "engaging seriously with alternative perspectives one encounters in the course of research and then reviewing one's own struggles to accept or understand".

Moving away from techno-centric or techno-deterministic approach which views that technological changes inevitably lead to progress in society (Wyatt, 2008), an increasing number of ICT4D scholars have turned their attention toward human development and more specifically, Capability Approach. Capability Approach originates from Amartya Sen's definition of development as "a process of expanding the real freedoms that people enjoy" (Sen, 2000: 3) with the emphasis placed on "the expansion of the 'capabilities' of persons to lead the kind of lives they value—and have reason to value." (Sen, 2000: 18). Sen (2000: 75) distinguishes "functioning" from "capability"—the former refers to "the various things a person may value doing or being" whereas the latter indicates "the substantive freedom to achieve alternative functioning combinations" or "the freedom to achieve various lifestyles" which an individual perceives as valuable. Capability Approach implies that "assessments of the well-being or quality of life of a person, and judgements about equality or justice, or the level of development of a community or country, should…primarily focus on…the effective opportunities that people have to lead the lives they have reason to value." (Robeyns, 2006: 351) As opposed to the views which equate

development with economic growth assessed mainly by income, gross domestic product (GDP), and gross national product (GNP) figures, those who lean toward human development argue for alternative means of assessment such as Human Development Index (HDI; examines aspects of life expectancy and education along with income figures), which in turn influenced the content of Millennium Development Goals (MDGs) and later, Sustainable Development Goals (SDGs) (Dearden & Tucker, 2016).

Despite its good claims to utilize ICT for positive change in everyday life in the Global South, there have been a number of failures in ICT4D. Heeks (2002: 101-102) suggested a categorization of IS projects in the developing world: "total failure" ("of an initiative never implemented or in which a new system was implemented but immediately abandoned"), "partial failure" ("in which major goals are unattained or in which there are significant undesirable outcomes"), and "success" (where "most stakeholder groups attain their major goals and do not experience significant undesirable outcomes"). Based on the numbers suggested in previous surveys, he claims that around 20% to 25% of the IS projects in the advanced economies are total failures, nearly one-third to 60% partial failures, and only a small proportion are success—he expects that the ratio of failed projects is not likely to be lower in the developing countries (Heeks, 2002). The situation does not seem to have improved significantly over time. Based on Heeks's (2002) notions of failure and success, Dodson et al.'s (2013: 23) study found that 70% of selected articles in Information Technologies and International Development (ITID) journal (28 out of 40 papers) explicitly or implicitly demonstrated negative outcomes related to ICT "use, uptake, or adoption" in the developing communities.

ICT4D failures let us realize that ICTs themselves are not the panacea for development, but only a *facilitator* in the course (Gomez & Pather, 2012; Mthoko & Khene, 2017). Pertaining to

this study's topic, we can derive the importance of ICT4D evaluation from the above discussions—it allows us to thoroughly examine ICT4D projects and help us understand what essentially works or does not work. Moreover, knowledge and lessons generated from the evaluations may provide an invaluable input to project designs in the field, potentially preventing future failures. ICT4D evaluation is clearly not something new and its significance has been broadly recognized by scholars and practitioners. We now turn to what has been understood as ICT4D evaluation and what models and frameworks have been proposed.

2.1.2 *ICT4D evaluation*

Heeks (2008) argues that the major lesson learned from the ICT4D 1.0 era—i.e. during the 1990s when there had been rising interests in rural telecenters and subsequent failures—is that delivery of information, quick and easy implementation of technologies, and tangible outcome per se are not the keys to ICT4D success. He explains that experiences from ICT4D 1.0 era and skepticism toward "hype and uncorroborated stories" led to the interest in "objective impact evaluation" (Heeks, 2008: 27). This had been also a sensitive issue to the stakeholders as funders of projects had become increasingly curious about what socio-economic impact the projects can actually deliver, as they were hoping to see evidence to support their expenses (Earl et al., 2013). The heightened interests in evaluation among ICT4D researchers were illustrated in the findings of Heeks's (2014) review of development informatics[4] literature, where he found that ICT4D evaluation was often addressed in the studies.

[4] Heeks (2018: 11) explains the term "development informatics" as his attempt to differentiate research from practice. He perceives "ICT4D as a field of practice" whereas "development informatics as the academic sub-discipline that studies this field of practice".

It has been argued that there have been shifts in ICT4D evaluation foci along with major changes in key topics in the field over time—during 1990s, it was about assessing the ICT "read[iness]" of the Global South; around the time of the new millennium, it became evaluating the "availability" of, or access to, ICTs; in 2000s, attention was paid to examining ICT adoption and use ("uptake") by the target population; from 2010s, accumulated experiences in the field allowed assessing "the actual development impact" of ICT (Heeks, 2018: 125).

Heeks (2018: 125-126) explains that ICT4D evaluation can be based around the following six questions: "what is the rationale for evaluation?"; "who is the intended audience for the evaluation?"; "what is to be measured?"; "how are the selected indicators to be measured?"; "at what point in the ICT4D project lifecycle are indicators to be measured?"; and "how are evaluation results to be reported, disseminated and used?" No single evaluation approach or methodology in ICT4D evaluation is the best and it is the purpose and context of evaluation that determine which is more appropriate among possible options (Earl et al., 2013). There can be various ways to group ICT4D evaluation approaches, and one possible categorization can be the following: "generic" (those which can be applied to any project, e.g. cost-benefit analysis); "discipline-specific" (related to a specific academic discipline, e.g. economics, Capability Approach, etc.); "issue-specific" (linked to a certain development goal or issue, e.g. gender evaluation methodology (GEM)); "application-specific" (focusing on a single technology, e.g. assessing telecenter performance); "method-specific" (centered on a specific data collection method or approach, e.g. qualitative methods such as participatory methods and ethnography, or quantitative methods such as randomized control trials (RCTs)); and "sector-specific" (focusing on a particular sector in development, e.g. e-health, e-governance, etc.) (Heeks, 2018: 126-128).

Researchers have highlighted different aspects of ICT4D research or evaluation. For example, in addressing the question of "what constitutes good ICTD research?" Burrell and Toyama (2009: 82, 92) highlight the following questions to be considered which imply the need to pay attention to planning, design, and application of research methods during ICT4D evaluation: "what should one look for in a study using baseline and post-intervention surveys?"; "what are the criteria for judging economic modeling in ICTD work?"; "what standards do we expect an ethnography to be held to?"; and "how should user interface designs built for poor, illiterate communities be evaluated?" Some recognize the importance of a holistic view like Qureshi (2017), who suggests a theoretical lens which can be applied to examine development outcomes of ICT4D projects, mainly focusing on those pertaining to healthcare, education or agriculture. The lens includes four interrelated areas for consideration, i.e. unit of analysis, intervention, ICT, and outcomes, based on the recognition that: ICT4D success is highly influenced by relevant ICT infrastructures, investments, and policies; analysis approach may differ according to the unit of interest; and that the choice of development outcome for examination would affect study's contribution (Qureshi, 2017). These different approaches in ICT4D evaluation commonly illuminate the complexity of interdependent factors and shed light on the significance of *context*—which might include factors coming from the geographical setting of implementation as well as the dynamics brought about by the projects (Hayes & Westrup, 2012).

The complexity illustrated above hints us to our next point on challenges in ICT4D evaluation. Dearden and Tucker (2016) explain that, in ICTD we are essentially dealing with a social phenomenon (i.e. development) rather than a mere technical issue, and that it is challenging to define development itself. Subsequent difficulties arise in deciding which evaluation indicator(s) to use, in either situations where we choose to define development as "an observable process that

is naturally occurring within societies" or as "an active interventions designed to move social conditions in particular directions" (Dearden & Tucker, 2016: 38). Furthermore, evaluation itself is not value free (Earl et al., 2013) which adds to the complexity. Also, the use of RCT as a traditional approach to establish impact in program evaluation faces some significant challenges in ICT4D setting due to the everchanging contexts and technologies, expansive scope of ICTs in multiple domains, and the indirect connection between ICT and expected impacts (Souter, 2008 cited in Earl et al., 2013). All of the factors might have contributed to the tendency that impact evaluation in ICT4D often addresses easy-to-measure aspects, i.e. technical and financial elements, rather than examining impact on broader areas of development (Thapa & Sæbø, 2014). In alignment with this, Gomez and Pather (2012: 7) explain the reason behind the lack of robust evaluation framework covering across tangible—often linked with technical and financial aspects—and intangible impacts as "the sheer complexity of the task of measuring the impact of information on development, the lack of appropriate impact indicators, and the difficulty to collect relevant data." The authors point out that the focus on statistics and tangible economic growth indicators, along with "scattered anecdotes of success" and "the detailed documentation of outputs and outcomes" altogether fail to provide a concrete picture of "larger social or economic impacts", which are the keys to improve policies and program undertakings (Gomez & Pather, 2012: 8). Mthoko and Khene (2017: 2 citing Pade & Sewry, 2009) list the following as the current shortcomings and challenges in ICT4D evaluation which well-summarize the above points: "the difficulties of accounting for unexpected benefits"; "developing evaluations that are sensitive to rural contexts"; "the need for diverse indicators"; "the lack of community participation in conducting the evaluation"; "evaluations becoming political and risk being subjective"; "insufficient funding and resources to conduct evaluations"; "the time-dependent nature of ICT4D

programs"; "not considering all stakeholders"; and "no direct and causal relationship between ICT and poverty alleviation".

Gomez and Pather (2012: 9) explain that during the "early" phases of ICTD evaluation we have paid attention to assessing quantifiable and tangible outputs such as number of users and computers, e-literacy rate, and bandwidth consumption rate, and then during the "intermediate" phase we focused on evaluating economic and mostly tangible outcomes including creation of income and business opportunities. Recognizing the difficulty in capturing social development values in tangible forms and the limitations of macroeconomic models—frequently adopted by international agencies—in establishing the link between IT investments and policies and socio-economic change, the authors argue that in "mature" phase, we need to shed light on intangible impacts such as "aspirational outcomes", "citizen empowerment", and "individualized motivator factors" (Gomez & Pather, 2012: 9). This shift in ICT4D evaluation is aligned with the changes in views toward development that we have witnessed over the years, i.e. from the modernization paradigm highlighting economic growth and transfer of technology from the Global North to the Global South, to a more holistic, human-oriented views (Gomez & Pather, 2012).

2.2 PROGRAM EVALUATION

2.2.1 *Concept of program evaluation*

Reviewing the definition of program evaluation, its difference from other similar inquiries, and its significance and challenges will help us grasp key notions, foci, and issues in the field. First, in terms of conceptualization, Weiss (1998) argues that the notion of evaluation covers a range of judgments made but what they all have in common is the concept of judging merit. Accordingly, her definition of program evaluation highlights judging quality or value against a set of standards:

"the systematic assessment of the operation and/or the outcomes of a program…, compared to a set of explicit or implicit standards, as a means of contributing to the improvement of the program..." (Weiss, 1998: 4). For Posavac and Carey (1997), needs, planning, and cost elements are important in explaining program evaluation: determining "whether a human service is needed and likely to be used, whether the service is sufficiently intensive to meet the unmet needs identified, whether the service is offered as planned, and whether the service actually does help people in need at a reasonable cost without unacceptable effects." (Posavac and Carey, 1997: 2). In comparison, Stufflebeam and Coryn (2014: 14) emphasize the process of program evaluation and what information it tries to capture: "the systematic process of delineating, obtaining, reporting, and applying descriptive and judgmental information about some object's merit, worth, probity, feasibility, safety, significance, and/or equity." Despite the differences in foci, the conceptualizations converge to some extent that program evaluation is about making judgments on program in terms of its value and influence. This also reflects Scriven's (1993) understanding that the task of evaluation essentially lies upon determining merit, worth or value.

In comparison to other types of similar inquiries, Gredler (1996: 14) argues that evaluation is "decision-oriented" rather than "discipline-oriented", unlike educational research. Weiss (1998) claims that what makes evaluation different from other research in general is its intention for use. Fitzpatrick et al. (2011) mirror this thinking and explain that the most important purpose of research is adding knowledge to the field and theory whereas that of evaluation is delivering useful information to program stakeholders. Similarly, Posavac and Carey (1997) mention that whereas basic research's question is largely based on theoretical interest, program evaluators try to address the information needs of people or organizations to strengthen program effectiveness, support

decision making process, and allow public to scrutinize program outcomes. Royse et al. (2001: 2) claim that "program evaluation is a practical endeavor not an academic exercise."

Program evaluation can: provide useful information in making important decisions; improve programs to better address individual and societal needs; facilitate learning culture for organizations; and empower stakeholders who might have been neglected in decision making process (Fitzpatrick et al., 2011). Moreover, it provides a room to consider better ways to address problems and generates valuable input for future program designs (Royse et al., 2001).

2.2.2 *Categorization of program evaluation*

2.2.2.1 Purposes of evaluation: Formative, summative

The terms formative evaluation and summative evaluation were introduced by Scriven (1967). Essentially, formative evaluation is a type of evaluation that generates information during a program's early phases which can become an input for program improvement, whereas summative evaluation produces information about the effectiveness of a program usually after its completion, for decision makers to determine its continuance (Weiss, 1998). In terms of content, in formative evaluation, evaluators: examine goals and priorities of the program; offer guidance in planning by considering possible alternative ways of addressing the concerned problem; and assess planning, implementation, and early results (Stufflebeam & Coryn, 2014). In comparison, summative evaluation would address what was done and achieved, and examine aspects of program success and failure (Stufflebeam & Coryn, 2014). Fitzpatrick et al. (2011) argue that both formative and summative evaluations are important because crucial decisions are made during a program's developmental stages as well as when the program is stabilized and completed.

2.2.2.2 Stages of program: Needs assessment, process, outcome, impact

Another categorization of program evaluation can be based on the stages of program it relates to. First, before starting on planning, evaluation can take place to understand what people need to move to a satisfactory state, i.e. *needs assessment* (Posavac & Carey, 1997). Scriven (1993) defines needs as not the discrepancy between the present and ideal states, but what is required to resolve malfunction—this differentiates needs from desire or want. Through needs assessment, an evaluator should be able to describe and define the problem that stakeholders are experiencing, specify the extent of the problem, and clarify target population (Rossi et al., 2004). Moreover, by working closely with target population through e.g. community surveys, focus groups, and conversations with key informants in the community, an evaluator can learn potentially useful and unacceptable aspects of a program (Posavac & Carey, 1997).

Program *process evaluation* can be defined as "the systematic and continual documentation of key aspects of program performance that assesses whether the program is operating as intended or according to some appropriate standard" (Rossi et al., 2004: 171). It usually addresses whether the program is reaching targets and whether the program meets design specifications or certain standards (Rossi et al., 2004). Process evaluation can be important when the stakeholders are interested in knowing what is happening in the program, to understand why certain outcomes resulted (i.e. why the program was a success or a failure), and to establish a link between outcomes with specific elements of program implementation (Weiss, 1998). What process evaluation differs from formative evaluation is that the former can be carried out anytime during a program whereas the latter usually takes place during the initial development stage (Royse et al., 2001).

In terms of stages of a program, outcome can be defined as the end results for target population of a program which can either be intended or unintended (Weiss, 1998), or either positive or

negative. Weiss (1998) argues that there are cases where impact is used interchangeably with outcome, but it can also imply 'long-term' outcomes.

However, there are others who distinguish outcome (evaluation) vs. impact (evaluation) with a different focus, such as Rossi et al. (2004). According to the authors, outcome evaluation is about assessing "the state of the target population or the social conditions that a program is expected to have changed." (Rossi et al., 2004: 204) They argue that outcome per se does not imply that the program actions actually *cause* changes in the target (Rossi et al., 2004). In contrast, impact assessment seeks to "determine what effects programs have on their intended outcomes and whether perhaps there are important unintended effects." (Rossi et al., 2004: 234) It is essentially concerned with establishing a causal relationship between a program and changes (if any) in its participants or conditions of interest (Rossi et al., 2004).

2.2.2.3 Paradigmatic stances

Theoretical models and approaches in program evaluation seem to be closely related to paradigmatic stances. According to Fitzpatrick et al. (2011), positivism dominated during the early days of evaluation but declined around the time of World War II (Reichardt & Rallis, 1994 cited in Fitzpatrick et al., 2011) with the rise of postpositivism and later constructivism, and more recently transformative paradigm. What seems to have influenced the changes is the way scholars perceive reality—from the notion of objective single reality to that of constructed multiple realities—and the shift of focus from finding the causal links between input and outcomes to understanding context and empowering stakeholders. Royse et al. (2001) argue that other than those mentioned above, realism, determinism, rationalism, empiricism, operationism, parsimony, pragmatism, scientific skepticism, anecdotism, and the rejection of nihilism can be understood as possible philosophical foundations for program evaluation.

2.3 IS/IT EVALUATION

2.3.1 *Concept of IS/IT evaluation*

In defining IS evaluation, Smithson and Hirschheim (1998: 160) emphasize value judgment: "the assessment or appraisal of the value, worth or usefulness of an information system." Carlsson (2003: 11) highlights IS's potential influence on social aspect and goal-based approach: "the evaluation of different aspects of real-life interventions in the social life where IS are critical means in achieving the interventions' anticipated goals". Reviewing the literature, Marthandan and Tang (2010: 337) find that the terms IS success, IS effectiveness, IS evaluation, IS appraisal, and IS impact have been used interchangeably in the IS field, all aimed to capture how IS support organizations to accomplish targeted objectives.

Farbey et al. (1999: 190) define IT evaluation as "a process, or group of parallel processes, which take place at different points in time or continuously, for searching and for making explicit, quantitatively or qualitatively, all the impacts of an IT project and the programme and strategy of which it is a part." Seddon et al. (2002: 12) explain notions of IS evaluation and IT evaluation in an interchangeable manner, as all aimed at "assessing the benefits of IT". Also in many studies, IS evaluation and IT evaluation have been studied compatibly as IS/IT evaluation (e.g. Irani & Love, 2001, 2002; Lin & Pervan, 2001; Song & Letch, 2012; Ward et al., 1996). Thus, IS evaluation and IT evaluation are closely related to each other and past studies have often used the terms and notions together and/or interchangeably—which this study will follow.

IS/IT evaluation can serve a number of purposes: justifying an existing or planned new system; comparing competing alternative systems in terms of their merit; providing better understanding about how to manage an IS/IT project; and generating knowledge on evaluation and systems development for future projects (Farbey et al., 1992). In addition to these, a review of literature

informs that IS/IT evaluation also can: determine the quantitative or qualitative worth of IS/IT; provide a feedback function to the management; and generate understanding of how technology and organizational processes, culture, and politics influence each other (Serafeimidis & Smithson, 2000). Considering the growing significance of IS/IT in organizations, Irani and Love (2008) argue that not only technical aspects of technology should be examined in the evaluation, but also attention should be paid to users who operate the system.

2.3.2 *Changes in views toward IS/IT and implications on IS/IT evaluation*

Over time, there have been changes in the views toward IS/IT among scholars. Symons and Walsham (1988: 119-120) describe the major branches of IS(/IT) research as: (1) *discrete-entity models* (Kling, 1987 cited in Symons & Walsham, 1988) which view technology as a socially neutral instrument with clearly verifiable costs and requirements in expertise; (2) *formal-rational perspective* focusing on what technology could contribute to efficiency and effectiveness of organizations, without much emphasis on human influence; and (3) *socio-technical perspective* which centralizes the "interaction of the 'technical system' with the 'social system'" and optimization of their workings together. (1) and (2) entail traditional views on IS/IT, and the major shift to (3) has been brought about by increased attention to human factors in the workings of IS and understanding IS as "products of history and human agency" (Symons, 1991: 206).

These changes in perspectives toward IS/IT mirrored transitions in IS/IT evaluation paradigm. During its early years, a major reason behind the need for IS/IT evaluation has been to address "IT productivity paradox"—there were difficulties in clearly understanding where and how IT investment pays off in terms of productivity and performance, despite the large amount of expenditure in the area (Irani & Love, 2001; Willcocks & Lester, 1996). It was thought that answers could be found if there was better understanding in evaluation and measurement

(Willcocks & Lester, 1996). Accordingly, traditional focus in IS evaluation has been on cost-benefit analysis (Smithson & Hirschheim, 1998). This emphasis essentially was based on the traditional view on IS/IT as a socially neutral entity, without much consideration of human factors in assessing the effectiveness of its operations, and with the assumption that costs or benefits from IS/IT use are clearly identifiable.

Yet, over the years, this view has been realized as too narrow and more attention has been paid to include a richer examination into human, social, and organizational aspects (Smithson & Hirschheim, 1998). This aligns with the lesson learned over time that "technology is not valuable, meaningful, or consequential by itself; it only becomes so when people actually engage with it in practice." (Feldman & Orlikowski, 2011: 1246). This also reflects the notion of IS as "complex sociotechnical entit[y]" which operates in organizational context (Serafeimidis & Smithson, 2000: 93; Symons, 1991). The notions of IS/IT as a socio-technical object have been associated with the thoughts of some scholars in the field that evaluation is not value free and that it involves various subjective views based on assumptions (Symons, 1991; Symons & Walsham, 1988). Moreover, it has influenced expectations for IS/IT evaluation—that it should be sensitive to the diverse and dynamic nature of contexts—based on the understanding that a particular methodology appropriate for a certain context, time, and audience may not be suitable for other situations (Serafeimidis, 2002). More specifically, Symons (1991) argues that interactionist lens should be applied in IS evaluation, i.e. examining the effects of IT as a product of interaction between technical and social aspects. These perspectives have been more evident in interpretive approach compared to technical/functional or economic/financial streams in IS/IT evaluation—all of which will be explained in Chapter 2.3.3.

2.3.3 *Categorization of IS/IT evaluation: Technical/functional, economic/financial, interpretive*

Technical/functional evaluation centralizes IT components, and the key interest lies on improving factors such as the *efficiency* of technical performance—"reduc[tion] of cost of performing a particular process or task by utilizing information technology" (Fitzgerald, 1998: 16)—, resources management, capacity, and reliability (Serafeimidis, 2002). The focus on efficiency is related to its primarily interest in assessing system quality and a system's direct outputs (Song & Letch, 2012). It is based on the notion that inputs and outcomes are tangible and the assumption that meaningful numbers can be assigned and be analyzed (Serafeimidis, 2002). This stream closely reflects positivism and formal-rational perspective where an IS is assessed without much consideration of its interactions with human factors and organizational context (Serafeimidis & Smithson, 2000). Under this branch of thought where the emphasis is on assessing technical aspects, primarily actors of evaluation are an organization's IT department and senior managers, and users' views may be indirectly reflected through their responses to questions (Song & Letch, 2012).

Economic/financial stream views IT as a capital investment and moves the focus of evaluation away from a narrow spotlight on IT performance, toward the quality of outputs and how the created output generates a desired set of outcomes (Serafeimidis, 2002). At the core of the approach lies *effectiveness*, which can be assessed in terms of outcomes such as IT value, IT use, and user satisfaction (Song & Letch, 2012). Although this approach is similar to technical/functional stream as it also primarily assesses tangible and quantifiable inputs and outcomes of IS/IT, it is distinct mainly in two ways: it addresses more of human and social aspects as it situates technology use in organizational context; and involves a broader range of stakeholders in evaluation process,

including technicians, managers in business, experts in economics, finance, and accounting, users of the IS/IT, and users of its outputs (Serafeimidis, 2002). Evaluations adopting this approach are sometimes referred to as IS/IT investment appraisal. Method-wise, cost-benefit analysis has been frequently mentioned throughout the literature. Some specific financial analysis methods that are frequently referred to in IS/IT investment appraisal include measuring or calculating: payback period (PP), accounting rate of return or return on investment (ARR/ROI), internal rate of return (IRR) or net present value (NPV) (Berghout & Renkema, 2001; Milis & Mercken, 2004). Other methods under this approach look at economic or behavioral science aspects, such as assessing productivity and user satisfaction (Serafeimidis, 2002).

The relatively heavy focus on tangible, financial aspects of IS/IT appraisal has led to the criticism that it cannot examine qualitative benefits and indirect costs of IS/IT (Irani & Love, 2002). Moreover, financial aspect oriented IS/IT evaluation may support management's objectives but not so much of other stakeholders' interests, and this might lead to sub-optimal level of benefit (Milis & Mercken, 2004). Correspondingly, it has been argued that traditional IS/IT appraisal methods may be appropriate for the private sector—such as in making decisions on adopting manufacturing capital equipment—but might not be suitable in assessing complex public sector IS that seeks to enhance service delivery (Irani & Love, 2002; Jones, 2008).

Interpretive perspective in IS research is "aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by its context." (Walsham, 1993: 4-5) In contrast to positivistic stance and its support for discovering an objective reality, interpretive IS research posits that "our knowledge of reality is gained only through social constructions such [as] language, consciousness, shared meanings, documents, tools, and other artifacts." (Klein & Myers, 1999: 69; Walsham, 1993) Accordingly,

interpretive IS evaluation is essentially focused on understanding different interests of multiple stakeholders and contextual meanings and values of IS/IT, and addresses intangible, qualitative, and in-direct objectives, and dynamic effects of IS/IT (Song & Letch, 2012). This approach recognizes the significance of IS users as social actors who are capable of evaluating IS, making suggestions, and providing opinions on its usefulness (Jones, 2008). To sum, interpretive IS evaluation research acknowledges "the value of contextual, qualitative and subjective data"—in contrast to the traditional technical/functional and economic/financial approaches mentioned above ("mechanistic" approach in Jones's (2008) terms) which are primarily based on economic notions and which largely neglect organizational and contextual aspects (Jones, 2008: 247).

2.4 AID/DEVELOPMENT EVALUATION

2.4.1 *Concept of aid/development evaluation*

Effectiveness in aid/development can be defined as managing aid/development efforts in a way that maximizes their contribution and impact (Organisation for Economic Co-operation and Development (OECD), n.d.-a). There was pervasive skepticism toward the effectiveness of aid during the mid-1990s as the aid receiving countries were not escaping poverty—since then, scholars worldwide and international organizations such as the World Bank have invested much effort to examine aid effectiveness (Collier & Dollar, 2001). The impact of aid/development is still of debate. In this context, assessing the effectiveness of aid/development activities is crucial to determine whether they can truly make desirable contribution to betterment in life and improvement in standard of living (Riddell, 2007)—ultimately for us to make value judgments on whether the development community as a whole is "doing the right thing" (Crawford & Bryce, 2003: 366).

Scholars in the development field understand that evaluation is a complex political activity involving methodological decisions and judgment of worth or merit (Stewart, 2005). It is argued that good development evaluation implies transparency, truth supported by evidence, credibility ensured by independence, a sense of responsibility, and consideration of process and context (Picciotto, 2011). Moreover, development evaluation should assess relevance of development goals, likelihood of meeting the goals, efficiency of means, sustainability, impact, and contribution of certain actions or interventions to development (Picciotto, 2013). Additionally, it should accommodate changing global environments and understand the potential influence of international agreements in the field (Picciotto, 2003).

Development evaluation has a potential significance in influencing the direction of future development efforts by generating connections between findings and policy (Picciotto, 2013; Stewart, 2005). Also, it has accountability implications as there has been cynicism among the taxpayers of donor countries regarding the workings of international development programs—they demand to know whether the aid really works (Picciotto, 2013).

2.4.2 *International summits and agenda on aid/development*

In this chapter, we will look at major international summits and agenda on aid/development effectiveness. Understanding these is important because, in making value judgment of development goals in projects or programs, evaluators can refer to these as an international consensus and reflect them on their practice. The following international summits and agenda were selected from Dabelstein and Patton (2013) based on their significance reflected throughout the aid/development effectiveness literature.

The history of international aid largely goes back to the post-World War II era with Marshall Plan (the European Recovery Program)—around the time of Cold War, development efforts were

dominated by the politics of Western capitalists and the Soviet Union (Dabelstein & Patton, 2013). Despite the end of Cold War, these donor centric aid/development discourse continued to influence (Dabelstein & Patton, 2013), demanding—rather than 'forming partnerships with'—the countries in the Global South to cooperate with the donors in aid/development governance.

Then a transition came along with the launch of the Millennium Development Goals (MDGs) following the adoption of United Nations Millennium Declaration during the Millennium Summit in 2000 (United Nations (UN), n.d.-a). With the set target year of 2015, eight goals were introduced as an agreed international development agenda among countries and leading development institutions worldwide: eradicate extreme poverty and hunger; achieve universal primary education; promote gender equality and empower women; reduce child mortality; improve maternal health; combat HIV/AIDS, malaria and other diseases; ensure environmental sustainability; and foster global partnership for development (United Nations (UN), n.d.-c). The MDGs not only demonstrated worldwide commitment for supporting development effectiveness, but also created a foundation for Paris Declaration—MDGs listed the key development goals of the global community and Paris Declaration laid out ways for aid implementation to effectively support MDGs and advancement in countries (Dabelstein & Patton, 2013). In terms of development evaluation, it suggested a focus on results (Picciotto, 2002). However, MDGs were criticized for various reasons such as unrealistic goals to be met by the target year, the arbitrary deadline, and not being specific on who is responsible and what means could be utilized (Picciotto, 2002; Poku & Whitman, 2011).

In 2005, Second High Level Forum on Aid Effectiveness took place in Paris, and donor and recipient countries endorsed Paris Declaration on Aid Effectiveness which contains 56 partnership

commitments and 14 targets around five principles (Organisation for Economic Co-operation and Development (OECD), n.d.-a, n.d.-c: 1st page[5]):

- Ownership: "Developing countries set their own development strategies, improve their institutions and tackle corruption."
- Alignment: "Donor countries and organisations bring their support in line with these strategies and use local systems."
- Harmonisation: "Donor countries and organisations co-ordinate their actions, simplify procedures and share information to avoid duplication."
- Managing for results: "Developing countries and donors focus on producing—and measuring—results."
- Mutual accountability: "Donors and developing countries are accountable for development results."

Organisation for Economic Co-operation and Development (OECD) argues that there have been strong support for the agenda from the Global South, donors, global partnerships, and civil society organizations around the world which is partly reflected by the evidence of remarkable increases in annual aid flows from USD 60 billion in 2002 to USD 120 billion in 2008 (Organisation for Economic Co-operation and Development (OECD), n.d.-a). After the Declaration was made, there were heightened expectations about aid governance improvement (Deutscher & Fyson, 2008). Specific partnership commitments were made, linking monitored targets with a horizon of 2010 (Rogerson, 2005). Major contribution of the agenda is that it provides a facilitating environment for aid effectiveness, with a set of universal standards and a support for country-based monitoring (Rogerson, 2005).

[5] The original source does not contain page numbers.

Yet, there have been criticisms on the agenda. Bissio (2007) argues that the Paris Declaration does not effectively resolve power asymmetry between the donors and partner countries in the Global South and that it does not assess if aid is an effective means to reduce poverty or support human rights. He adds that the voices of developing countries are not well-represented in standard-setting or monitoring bodies of the Declaration, i.e. the OECD and the World Bank (Bissio, 2007). Kharas and Linn (2008) point out that while the Declaration's intention is good, its implementation is too slow to significantly influence the achievement of the MDGs—there is essentially a lack of monitoring capability of recipients which leads to excessive donor-oriented monitoring practices with much costs involved. They add that the Declaration sheds less light on private donors such as private foundations and non-governmental organizations (NGOs) (Kharas & Linn, 2008). Rogerson (2005) suggests that to close the gap between what is stated in the Declaration and the reality, more work is needed in areas such as improving cross-country aid allocation balance and long-term predicitability of aid commitments. As a different focus to what is outlined in the Declaration, Kharas and Linn (2008) argued for a greater attention to resolve aid fragmentation and volatility, and working more closely with private actors.

In 2015, the target year for the MDGs, 17 Sustainable Development Goals (SDGs) were introduced as post-MDGs agenda. The goals were set mainly around the themes of ending poverty, protecting the environment, and ensuring prosperity for all with the new target year set to 2030 (United Nations (UN), n.d.-b). It was praised as being more inclusive, involving a broader scope of stakeholders such as middle- and low-income countries, private sectors, and civil society (Clarke, 2015). However, Patterson (2015) points out that some challenges lie ahead for the SDGs—and potentially for development effectiveness—, such as gathering the diverse range of

relevant stakeholders for cooperation, resolving potential conflict of interests among different stakeholders, and ensuring accountability.

2.4.3 *Changes in views toward development and implications on aid/development evaluation*

Views toward development have changed over the last several decades since the World War II ended. Picciotto (1995) provides an overview of the shift in development discourse between the end of the World War II and mid-1990s which can be summarized as the following: a rise in multilateral and bilateral development projects after the World War II, focused on poverty reduction and economic growth; remarkable socio-economic advancement evidenced among developing countries between 1960s and 1990s; despite the achievement, prevailing high levels of poverty and unimproved health status in the Global South led to aid fatigue among the donors; greater attention to humanitarian relief amidst the end of Cold War and the rise of civil conflict within the developing countries; in parallel, increased concerns on accountability and development effectiveness and less attention to ideology in managing aid/development efforts. At the beginning of the new millennium, the MDGs took over the place of economic growth as the goal of development, among the recognition that national income is a poor indicator of socio-economic advancement—unable to capture inequalities, environmental harms, and social conflicts—and the shift in focus toward assessing the *quality* of growth (Picciotto, 2012). The transition process in conceptualizing development took momentum in the aftermath of Asian financial crisis in the late 1990s, and culminated in Sen's definition of development as freedom (Harriss, 2014; Picciotto, 2012; Sen, 1999) which we touched upon earlier (Chapter 2.1.1). This implied a turn away from economic growth centered approach toward "human development"—Anand and Sen (2000: 2029) define this as "expanding 'human capability'"—oriented thinking.

Over time, these changes in focus subsequently influenced the way aid/development was assessed. During the early phases of international development—when the formula for achieving advancement was deemed as a linear process and mostly driven by mass public expenditure investment—relatively more attention was paid to assessing aid/development in monetary terms, using cost-benefit analysis (Picciotto, 1995). Later on, when the paradigm shifted to spotlight the significance of inner-workings of development process in terms of policy, institutional governance, and knowledge, cost-benefit analysis lost its dominant status in aid/development evaluation—evaluators in the field became more occupied with capacity building to address thematic issues such as those related to poverty, environment, and private industries (Picciotto, 1995). White's (2010) work mirrors this analysis and explains that the decreased interest on cost-benefit analysis during the 1980s and early 1990s was brought about by two trends in development: there had been a rise in social interventions which aimed for empowerment and forming social capital and these were viewed as difficult to be analyzed by using quantitative methods; and there had been an increased attention to participatory approaches in development and participatory evaluation. This movement in aid/development evaluation toward capacity building and empowerment also has connections with Sen's notions of development and its emphasis on capability. Recalling from earlier, at the core of Sen's Capability Approach lies the claim which has much implication on development evaluation—that "assessments of the well-being or quality of life of a person, and judgements about equality or justice, or the level of development of a community or country, should…primarily focus on…the effective opportunities that people have to lead the lives they have reason to value." (Robeyns, 2006: 351)

Based on the discussions in the previous chapter, these shifts toward empowerment, capacity building, and participatory approaches in aid/development evaluation parallel what have been

spotlighted in the international development agenda on aid effectiveness—a heightened interest in building partnerships between the donors and developing countries, and supporting the engagement of the Global South in aid/development discourse and evaluation which can be illustrated with keywords such as ownership, alignment, and mutual accountability.

2.5 IMPLICATIONS: PARALLELS ACROSS ICT4D EVALUATION AND THE THREE EVALUATION FIELDS

From the literature review, we can derive initial thoughts on how each of program evaluation, IS/IT evaluation, and aid/development evaluation can be positioned to address the research questions—particularly RQ2 (associations with the three evaluation fields) and RQ3 (conceptual elements from other fields that can potentially enrich and strengthen ICT4D evaluation)—and how they can potentially support strengthening the conceptual basis of ICT4D evaluation. Moreover, we draw initial parallels in historical trends across ICT4D evaluation and the three evaluation fields from the literature review, as a basis for addressing RQ2.

First, from the literature review, we can position each area as a building block to address the research questions in the following ways:

- Program evaluation [insights on assessing ICT4D as a social program]: Program evaluation models, theories, and approaches can provide insights on assessing ICT4D programs as a type of *social programs*, which "make use of ICTs to facilitate social change" (Mthoko & Khene, 2017: 8). More specifically, they help us understand what evaluating a program largely entails (i.e. judging merit) and how programs can be assessed (e.g. by focusing on purpose—i.e. formative/summative—or by focusing on stage—i.e. needs assessment/process/outcome/impact). Moreover, program evaluation's notions, theories, and approaches provide *a set of shared basic common language* that can be widely

applicable to evaluation of programs in various disciplines such as IS/IT, aid/development, ICT4D, education, social work, public health, etc.

- IS/IT evaluation [insights on assessing (the use of) ICTs in ICT4D evaluation]: The models, theories, and concepts can provide *richer understanding of how one can view and assess ICT in ICT4D evaluation.* The interpretive views in IS/IT evaluation spotlight *the interactions between technology and humans or organizations* which suggest that it is important to consider human factors as a major determinant in the workings of ICT4D.
- Aid/development evaluation [insights pertaining to the development context of ICT4D evaluation]: Aid/development evaluation literature provides insights on *dimensions pertaining to development context*. Recent aid/development evaluation literature highlights the significance of *interactions among different agents or stakeholders in aid/development* and their potential influence on effectiveness. Moreover, the prevailing perspectives in aid/development evaluation signify humans not only as a key determinant of aid/development effectiveness, but also as the central agent of its ultimate goal—human capacity development or empowerment.

Second, we find key initial parallels in historical trends across the fields which can be summarized as: (1) higher awareness on context; (2) movement away from techno-centric or techno-deterministic approach; and (3) greater attention to interpretivist or human-centered notions. To illustrate, across program evaluation, IS/IT evaluation, and aid/development evaluation, there was a broad movement toward examining contextual dynamics and human or organizational factors. In program evaluation, this was seen in the gradual shift from positivism and postpositivism to constructivism and transformative paradigmatic focus. In case of IS/IT evaluation, this was seen in the deviation from technical and economic approaches to interpretive

approach. Researchers in aid/development evaluation have witnessed transitions from monetary or quantitative focus toward emphasis on capacity building and empowerment. This trend also largely mirrored in ICT4D evaluation, in terms of growing attention to intangible and human-oriented aspects, moving away from the previous emphasis on quantifiable and tangible aspects (as illustrated in Gomez & Pather, 2012).

From the literature review, we have started to grasp the key conceptual elements of the three evaluation fields (which will be presented in more detail in Chapter 3.1.3. where we explain the areas for coding derived from the literature review). These would be the elements that this study mostly refers to in examining the associations between ICT4D evaluation and each of the three evaluation fields (addressing RQ2) and in identifying the components from the three fields that can potentially strengthen and enrich ICT4D evaluation (addressing RQ3). With this foundation, let us now examine the methodology chosen to address the research questions.

Chapter 3. METHODOLOGY

Table 3.1 states the research problem and research questions presented in Chapter 1.1 and illustrates their connections with necessary information to address the research questions and corresponding research methods. Following sub-chapters will explain rationale, data collection, and data analysis for content analysis, interviews, and feedback session on preliminary findings.

3.1 CONTENT ANALYSIS

3.1.1 *Rationale for content analysis*

Content analysis was designed to be conducted for addressing primarily RQ1-1 (major foci of ICT4D evaluation), RQ1-2 (changes in major foci over time), and RQ2 (associations between ICT4D evaluation and the three evaluation fields)—which in turn would generate implications for answering RQ3 (conceptual elements from other fields that can potentially enrich and strengthen ICT4D evaluation).

The primary reason this study chose content analysis of text—i.e. academic journal articles and aid/development agency reports on ICT4D evaluation—is to understand the trend of ICT4D evaluation's major foci among the broad researcher community in the field and how (and if) the concepts from the three areas of evaluation have been paralleled or applied by academics and practitioners. Referring to Drisko and Maschi (2016) on the possible purposes of using content analysis, employing the method would allow to navigate the views—pertaining to the research questions—of a large number of ICT4D researchers across a time period, within a practical timeframe of data collection.

Table 3.1 Connections among problem, research questions, and data collection methods

Context, Problem	Research questions (RQs)	Rationale for RQs with respect to the problem	Needed information to address the RQs	Data collection methods
Context: Despite the growing interest in assessing the effectiveness and impact of ICT4D, ICT4D evaluation is yet to be seen as a field with a clear consensus on what it constitutes. *Problem:* The need to identify the major foci, gaps, and challenges of ICT4D evaluation and explore ways to strengthen its conceptual elements and resolve prevailing issues—to enhance its standing as a field of its own, to which researchers can be aware of its expected criteria and practice in a broad sense.	RQ1-1. What have been at the major foci of ICT4D evaluation?	To understand (1) what issues, themes, and questions are regarded as important in ICT4D evaluation; (2) what areas need further conceptual refinement to enhance ICT4D evaluation's robustness as a field.	Key foci ("foci" as informed by the areas presented in the Heeks's (2018: 126) six questions of ICT4D evaluation) that have emerged in ICT4D evaluation and their changes over time (if any).	Primary: Content analysis (for RQ 1-2, later changed to interviews as the primary data collection method)[6] Secondary: Interviews
	RQ1-2. Have there been changes in the major foci of ICT4D evaluation over time?			
	RQ2. What have been the associations between ICT4D evaluation and (a) program evaluation, (b) IS/IT evaluation, and (c) aid/development evaluation?	To ultimately enrich ICT4D evaluation (linked to RQ3), examine its associations with other evaluation fields with a long history of rich discourse and/or strong foundation of models, theories, and approaches that can help improve or clarify the conceptual underpinnings of ICT4D evaluation.	The models, theories, concepts, and approaches from the three fields (program evaluation, IS/IT evaluation, and aid/development evaluation) and other disciplines; which and how conceptual elements from each of the three (and other) fields *have been referred to* in ICT4D evaluation field.	Basis: Literature review Primary: Content analysis Secondary: Interviews
	RQ3. What conceptual elements can be suggested from the three evaluation fields' (and others') theories and practices to help enrich the conceptual elements of ICT4D evaluation?	To identify what elements of the three (and other) fields can potentially help conceptually refine ICT4D evaluation's major foci—but which have not yet been fully explored or utilized.	The models, theories, concepts, and approaches from the three (and other) fields; concepts (linked to the major foci of ICT4D evaluation) that need further refinement (if any); which and how elements from each of the three (and other) fields *can potentially* strengthen and enrich ICT4D evaluation's conceptual underpinnings.	Basis: Literature review Primary: Interviews Secondary: Content analysis

[6] During the data collection and analysis process, it was found that only a few or even zero number of the reviewed articles or reports were published in some years between 2000 and 2018. Therefore, it was decided that number of articles or reports cannot be used as a numeric indicator for analyzing changes in the major foci of ICT4D evaluation over time (i.e. not feasible to do quantitative content analysis). Therefore, RQ 1-2 was later changed to be examined primarily through interviews.

Possible limitations in conducting content analysis to address the research questions may stem from the sampling process of the articles and reports. More specifically, the articles and reports selected for the analysis may not cover all relevant data—there might be works that can provide valuable insights in addressing the research questions, and yet are not included due to inclusion/exclusion criteria (explained in Chapter 3.1.2). Moreover, even if I gain knowledge pertaining to the research questions from the content analysis, I cannot ask the authors of the analyzed articles or reports for clarification or further elaboration. Furthermore, unintentionally, my assumptions regarding the research questions may override and influence the findings from the analysis through confirmation bias.

To mitigate the above possible limitations, I conducted individual, semi-structured interviews to directly engage with ICT4D researchers and capture their perspectives beyond what the texts can illuminate. Also, I triangulated findings from the content analysis with that from the interviews to avoid any significant systematic researcher bias. For this triangulation purpose, the target pool of potential interviewees included the authors of the analyzed articles or reports.

3.1.2 *Data collection of content analysis*

This part of the study can be further divided into two sub-sections: content analysis of (1) selected academic journal articles and (2) aid/development agency reports on ICT4D evaluation. It was expected that analyzing the former would illuminate prevailing views in the academia whereas examining the latter would help understand perspectives existing in the practitioner sphere on ICT4D evaluation.

For journal articles, I selected those which have ICT4D evaluation as the main topic. The articles subject for review were those that were published between 2000 and 2018. 2000 was chosen as the starting point because: it is the year from when the major international movements

in recognizing and promoting ICT as a tool for development have been seen, such as the establishment of the Digital Opportunity Task Force at the G8 Summit (2000), World Summit on the Information Society (WSIS) in Geneva (2003) and Tunis (2005), etc. (Gomez, 2013); also when the MDGs were introduced which is a significant milestone of global commitment to development effectiveness (Dabelstein & Patton, 2013). The articles were selected from six different journals, including the top three journals in ICT4D journal impact ranking table (Heeks, 2010a), i.e. Information Technologies and International Development (ITID), the Electronic Journal of Information Systems in Developing Countries (EJISDC), and Information Technology for Development (ITD). Moreover, as this study intends to explore associations between ICT4D evaluation and the three other fields of evaluation, one top journal from each of program evaluation, IS/IT, and development were selected: Evaluation, Management Information Systems (MIS) Quarterly, and World Development. For further explanation about the selection of the latter three journals, please see Appendix A. An initial pool of relevant articles subject for content analysis were formed with those that concern ICT projects in the developing countries context, with words "evaluation" or "assessment" (or their variations) appearing at least once in title, abstract or keywords sections. From the initial pool, even if "evaluation" or "assessment" (or their variations) appear at least once in title, abstract or keywords sections, if it is found that the content of the journal article does not cover ICT4D evaluation as a topic and/or does not describe ICT4D evaluation practice at all, it was excluded from content analysis.

Second pool for content analysis was aid/development agency reports on ICT4D evaluation. The list of aid/development agencies came from OECD's (2016) report which contains names and profiles of member organizations of OECD Development Assistance Committee (OECD-DAC)

Network on Development Evaluation (EvalNet).[7] Project reports of EvalNet members that concern evaluating ICT4D were chosen by looking at the title and contents. The reports were accessed either through DAC Evaluation Resource Centre (DEReC) website (http://www.oecd.org/derec/) or by searching through each EvalNet member's website, particularly 'publications' section. The full list of EvalNet members is provided in Appendix B.

During the selection of articles and reports for content analysis, inclusion/exclusion criteria were further detailed (Appendix C). A total of 108 articles and 114 reports were analyzed (please see Appendix D for a full list of reviewed articles and reports).

3.1.3 *Data analysis of content analysis*

For each of the selected articles and reports, the areas presented in Appendix E were initially reviewed for coding, using NVivo software.

In determining which aspects of the works to be coded—i.e. the codes presented in Appendix E—a few stages of decision process took place. First of all, the areas for coding were chosen based on the research questions that content analysis was designed to primarily address. As Table 3.1 presents, these research questions were "RQ1-1. What have been at the major foci of ICT4D evaluation?" and "RQ2. What have been the associations between ICT4D evaluation and (a) program evaluation, (b) IS/IT evaluation, and (c) aid/development evaluation?"[8]

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[7] EvalNet is a subsidiary body of OECD-DAC and a network for gathering evaluation managers and specialists from evaluation units of OECD development cooperation ministries and agencies, regional development banks, the World Bank, IMF and UNDP (Organisation for Economic Co-operation and Development (OECD), 2015). Its primary goal is to improve effectiveness of development cooperation through supporting high-quality evaluation and evaluation cultures and practices of member organizations (Organisation for Economic Co-operation and Development (OECD), 2015).

[8] "RQ1-2. Have there been changes in the major foci of ICT4D evaluation over time?" was also originally planned to be addressed primarily through content analysis but during the data collection and analysis process, it was found that only a few or even zero number of the reviewed articles or reports were published in some years between 2000 and 2018. Therefore, it was decided that number of articles or reports cannot be used as a numeric indicator for analyzing changes in the major foci of ICT4D evaluation over time (i.e. not feasible to do quantitative content analysis). Therefore, RQ 1-2 was later changed to be examined primarily through interviews.

According to the research questions chosen to be primarily studied through content analysis, codes for each areas of “general information of the article or report”, “areas of foci based on Heeks's (2018: 126) six questions of ICT4D evaluation”, “ICT4D evaluation”, “program evaluation”, “IS/IT evaluation”, and “aid/development evaluation” (i.e. areas of codes presented in Appendix E) were derived from the literature review (Chapter 2).

To address RQ1-1, the codes for “general information of the article or report”, “areas of foci based on Heeks's (2018: 126) six questions of ICT4D evaluation”, and “ICT4D evaluation” were included. The codes for the above three categories were adapted from Gomez (2013) and Heeks (2018).

To address RQ2, codes emerged from the literature review as core aspects to understand each of the three evaluation fields (e.g. purpose/stage/paradigmatic stance of evaluation in program evaluation; approaches in IS/IT evaluation; notions of development and development agenda in aid/development evaluation). Moreover, codes were added to capture any specific models, theories or frameworks from each of ICT4D evaluation and the three evaluation fields that were applied, suggested or mentioned in the reviewed materials.

As I conducted content analysis, areas for coding were added or removed based on their relevance and feasibility of coding during the iterative coding and analysis process. A code added was “other evaluation models, theories or frameworks”, in order to capture any evaluation models, theories or frameworks that do not come from ICT4D or the three evaluation fields but have been applied, suggested or mentioned in the reviewed articles or reports. The list and rationale for removed codes are explained in detail in Appendix E.

For other researchers who want to use the code scheme this study has refined and developed, they should first determine which research question(s) they would like to primarily examine

through content analysis, and then adapt the coding scheme according to the question(s). For example, if a study explores major foci and evaluation models, theories or frameworks of ICT4D evaluation, he/she does not have to include codes under the areas of "program evaluation", "IS/IT evaluation", and "aid/development evaluation", as these are intended to examine associations with the three fields. Also, according to the type of material that is being analyzed, the feasibility of using specific codes might differ. For example, this study excluded thematic or sectoral reports on ICT4D in general which does not assess a particular ICT4D project. However, if one focuses on analyzing thematic or sectoral reports, codes such as "ICT subject to study" would be less relevant compared to "domain of ICT4D work".

3.2 INTERVIEWS

3.2.1 *Rationale for interviews*

The second data collection method was individual semi-structured interviews of academics and practitioners working in the ICT4D (evaluation) field. The aim was to address all research questions by interviews, but with relatively more emphasis on RQ3 (conceptual elements from other fields that can potentially enrich and strengthen ICT4D evaluation).

At the core, individual interviews provide the opportunity to understand the lived experiences and to directly elicit the perspectives of people who are at the heart of the research context. This well aligns with this study's need to understand the views of academics and practitioners in the ICT4D (evaluation) field, beyond what the articles and reports can inform and deliver. This applies to gaining necessary information for addressing all the research questions of this study, but particularly for the following areas which were expected to be not explicitly addressed across the analyzed articles and reports, and yet are central in addressing RQ3: (1) concepts (linked to the

major foci of ICT4D evaluation) that need further refinement and (2) which and how elements from each of the three fields (or other disciplines or practices) can potentially strengthen and enrich conceptual underpinnings of ICT4D evaluation.

Moreover, interviews can help engage in in-depth conversations with the researchers to access their views based on specific accounts of their experiences in the field. In the process, one can probe for clarification and ask for supporting examples to understand the strength and context of their perspectives. In accordance with these expectations, this study conducted semi-structured interviews, which can be "flexibly administered in order to capture the perspectives of participants as far as possible while ensuring that interviewees focus on issues relevant to the study." (Williamson, 2013: 361)

A possible limitation is that, the findings from the interviews might not be transferable to reflect the views of a broader community of ICT4D researchers outside those who were interviewed. Triangulation of interview findings with content analysis results was crucial to mitigate the limitation, as the latter will draw perspectives pertaining to the research questions—albeit in less direct ways compared to the interviews—from a wider pool of ICT4D researchers.

Similarly to the case of content analysis, cautions were made so that my own personal assumptions and viewpoint do not override to the extent that I ask and probe to confirm my thoughts. As a way to ensure this, the list of possible interview questions was checked with the members of supervisory committee before its implementation, to ensure that they are not leading questions.

3.2.2 *Data collection of interviews*

Primary target pool of interviewees was the authors of the analyzed articles or those working in the EvalNet member organizations of the analyzed reports. Secondary target pool of interviewees

was those who are not one of the selected articles' authors nor working in the EvalNet member organizations of the analyzed reports, but have been working in the field of ICT4D as an academic and/or practitioner for at least some time period. They were either identified through snowball sampling or by the author of this study. In case of the latter, there was a consideration to differentiate the interviewees based on other criteria such as the domain of work or years of experience in ICT4D. Potential interviewees were recruited and contacted mostly through emails and other online platforms. There were 24 interviews. The interviews were conducted via phone calls or other online video or audio communication platforms including Skype and Zoom, and one interviewee provided a written response. The length of the interviews varied between around 20 minutes and 1 hour and 30 minutes.

Examples of interview questions asked are shown in Appendix F. In addition to the responses, each interviewee was asked: country or regional focus of his/her work in the ICT4D field; domain of ICT4D he/she most closely identifies his/her work with; number of experience years in the ICT4D field; and broad type of research method he/she frequently adopts in ICT4D research (in case of interviewees from academia).

3.2.3 *Data analysis of interviews*

The interview transcripts were coded using NVivo software. A set of broad codes were derived based on the topics that were asked (e.g. "foci of ICT4D evaluation", "associations with other fields", "challenges in ICT4D evaluation", etc.). The approach was thought to be reasonable since the interview questions closely reflect the research questions that this study ultimately aims to answer. Within each broad code, different themes were identified from the responses. Analysis and writing of findings were organized around the identified themes.

3.3 FEEDBACK SESSION ON PRELIMINARY FINDINGS (CHANGE SEMINAR)

3.3.1 *Rationale for feedback session*

Another round of data collection was carried out as a feedback session on the preliminary findings from the content analysis and interviews. Presentation of preliminary findings and feedback session took place during a seminar class organized by Computer Science and Engineering (CSE) department at the University of Washington. The Change Seminar graduate course meets weekly during the quarter and invites guest speakers working in various areas related to ICT4D field who can share their research and experiences. The course is open to the University of Washington's graduate students, faculty members, and staff who are interested in the topic of ICT4D.

The session was not originally included in the dissertation proposal but was later added to the study with the purpose of: (1) triangulating the findings with the experiences and understanding of graduate students, faculty, and staff members of the University of Washington (2) understanding where the gaps lie in the presentation of findings and analysis, and derive room for improvement for the final draft of dissertation and possible areas for future research; and (3) contributing to the broader ICT4D community as part of knowledge sharing practice.

Originally, the feedback session was planned to be held as an open session in one of the international ICT4D/ICTD conference venues where academics and practitioners with expertise and experiences in the field can gather and share their thoughts about the preliminary findings of this study. However, due to personal circumstances, the author of this study could not attend the conference and therefore it was decided to be held instead in the Change Seminar. If the session was held at the conference, a greater number of academics and practitioners could have discussed on the findings for a longer period of time. This could have facilitated much discussion on the topic of this study, such as through a combination of small group and plenary discussions.

Moreover, considering that there were several attendees (around eight out of 20 attendees who responded on the feedback sheet) at the Change Seminar feedback session who have been interested in the ICT4D field for three years or less, it is likely that the conference participants on average would have worked for more number of years in the field. Therefore, if the session was held during the conference, more in-depth discussions could have taken place on the topic of ICT4D evaluation and the preliminary findings based on the participants' own experience. However, the author highly valued the opportunity to present the findings and hear feedback during the Change Seminar, because the seminar is open to graduate students, faculty, and staff of any department (i.e. reflecting the breadth of backgrounds of the attendees) and it provided a chance to hear from those who are relatively new to the field—whom can offer fresh eyes on the topic—along with participants with relatively more experience in the ICT4D field.

3.3.2 *Data collection of feedback session*

On February 26th, 2019, the feedback session was held under the title "ICTD project evaluation: Exploring its foci and current gaps." The session took place for around one hour. During the session, background and preliminary findings of this study were first presented. Feedback response sheet (Appendix G) was distributed and collected, and plenary Q&A time took place. Participation in the session and filling out the response sheet were voluntary. Three main questions asked for feedback were: (1) "How well does the findings reflect your understanding or experience in the ICTD field?"; (2) "Were there findings that you expected? Were there other findings that you were surprised to see?"; and (3) "What are holes in the findings? What would you want to explore further? What clarification is needed?"

There were 20 response sheets collected in total (not every attendee filled out the response sheet).

3.3.3 *Data analysis of feedback session*

Similarly to interview analysis, the data from the feedback sheet was first categorized by the three broad topics of questions that were asked (i.e. the extent to which the findings reflect one's understanding or experience in the ICTD field; expected or unexpected findings; holes in the findings that need clarification or further exploration). Afterwards, themes were identified within each topic.

Chapter 4. FINDINGS

The chapter will present findings from analyzing data gathered from three different methods: content analysis, interviews, and feedback session on preliminary findings.

4.1 CONTENT ANALYSIS[9]

108 academic journal articles and 114 aid/development agency reports were selected for content analysis according to the inclusion/exclusion criteria (Appendix C). The findings from content analysis are organized by the following areas: **overview of the reviewed journal articles and reports** (published year and venue, continental/regional context, domain of ICT4D work, and ICT or related subject to study); **research or evaluation approach and method** (type of research or evaluation question, paradigmatic stance, research method or approach, and scope or level of analysis); **aspects of ICT4D evaluation** (aim or rationale for evaluation, subject of evaluation, target audience for evaluation, and timing of evaluation); **aspects of IS/IT evaluation** (approaches in IS/IT evaluation, IS/IT adoption, acceptance, use models or theories applied); **aspects of aid/development evaluation** (notions of development, development agenda); and **evaluation models, theories or frameworks** (of ICT4D evaluation, the three evaluation fields, and others). During the analysis process, it was decided to remove some codes (evaluation procedure, forms of reporting/disseminating/utilizing evaluation results, approaches in ICT4D evaluation, purpose of evaluation, stage of evaluation). Rationale for the removal is explained in detail in Appendix E.

[9] For tables in this chapter, whenever it has "(multiple codes possible)" in the table title, it means that multiple different codes at the same level may have been applied to a single reviewed work.

4.1.1 *Overview of the reviewed journal articles and reports*

This chapter will present a general overview of the reviewed works, covering areas of: **published year**, **published journal venue or associated aid/development agency or government department**, **continental or regional context**, **domain of ICT4D work**, and **ICT or related subject to study**.

4.1.1.1 Published year and venue

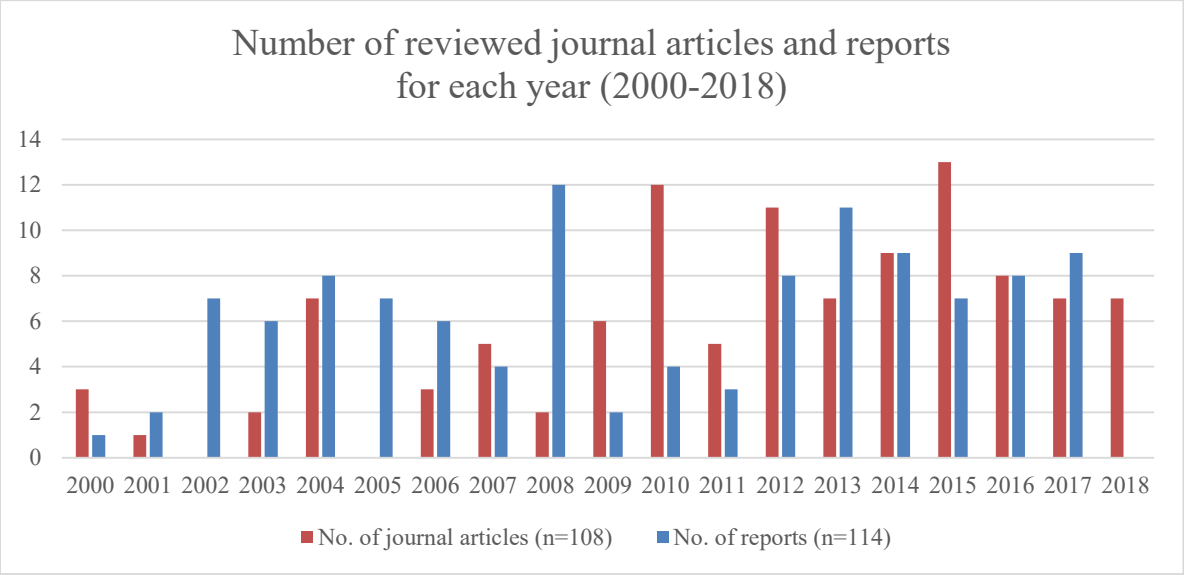

Figure 4.1 Journal articles, Reports: Published year

Figure 4.1 shows the number of reviewed articles and reports published in each year. It shows that there was a broad distribution across the period subject to study (2000–2018), and that they were in small numbers in each year. Moreover, only a few or even zero number of the reviewed articles or reports were published in some years. Therefore, it was decided that number of articles or reports cannot be used as a numeric indicator for analyzing changes in the major foci of ICT4D evaluation over time (RQ 1-2; please refer to Table 3.1).

Table 4.1 Journal articles: Published venue

Journal venue	% of journal articles
The Electronic Journal of Information Systems in Developing Countries (EJISDC)	**51.9**
Information Technology for Development (ITD)	**21.3**
Information Technologies and International Development (ITID)	**20.4**
World Development	4.6
Evaluation	0.9
Management Information Systems (MIS) Quarterly	0.9

Looking at the journal venue that the reviewed articles were published (Table 4.1), around half of them came from EJISDC and almost all of them came from *the three ICT4D journals (i.e. EJISDC, ITD, and ITID)*. Only a handful came from World Development, Evaluation, and MIS Quarterly. This is not surprising, considering that the inclusion/exclusion criteria were designed to select articles which contain all components of ICT, development (and developing countries context), and evaluation. Based on the sources, we can regard the findings from the selected journal articles presented in the following chapters to reflect mostly that of the three ICT4D journals.

Table 4.2 Reports: Associated aid/development agency or government department (multiple codes possible)

Associated aid/development agency or government department	% of reports
Japan International Cooperation Agency (JICA)	**32.5**
United States Agency for International Development (USAID)	**25.4**
United Nations Development Programme (UNDP)	**17.5**
Korea International Cooperation Agency (KOICA)	**11.4**
Swedish International Development Cooperation Agency (Sida)	6.1
Department for International Development (DFID; the U.K.)	2.6
Lux-Development (LuxDev; Luxembourg)	2.6
Australian Agency for International Development (AusAID)	0.9
Danish International Development Agency (Danida)	0.9
Italian Cooperation Agency	0.9
Ministry of Foreign Affairs of Finland	0.9

Most of the reviewed reports were on projects or programs conducted *by JICA, USAID, UNDP, and KOICA* (Table 4.2). Reports from the four agencies accounted for more than 80% of the reviewed reports. Therefore, the findings from the reviewed reports presented in the subsequent chapters can largely be regarded as pertaining to those of the four aid/development agencies. The rest of the reports were on projects or programs carried out by aid/development agencies or government departments of Sweden, the U.K., Luxembourg, Australia, Denmark, Italy, and Finland.

4.1.1.2 Continental or regional context

Table 4.3 Journal articles: Continental/regional context (multiple codes possible)

Continent/Region*	% of journal articles
Africa	**54.6**
Asia**	**23.1**
Latin America and the Caribbean	11.1
Middle East	10.2
Europe	0.9
Not specific	4.6

*Excluded: U.S.A. (three articles, including cases where projects were carried out in collaboration with countries in the Global South, or as a part of benchmark country group for measuring e-government development of Arab countries), Denmark, Sweden, the U.K., South Korea, and Australia (each mentioned once in an article as a part of benchmark country group for measuring e-government development of Arab countries).
**Excludes Middle Eastern countries.

In terms of continental/regional context, more than half of the reviewed journal articles concerned ICT4D evaluation in *African countries* (Table 4.3). This was followed by *Asia* (23.1% of the reviewed articles), Latin America and the Caribbean (11.1%), Middle East (10.2%), and Europe (0.9%). In terms of individual country, there was a noticeable number of articles examining cases in South Africa (12.0%) and India (10.2%).

Table 4.4 Reports: Continental/regional context (multiple codes possible)

Continent/Region*	% of reports
Asia**	**54.4**
Africa	**23.7**
Middle East	14.9
Europe	7.0
Latin America and the Caribbean	7.0
Oceania	2.6

*Excluded: "Asian and Pacific countries", unclear list (one report each).
**Excludes Middle Eastern countries.

Of the reviewed reports, around 54% and 24% examined cases in *Asian and African countries* respectively (Table 4.4). This was followed by Middle East (14.9%), Europe (7.0%), Latin America and the Caribbean (7.0%), and Oceania (2.6%). This is comparable with journal articles—within the scope of the reviewed materials, Asia and Africa seem to have received much attention in both types of venues, although the orders of first and second ranks are different. In terms of individual country, the number of reports on projects that took place in Vietnam and Jordan (each being 8% of the reviewed reports) was notable. However, for reports, it is worthwhile to note some factors which would have led to over-representation of the degree of focus on a particular continent/region (which also applies to subsequent chapters on content analysis findings from the reviewed reports)—e.g. some of the reviewed reports were part of an evaluation sequence on the same project (e.g. Light et al. (2008), Light & Rockman (2008), Method (2008) on Jordan Education Initiative; Chetwynd & Chetwynd (2007) and Chetwynd et al. (2008) on Kosovo Media Assistance Program).

4.1.1.3 Domain of ICT4D work and ICT or related subject to study

Table 4.5 Journal articles: Domain of ICT4D work (multiple codes possible)

Domain of ICT4D work	% of journal articles
Government	**21.3**
Education, training, skills development	**20.4**
Health	18.5
Community	17.6
Business, industry, markets	16.7
Agriculture	13.0
Empowerment	8.3
Rural development	8.3
Environment	1.9
Gender	1.9
Media*	1.9
Youth	1.9
Aspirations	0.9
Civil society	0.9
Household (expenditures)	0.9
Public safety	0.9
Unclear	1.9

*Excluding cases where media is merely used as a medium of a project of another domain.

The reviewed works showed associations with various domains as Table 4.5 illustrates. ICT4D projects in one or more domains of *government* (e.g. e-government, government IS), *education/training/skills development* (e.g. ICT-based learning tools, e-learning), *health (*e.g. health IS, mobile phone based tool for maternal health), *community* (e.g. community information centre, telecenters, community radio programs), *business/industry/markets* (e.g. Palestinian hotel websites, IS used by small and medium-sized enterprises (SMEs)), and *agriculture* (e.g. mobile-based price information and marketing service for farmers, animated video based educational programs for agricultural topics) were more prevalent compared to those in other domains among the reviewed articles. Moreover, there were a range of disciplines referred to in the literature review section of the reviewed articles (examples shown in Table 4.6 below). They not only included those closely related to ICT or development (e.g. communication media,

IS/IT/technology, development) but also other comparably more remote disciplines (e.g. education, health, psychology, sociology).

Table 4.6 Journal articles: Associated academic discipline(s)
(if addressed in literature review; multiple codes possible)

Discipline	Journal article examples
Communication media	Negash (2010)
Design studies	Emmanuel & N. (2010)
Development (e.g. human development, Capability Approach, empowerment)	Alam & Wagner (2016), Corbett & Keller (2004), Dasuki & Abbott (2015), Dasuki et al. (2017), Madon (2004), Nyemba-Mudenda & Chigona (2018), Prinsloo & de Villiers (2017), Vincent & Cull (2013), Mooketsi & Chigona (2014)
Education or learning	Andersson & Hatakka (2010), Bass & Heeks (2011), Bello-Bravo et al. (2018), Jobe & Hansson (2014), Negash (2010), Mooketsi & Chigona (2014)
Health	Bernardi & de Chiara (2011)
IS, IT, technology (including adoption, acceptance)	Akeel et al. (2013), Bwalya (2009), Chopra & Rajan (2016), de Vreede et al. (2003), Guclu & Bilgen (2011), Harry et al. (2014), Mooketsi & Leonard (2013), Mtebe & Raisamo (2014), Ndiege et al. (2012), Negash (2010), Neupane et al. (2012), Odit et al. (2014), Tully (2015), Mooketsi & Chigona (2014)
Organizational studies, management	Bailur (2006), Fenenga & de Jager, (2007), Lind et al. (2000), Molla & Bhalla (2006)
Political science (e.g. politics and power)	Dasuki & Abbott (2015), Neupane et al. (2012)
Psychology	Toyama (2018)
Public administration, governance	Guclu & Bilgen (2011), Kettani et al. (2008)
Sociology	Bernardi & de Chiara (2011), Latifov & Sahay (2012), Miscione (2007), Negash (2010), Tully (2015)

Table 4.7 Reports: Domain of ICT4D work (multiple codes possible)

Domain of ICT4D work	% of reports
Education, academic, research, training, skills development, human resources development	**45.6**
Government	**27.2**
Media*	14.9
Environment	9.6
Internet or telecommunications	7.9
Business, industry, markets	7.0
Community	5.3
Health	5.3
Agriculture	3.5
Empowerment or capacity building	3.5
Humanitarian assistance	2.6
Rural development	1.8
Youth	1.8
Financial services (in various fields)	0.9
Civil society	0.9
People with disabilities	0.9

*Excluding cases where media is merely used as a medium of a project of another domain.

Among the reviewed reports, there were a significant number of projects associated with *education, research, and skills development related domains* (e.g. multimedia classroom, computer software technology training center, computer skills training for government officials), as well as those related to *government* (e.g. government IS, district e-service center), *media* (e.g. production of radio programs, renovation of studio facilities and transmitting station) and *environment* (e.g. climate information and early warning system, environmental information management and monitoring system) domains (Table 4.7).

Table 4.8 Journal articles: ICT or related subject to study (multiple codes possible)

ICT or related subject to study	% of journal articles
Information systems	**22.2**
Phone-based tools or services*	**18.5**
e-government or e-governance projects**	13.9
Online web-based tools without gadget specificity	13.0
Telecenters or information centers	12.0
Computer, computer-based tools or services (including computer labs)	9.3
Media or media-based tools	6.5
ICT or IS education	3.7
Infrastructure (e.g. IT infrastructure, network infrastructure)	2.8
Application or software without gadget specificity	1.9
Cybercafés	1.9
Libraries (as public access venues)	1.9
Rural ICT (no specific application)	1.9
ICT in healthcare delivery (no specific application)	0.9
ICT in education (no specific application)	0.9
Audio recording device	0.9
Podcasting	0.9
Point of sales (POS) machines and smartcards	0.9

*Includes mobile phone based tools or services (17 articles), automated telephony service (1), interactive voice response (IVR) (1), fixed line based service (1).
**Excludes government IS; this is included under "Information systems".

As presented in Table 4.8, in terms of ICT or related subject to study, there were a significant number of articles examining *information systems* (e.g. information systems in Libyan oil companies, health information systems, computerized electricity management system, group support systems, land information system, legal information system) and *phone-based tools or services* (e.g. mobile based price information and marketing service for farmers, SMS service for confirmed attendance of clinic staff, mobile payment system, IVR channel usable for telephonically reporting public safety matters). There were also a notable number of works assessing *e-government or e-governance projects*, *online web-based tools without gadget specificity* (e.g. Palestinian hotel websites, Nigerian bank websites), *telecenters or information centers*, and *computer or computer-based tools or services* (e.g. One Laptop per Child, computer game, computer lab).

Table 4.9 Reports: ICT or related subject to study (multiple codes possible)

ICT or related subject to study	% of reports
ICT or IS related education	**36.8**
Information systems	**21.9**
Media or media-based tools	17.5
Infrastructure	14.9
e-government or e-governance projects*	10.5
Information centers	8.8
Computer, computer-based tools or services (including computer labs)	7.9
Mobile phone based tools or services	5.3
Online web-based tools without gadget specificity	4.4
Training for ICT in education	0.9

*Excludes government IS; this is included under "Information systems".

More than a third of the reviewed reports were on *ICT or IS related education* (e.g. IT skills training courses for instructors, people with physical disabilities or government officials, upgrading of existing IT course, etc.) (Table 4.9). This was followed by *information systems* (e.g. environmental information management system, climate information and early warning system, human resources information system, education management information system), *media or media-based tools* (e.g. production of radio programs, improving radio broadcasting stations), *infrastructure* (e.g. Internet connectivity, telecommunications network, infrastructure supporting e-learning), *e-government or e-governance projects*, and *information centers* (e.g. Union Information Service Center (providing services such as Internet access, email, digital photos, printing, and training), Humanitarian Information Centre, Regional IT Center (for computer training activities, vocational training program, out of school program, etc.)). The rest included computer-, mobile- or online web-based tools or services, and training for ICT in education.

4.1.2 *Research or evaluation approach and method*

This chapter will examine research or evaluation approach and method of the reviewed works, including: **type of research or evaluation question**, **paradigmatic stance**, **research method or approach**, and **scope or level of analysis**.

4.1.2.1 Type of research or evaluation question

For coding type of research question (or evaluation question in case of reports), types found in Gomez (2013)—as a result of analyzing 948 ICTD papers published in selected peer reviewed journals and conferences between 2000 and 2010—were used as an initial list of codes. They included: "access", "conceptual", "descriptive", "measurement and improvement", "social change", "technology", and "learning"[10]. The broad categories well captured the types of research question in the reviewed articles (and reports), with some adaptation from Gomez (2013) of what each entailed (please see Appendix H for details of what each type entails and how it was adapted from Gomez (2013)).

Access research questions assessed topics around types of ICT access (e.g. telecenters, cybercafés, libraries). *Conceptual* research questions concerned presentation or testing of evaluation models, theories, methods or frameworks. *Descriptive* research questions: examined projects, experiences, and context; made comparisons of different ICT4D project cases; and addressed strengths, weaknesses, opportunities or potentials. *Measurement and improvement* research questions: assessed effectiveness, performance or results/outcomes/impact; examined benefits, barriers, challenges or influential factors (to project success or implementation, etc.).

[10] "Learning" was removed from the code list of this study. The rationale was that, from the inclusion/exclusion criteria, this study excluded works examining *the precondition to use* ICTs (e.g. assessing ICT use skills) to focus on works which evaluate ICT4D *projects or programs* (program evaluation being one of the main associated areas of this study).

Social change research questions looked into broad social impact associated with project implementation such as empowerment, public benefit, civic participation, etc. *Technology* research questions were concerned with: evaluating technology related issues, such as design and testing; and examining ICT acceptance or adoption factors, etc.

Table 4.10 Journal articles: Type of research question (multiple codes possible)

Type of research question	% of journal articles
Measurement and improvement	**67.6**
Descriptive	**35.2**
Technology	**33.3**
Conceptual	**26.9**
Social change	18.5
Access	5.6

As Table 4.10 shows, around one-third of reviewed articles' research questions were on *measurement and improvement*, followed by *descriptive*, *technology,* and *conceptual* questions. The significant percentage of measurement and improvement type of research questions is not surprising, considering that the articles selected had aspect of ICT4D evaluation according to the inclusion/exclusion criteria. It is notable that social change research questions were relatively less seen, considering the attention that human development and socio-economic development notions receives in the field (as illustrated later in Chapter 4.1.5.1).

Table 4.11 Reports: Type of research or evaluation question
(including proxy; multiple codes possible)

Type of research or evaluation question (including proxy)	% of reports
Measurement and improvement	**64.9**
Descriptive	14.0
Social change	13.2
Technology	7.0
Conceptual	3.5
Access	2.6
No clear statement of objective, rationale or main subject of evaluation	**35.1**

In contrast to the journal articles, research or evaluation questions were often not clearly stated in the reports, and thus statements on objective, rationale or main subject of evaluation were coded as a proxy to research or evaluation questions for around half of the reviewed reports. Still, there were around one-third of the reviewed reports (nearly all on JICA's projects) which did not have a clear statement on the above elements and thus could not be coded. This largely stems from the formatting of the reports. For example, JICA's evaluation reports in general followed a strict formatting which straightly dived into evaluation aspects (mostly on relevance, effectiveness, efficiency, impact, and sustainability) without stating the above elements. From a more inclusive perspective, we can broadly regard the reports on JICA's projects as addressing (implicit) measurement and improvement and descriptive evaluation questions. Excluding reports with no clear statement of objective, rationale or main subject of evaluation, *measurement and improvement* research or evaluation questions appeared relatively more often than other types. (Table 4.11).

4.1.2.2 Paradigmatic stance

Table 4.12 Paradigmatic stances explained by Cecez-Kecmanovic and Kennan (2013)

	Positivist	**Interpretive**	**Critical**
Ontology	Objective, stable reality	Subjective, socially constructed reality	"Transcends objective-subjective poles and assumes reality is socially constructed but nevertheless perceived as objectively existing"
Epistemology	"[S]tatements about reality are true only if they are repeatedly not empirically falsified"	It is about "understanding of others' lifeworlds and experiences"	"Knowledge enables people to see hidden forms of control, domination and oppression, which empowers them to seek change and reform existing conditions and social order"

*Source: Adapted from Cecez-Kecmanovic and Kennan (2013: 123).

For the purpose of coding paradigmatic stances of evaluation, four strands were considered: positivist, interpretivist, critical-transformative, and pragmatic. Conceptualization of the first three were referred from Cecez-Kecmanovic and Kennan (2013) (Table 4.12). Critical and pragmatic stances were narrowly defined in this study. First, critical-transformative paradigm is closely related to transformative-emancipation paradigm which can be "characterized by the intentional collaboration with minority and marginalized groups or those whose voice is not typically heard on particular issues" and emphasizes "attention to power, privilege, and voice" (Shannon-Baker, 2016: 326 referring to Mertens, 2003). Works which reflect or emphasize developing evaluation capacity of project participants or stakeholders—i.e. shifting the power away from external evaluators—were coded as critical-transformative. Second, pragmatic paradigm was defined in this study as 'a combination of different paradigmatic stances'—for example, in cases where a journal article or a report reflects both positivist and interpretivist paradigms, the work was coded as pragmatic.

Table 4.13 Journal articles: Paradigmatic stance of evaluation

Paradigmatic stance of evaluation	% of journal articles
Interpretivist strand	**61.1**
Positivist strand	**20.4**
Pragmatic	16.7
Critical-transformative strand	1.9

Of the reviewed journal articles, around 60% reflected *interpretivist* approach, followed by *positivist (or postpositivist)* (20.4%), and pragmatic approach (16.7%) (Table 4.13). It is notable that only two of the reviewed articles reflected critical-transformative approach.

Among the reviewed articles, Lennie et al. (2015) was one of the rare works illustrating critical-transformative paradigm in evaluation, as it explained evaluation capacity development (ECD) in detail. At the core of ECD is evaluation capacity building (ECB) of the project participants and stakeholders in designing and carrying out research and evaluation, instead of an external evaluator having the full evaluative control and authority. ECB is explained as the following (Preskill & Boyle, 2008: 444 cited in Lennie et al., 2015: 327):

> "ECB involves the design and implementation of teaching and learning strategies to help individuals, groups, and organizations, learn about what constitutes effective, useful, and professional evaluation practice."

Assessing Communication for Social Change (AC4SC) project applied a participatory methodology examining social and behavioral changes associated with Equal Access Nepal's (EAN) radio programs. In the project, 11 community researchers (CR) were trained by the EAN staff on participatory assessment tools and techniques, such as the most significant change (MSC). The CRs were young people with good access to community network who were listeners of the evaluated radio program, and who were capable of carrying out evaluation and reporting the results.

The CRs were seen as playing an important role in "documenting and observing the process of gradual change in a community and gathering what they referred to as 'in-depth', 'honest' and 'genuine' information." (Lennie et al., 2015: 333)

Table 4.14 Reports: Paradigmatic stance of evaluation

Paradigmatic stance of evaluation	**% of reports**
Interpretivist strand	**96.5**
Positivist strand	1.8
Pragmatic	1.8
Critical-transformative strand	0.0

Nearly all of the reviewed reports were *interpretive* (Table 4.14). Only a small number of reports reflected (post)positivist or pragmatic approach. It is notable that none of the reviewed reports could be coded under critical-transformative approach. There was a remarkably less variance across the reviewed reports compared to the reviewed articles (Table 4.13). This may be due to the standard format the aid/development agencies (particularly the ones which a majority of the reviewed reports in this study come from) use for evaluation report writing. For example, OECD-DAC's criteria for evaluating development assistance (including relevance, effectiveness, efficiency, impact, and sustainability) (Organisation for Economic Co-operation and Development (OECD), n.d.-b) can be more feasibly assessed by adopting interpretivist lens compared to other paradigmatic approaches.

4.1.2.3 Research method or approach and scope or level of analysis

Table 4.15 Journal articles: Research method or approach

Research method or approach	% of journal articles
Qualitative*	**50.0**
Quantitative	**26.9**
Mixed methods	18.5
Not specific**	4.6

*Including cases where a research employed qualitative approach, analyzing supplementary quantitative data along with qualitative data collected.
**Including cases where evaluation framework or related theories were introduced without research method or approach specificity.

On type of research method or approach, half of the reviewed articles were *qualitative*, followed by *quantitative* (26.9%), and mixed methods (18.5%) (Table 4.15).

Table 4.16 Reports: Research method or approach

Research method or approach	% of reports
Qualitative*	**64.9**
Mixed methods	**31.6**
Quantitative	2.6
Unclear**	0.9

*Including cases where a research employed qualitative approach, analyzing supplementary quantitative data along with qualitative data collected.
**Only a summary of the report available and there is not enough description about research method or approach.

In comparison, around two-thirds of the reviewed reports were *qualitative*, followed by *mixed methods* (31.6%), and a small minority being quantitative (2.6%) (Table 4.16). Of note is that a significant number of reports from certain aid/development agencies (such as JICA) did not clearly state specific research or evaluation method used. Therefore, coding expanded to cover the type of research approach taken that is reflected in the analysis.

Table 4.17 Journal articles: Primary scope or level of analysis

Primary scope or level of analysis	% of journal articles
Country	**42.6**
Community, city, region, etc. (smaller geographical or administrative unit within a country)	17.6
Multiple countries	13.0
Organization (e.g. companies, hospitals, farming cooperatives, etc.)	12.0
Project per se or type of project (e.g. telecenters, rural ICT4D projects, etc.)	8.3
Individual	5.6
Household or family	0.9

In coding primary scope or level of analysis, the coder essentially asked herself "what level is the evaluation about?" Of the reviewed journal articles, around 40% were on *country level*, followed by *smaller geographical or administrative unit within a country* (17.6%), *multiple countries* (13.0%), and *organization* (12.0%). The rest were on project level, individual, and household or family (Table 4.17).

Table 4.18 Reports: Primary scope or level of analysis

Primary scope or level of analysis	% of reports
Project - Organization (e.g. schools, universities, training centers, radio stations, etc.)	**48.2**
Project - Country	**34.2**
Project - Community, city, region, etc. (smaller geographical or administrative unit within a country)	8.8
Project - Individual	5.3
Project - Multiple countries	3.5
Project - Other adjacent level not applicable	0.9

All of the reviewed reports were primarily evaluated at the *project* level. Considering the venue and purpose of the reports, their *primary* focus of analysis was on assessing at project level, rather than deriving broader implications (although this can be part of objectives, such as by

examining lessons learned and listing recommendations). Moreover, according to the inclusion/exclusion criteria, this study excluded thematic or sectoral reports that do not address a particular project(s) or program(s)—which could have been written for the purpose of analyzing ICT4D projects at a different level than project level. Therefore, secondary scope or level of analysis was coded (Table 4.18)—which can be understood as the scope or level of analysis a work is most closely related to, after project level. Around half of the reviewed reports had *organization* as secondary level, followed by *country* (34.2%). The rest were divided by smaller geographical or administrative unit within a country (8.8%), individual (5.3%), and multiple countries (3.5%).

4.1.3 *Aspects of ICT4D evaluation*

The chapter will discuss findings related to some of the aspects of ICT4D evaluation highlighted by Heeks (2018): **aim or rationale for evaluation**, **subject of evaluation**, **target audience for evaluation**, and **timing of evaluation in the ICT4D project lifecycle**.[11]

4.1.3.1 Aim or rationale for evaluation

Table 4.19 Journal articles: Aim or rationale for evaluation (multiple codes possible)

Aim or rationale for evaluation	% of journal articles
Examine results or effectiveness	**34.3**
Examine technology or ICT access venues	**24.1**
Examine acceptance, adoption or influential factors	**21.3**
For prospective reasons	**20.4**
Contribute to conceptual work	14.8
Examine what was done	7.4
Other	5.6

[11] Heeks (2018: 126) originally also discussed procedure of evaluation ("[h]ow are the selected indicators to be measured?") and report, dissemination, and use of evaluation ("[h]ow are evaluation results to be reported, disseminated and used?") but codes for the aspects were decided to be removed. Please see Appendix E for rationale for the removal.

A significant number of the articles had the aim or rationale for evaluation as (Table 4.19): *to examine results or effectiveness* (e.g. explore the role of an ICT in achieving development, investigate outcomes, assess effectiveness), *to assess technology or ICT access venues* (e.g. assess usability, explore features/functions, evaluate applicability in different settings), *to understand acceptance/adoption factors or factors influencing project success* (e.g. explore acceptance or success factors, examine opportunities or challenges), and *to evaluate for prospective reasons* (e.g. make recommendations for similar projects, for future sustainability). Other aim or rationale included: *to contribute to conceptual work* (e.g. develop or present evaluation framework/methodology/related concept, suggest guidelines for assessing ICT evaluation for telecentres) or *to assess what was done* (e.g. examine implementation, understand the gap between plan and enactment).

Table 4.20 Reports: Aim or rationale for evaluation (multiple codes possible)

Aim or rationale for evaluation	% of reports
For prospective reasons	**45.6**
Examine results or effectiveness	**35.1**
Assess against objectives or goals	**21.9**
Examine what was done	**19.3**
Examine influential factors	6.1
Examine technology	2.6
Other	5.3
Unclear	**35.1**

Among the reviewed reports, slightly less than half of them had the aim or rationale for evaluation as *prospective reasons* (e.g. achieve better development results by learning, improve similar programs or projects, propose solutions for challenges, come up with strategies for the future, identify room for improvement) (Table 4.20). Other types of aim or rationale that were relatively frequently mentioned included: *to examine results or effectiveness* (e.g. assess

performance, effectiveness, outcomes, impact), *to assess against objectives or goals* (e.g. evaluate if or to which extent the goals or objectives were met, assess whether the project will be able to achieve targets set forth), and *to examine what was done* (e.g. assess activities, strategy, appropriateness of program design). It is notable that the aim or rationale for evaluation was not explicitly clear in around a third of the reviewed reports.

4.1.3.2 Subject of evaluation

Table 4.21 Journal articles: Subject of evaluation (multiple codes possible)

Subject of evaluation	% of journal articles
On project results, outcomes, impact or effectiveness	**52.8**
On influential factors	**37.0**
On technology	**36.1**
On (potential) users*	**19.4**
On project design or implementation	15.7
On prospective aspects	6.5
Other	4.6

*Other than adoption, acceptance or use factors.

Subject of evaluation (Table 4.21) broadly corresponded to the aim or rationale for evaluation (Table 4.19). Areas related to *results, outcomes, impact or effectiveness* (e.g. benefits, drawbacks, social and behavioral change, impact on organizations or governance), *influential factors to outcomes, success or effectiveness* (e.g. contextual factors, acceptance or adoption factors, support from stakeholders), *technology* (e.g. completeness, features, system quality, usability), and *(potential) users* (e.g. user perceptions, satisfaction, engagement with users) were relatively more frequently assessed. Others included *project design or implementation* (e.g. management, strategies, efficiency, financial support), *prospective aspects* (e.g. areas for future improvement, sustainability, future plans), best practices, and utility of evaluation framework.

Table 4.22 Reports: Subject of evaluation (multiple codes possible)

Subject of evaluation	% of reports
On project results, outcomes, impact or effectiveness	**96.5**
On project design or implementation	**84.2**
On prospective aspects	**79.8**
On influential factors	**24.6**
On technology	7.9
On (potential) users*	5.3
Other	7.0

*Other than adoption, acceptance or use factors.

As Table 4.22 shows, nearly all of the reviewed reports assessed *results, outcomes, impact or effectiveness* (e.g. outcomes, impact, effectiveness, performance, success). *Project design or implementation* (e.g. relevance to partner countries' needs or plans, efficiency, management, partnership), *prospective aspects* (e.g. sustainability, replicability), and *influential factors to outcomes, success or effectiveness* (e.g. barriers or constraints, acceptance or contextual factors) were also among the relatively frequently evaluated subjects.

4.1.3.3 Target audience for evaluation

Table 4.23 Journal articles: Target audience for evaluation (multiple codes possible)

Target audience for evaluation (excluding unclear cases)	% of journal articles
Government, policymakers	**35.2**
(Potential) Service providers, implementers, facilitators, or project managers	17.6
Practitioners	16.7
Researchers or academics	16.7
Developers or designers	6.5
Educators	2.8
Investors, sponsors, or funders	2.8
Users or participants	1.9
Evaluators	1.9
IS industry in developing world countries	0.9

Sometimes target audience could be inferred by reading different sections of the reviewed articles such as recommendations or future research. This was coded only when it was clearly stated and

identifiable. *Government or policymakers*, *(potential) service providers/implementers/facilitators/project managers*, *practitioners,* and *researchers or academics* were relatively more frequently mentioned than others (Table 4.23).

Table 4.24 Reports: Target audience for evaluation (multiple codes possible)

Target audience for evaluation (excluding unclear cases)	% of reports
(Potential) Service providers, implementers, facilitators or project managers	**73.7**
Aid/development agencies or funders	**56.1**
Government, policymakers*	**29.8**
Broader stakeholders (e.g. private sector partners, those not specified but mentioned as "key national stakeholders")	7.9
Users or participants	4.4
Evaluators	0.9

*May overlap with service providers, implementers, facilitators, project managers (e.g. e-government projects).

Many of the reviewed reports targeted *(potential) service providers, implementers, facilitators or project managers* in sections such as recommendations (Table 4.24). *Aid/development agencies or funders, government or policymakers* were also relatively frequently targeted. Similarly to the reviewed articles, only a few addressed users or participants as target audiences for the evaluations.

4.1.3.4 Timing of evaluation

Table 4.25 Journal articles: Timing of evaluation in the ICT4D project lifecycle

Timing of evaluation in the ICT4D project lifecycle	% of journal articles
After or near-end implementation	**88.0**
Before implementation	4.6
During implementation	0.0
Not applicable	6.5
Unclear	0.9

Most of the reviewed journal articles' evaluation were done *after or near-end stage of project or program implementation* (e.g. ex-post evaluation of fully scaled up or pilot projects) (Table 4.25).

Only a handful of them concerned evaluation done *before the implementation* (e.g. assess potential or vision, baseline study, needs assessment). It is notable that, among the reviewed, there was none related to evaluation done during the implementation.

Table 4.26 Reports: Timing of evaluation in the ICT4D project lifecycle (multiple codes possible*)

Timing of evaluation in the ICT4D project lifecycle	% of reports
After or near-end implementation	**67.5**
During implementation	**23.7**
Before implementation	0.0
Unclear	10.5

*For example, when a single report examines multiple projects at different stages.

Similarly to the case of the reviewed articles, a significant number of the analyzed reports were on evaluations done *after or near-end of implementation* (e.g. ex-post evaluation of fully scaled up or pilot projects, terminal evaluation) (Table 4.26). However, in contrast to the articles, there were a notable number of analyzed reports on evaluations done *during the implementation* (e.g. mid-term evaluation) and zero number of those done before implementation.

4.1.4 *Aspects of IS/IT evaluation*

This chapter will look at aspects specifically related to IS/IT evaluation, including: **approaches in IS/IT evaluation** and **IS/IT adoption, acceptance, use models or theories applied**.

4.1.4.1 Approaches in IS/IT evaluation

During content analysis of the articles and reports, it was found that works frequently reflected multiple IS/IT evaluation approaches—i.e. having elements of technical/functional, economic/financial, and interpretive approaches (please refer to Chapter 2.3.3 for explanations of

approaches) rather than illustrating a single perspective. Therefore, this study will present examples of areas that were examined through each approach in the reviewed works.

In the reviewed articles, *technical/functional approach* was taken in exploring areas such as: features, functionality, design; usability; durability; technological challenges or factors which affected access and use (e.g. system outage, network coverage, and electricity supply); technical performance; quality of IS/IT; and effect or outcome measured by (quasi)experimental design. *Economic/financial approach* was taken in assessing areas such as: cost or money saved as a result of implementation; cost effectiveness; cost-benefit ratio calculation; cost incurred; financial sustainability; outcome of implementation (e.g. increase in income of participants as a result of implementation, revenue created, sales increase, profit performance); and sufficiency of funding. Example areas analyzed using *interpretive approach* included: influential factors (e.g. to project or program success, adoption); operation or management status; effect, outcome or impact as a result of implementation; participant or user perception (e.g. preference between human interaction vs. technology mediated interaction between teachers and students); patterns of technology use (e.g. of students in classroom setting); challenges and limitations; contextual setting of implementation; and user demands.

In the reviewed reports, *technical/functional* approach was taken in assessing areas such as: appropriateness and timeliness of hardware or software implemented; usability; environment to maintain and use technical equipment (e.g. temperature, space, security); equipment functionality; technical sustainability; technical reliability and performance (e.g. Internet connectivity); and technical equipment or infrastructure status. Example aspects that were assessed via *economic/financial* approach included: financial sustainability (e.g. potential operational and maintenance cost, income generating activities, a need for sustainable financial source, potential

source for funding); if implementation was within planned budget; efficiency in terms of financial resource management; areas of cost consideration (e.g. high cost of Internet access); cost incurred or expenditure; cost effectiveness; revenue increased or cost savings experienced as a result of implementation; and financial rate of return. On the other hand, *interpretive approach* was applied in analyzing areas including: organizational capacity or sustainability (e.g. of implementing agencies); political sustainability (e.g. around government support); support from stakeholders; effect, outcome or impact as a result of implementation; influential factors (e.g. to project or program success, such as ownership); usefulness; participant satisfaction; challenges and limitations; and contextual information (e.g. relevance to national policy or agenda).

4.1.4.2 IS/IT adoption, acceptance, use models or theories applied

Table 4.27 Journal articles: IS/IT adoption, acceptance, use models or theories applied (if any; multiple codes possible)

IS/IT adoption, acceptance, use models or theories	Journal article examples
Technology acceptance model (TAM)	Emmanuel & N. (2010), Mooketsi & Leonard (2013), Neupane et al. (2012), Osah et al. (2014)
Unified theory of acceptance and use of technology (UTAUT)	Chopra & Rajan (2016)
Diffusion of innovations	Tully (2015)
Task-technology fit	Negash (2010)

Some IS/IT adoption, acceptance or use models or theories were applied in several journal articles[12] (Table 4.27). Let us go through a brief overview of the models or theories.

First, *Technology acceptance model (TAM)* is "tailored for modeling user acceptance of information systems", intended "to provide a basis for tracing the impact of external factors on internal beliefs, attitudes, and intentions" (Davis et al., 1989: 985). The ultimate dependent variable of interest for TAM is the (actual) system use (Chakraborty & Rashdi, 2015; Davis, 1989). At the

[12] None appeared in the reviewed reports.

core of TAM lies two constructs to explain system use: “perceived usefulness” (how much an individual believes one’s performance can be improved as a result of a particular system use) and “perceived ease of use” (how much an individual perceives a system can be used without investing one’s effort) (Davis, 1989). TAM posits that one’s attitude toward the system use and perceived usefulness jointly drive behavioral intention, which in turn affects system use (Davis et al., 1989).

As an example among the reviewed articles, Emmanuel and N. (2010: 1) adopted TAM to evaluate user perception of mobile shop-owner interface designed “to promote rural micro-entrepreneurship and economic development” in a rural community in South Africa.

Unified theory of acceptance and use of technology (UTAUT) suggests “an integrated approach for understanding the impact of performance expectancy, effort expectancy, social influence, and facilitating conditions, along with gender, age, experience, and voluntariness of use on the behavioral intention and usage behavior of users of technology” (Chakraborty & Rashdi, 2015: 221 referring to Venkatesh et al., 2003). The four key direct determinants of behavioral intention or use behavior can be defined as the following: (1) “performance expectancy” indicates the extent to which an individual anticipates that the use of a particular system will enhance one’s job performance; (2) “effort expectancy” is associated with perceptions about how easy it is to use the system; (3) “social influence” is about the degree to which a person believes his/her significant referents think one should use the system; and (4) “facilitating conditions” pertain to the extent to which one sees existing organizational and technical bases can facilitate the system use (Venkatesh et al., 2003).

Chopra and Rajan (2016: 15) “validate[d] and extend[ed]” the UTAUT by analyzing the effect of “social influence, performance expectancy, and effort expectancy on salespersons’ satisfaction”

as a result of adopting point-of-sale (POS) machines, use of which was required by India's Chhattisgarh government.

Diffusion of innovations (DOI) or innovation diffusion theory (IDT) originates from sociology[13], and it seeks to explain "the process in which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 2003: 5; Venkatesh et al., 2003). Essentially, it is interested in explaining the "adoption of innovations" (Miller, 2015: 261). Rogers's theoretical framework for understanding DOI was drawn from a review of 506 diffusion studies across various academic fields (Srivastava & Moreland, 2012 citing Rogers, 1962). Rogers (2003 cited in Tully, 2015) suggests that perceived five attributes of innovation affect the adoption of an innovation: relative advantage, compatibility, complexity, trialability, and observability.

Tully (2015) applied DOI to explore what influences the adoption of an open source software by organizations in Nairobi, Kenya. They found trialability and observability as significantly influential factors and added perceived flexibility as another important attribute for understanding the adoption of free, open source technology (Tully, 2015).

Task-technology fit (TTF) model explains that "a better fit between technology functionalities, task requirements, and individual abilities will lead to better performance (i.e., faster or more effective task accomplishment)." (Goodhue, 1995: 1828) The dependent variable of TTF is an individual's performance (Goodhue & Thompson, 1995). The model was built upon the need to strengthen theoretical basis underlying user evaluation of IS quality (Goodhue, 1995). TTF also posits that when technological features and task needs correspond to each other, performance

[13] Although DOI originates from sociology and strictly speaking it is not an IS/IT acceptance theory, it is explained in this chapter due to its frequent appearance in technological innovation adoption in IS/IT literature.

impacts would be generated, assuming that utilization of the technology has taken place (Goodhue & Thompson, 1995).

Negash's (2010) findings confirmed task-technology fit, as they found that medical professional participants appreciated videoconferencing as a means for HIV/AIDS training because the technology's advanced features were well aligned with the complexity of training content.

4.1.5 *Aspects of aid/development evaluation*

This chapter will describe which **development notions** were implied and what **development agenda** were mentioned in the reviewed articles and reports.

4.1.5.1 Notions of development

Table 4.28 Journal articles: Notions of development (multiple codes possible)

Notions of development	% of journal articles
Human development	**28.7**
Economic-oriented development	16.7
Socio-economic development	13.9
Performance improvement	13.0
Process improvement	5.6
Community development	5.6
Rural development	4.6
Sustainable development	4.6
Competence or capacity development	3.7
Social change	2.8
Improved utilization	2.8
Development of information society	1.9
Knowledge related development	1.9
Socio-political development	1.9
Encompassing social, cultural, economic, political development	1.9
Organizational development	1.9
Socio-technical change	0.9
Unclear	4.6

Development notions varied across journal articles (Table 4.28). *Human development*, *economic-oriented development*, *socio-economic development*, and *performance improvement* (e.g. better service delivery, better governance, better performance or productivity, service quality improvement) were relatively frequently implied. While a significant number of articles show some link to human development notions, connections with economic-oriented development notions are also salient.

Table 4.29 Reports: Notions of development (multiple codes possible)

Notions of development	% of reports
Human development	**28.1**
Competence or capacity development	16.7
Performance improvement	14.9
Economic-oriented development	13.2
Socio-economic development	12.3
Development of information society	8.8
Socio-political development	5.3
Sustainable development or address environmental issues	5.3
Institutional or organizational development	3.5
Meet international or global agenda, goals or objectives	2.6
Social change	2.6
Business or industrial development	2.6
Process improvement	1.8
Address (or resolve) humanitarian needs	0.9
Community development	0.9
Rural development	0.9
Unclear	18.4

Like the reviewed articles, reports also illustrated a range of development notions (Table 4.29). *Human development*, *competence or capacity development* (e.g. improved decision making process or capacity; improved monitoring, evaluation or reporting capacity; improved service delivery capacity), *performance improvement* (e.g. better service delivery, better governance, better performance or productivity), *economic-oriented development*, *socio-economic*

development, and *development of information society* (e.g. reduce information gap, resolve digital divide, improved connectivity) were relatively more frequently implied compared to others. Similarly to the case of the reviewed articles, human development notions, economic-oriented development notions, and performance improvement seem to have drawn more attention compared to others.

4.1.5.2 Development agenda

Table 4.30 Journal articles: Development agenda mentioned (if any; multiple codes possible)

Development agenda	% of journal articles
Millennium Development Goals (MDGs)	7.5
Other international development agenda	2.8
National development plan, policy, strategy or agenda	1.9
Sustainable Development Goals (SDGs)	1.9

Around 8% and 2% of the reviewed articles referred to the MDGs and SDGs respectively (Table 4.30). Other mentioned international development agenda included Paris Declaration on Aid Effectiveness, Accra Agenda for Action[14], Monterrey Consensus[15], and Genoa Plan of Action[16].

[14] The outcome of the Third High Level Forum on Aid Effectiveness which took place in Accra, 2008. It suggested four areas for improvement to facilitate and strengthen the implementation of the Paris Declaration: (1) recipient countries' ownership of development processes; (2) inclusive partnerships among donors in and outside OECD-DAC, developing countries, (private) foundations, and civil society; (3) delivering real and measurable results; and (4) supporting capacity development of developing countries (Organisation for Economic Co-operation and Development (OECD), n.d.-c, n.d.-e).

[15] "A set of aid policies guidelines and development priorities, stressing the importance of good governance for achieving development" agreed by "International Development Agencies (IDAs), governments, civil society members and non-government organizations" in Monterrey as the outcome of the Monterrey Conference (the United Nations International Conference on Financing for Development) held in 2002. (Navarra, 2010: 128).

[16] A plan consisting of nine Action Points aimed to promote "all nations' ability to participate in the ICT revolution", introduced by "the Digital Opportunities Task Force (DOT Force)—a body created by the G8 nations at its annual summit in mid-2000." (Roman & Colle, 2003: 86)

Table 4.31 Reports: Development agenda mentioned (if any; multiple codes possible)

Development agenda	% of reports
National development plan, policy, strategy or agenda	**57.9**
Millennium Development Goals (MDGs)	14.9
Other international development agenda or framework	9.6
Sustainable Development Goals (SDGs)	1.8

Compared to the articles, the MDGs appeared significantly more frequently across the reviewed reports (around 15%). SDGs were not mentioned as much (1.8%) (Table 4.31). There was a significant number of reports mentioning national development plan, policy, strategy or agenda (including those formed in collaboration between a partnering country and an aid/development agency)—these mostly appeared when assessing project relevance in relation to a partner country's development plan, policy, strategy or agenda. Other international development agenda or framework including United Nations Development Assistance Framework (UNDAF)[17], Education for All (EFA)[18] goals, and Rio Convention[19] were mentioned in the reviewed reports.

4.1.6 *Evaluation models, theories or frameworks*

This chapter will examine which **evaluation models, theories or frameworks** were applied, suggested or mentioned in the reviewed works.

[17] "A strategic, medium term results framework" which aims to describe how UN "will contribute to the achievement of development results based on a common country analysis and UN comparative advantage." (United Nations Development Group, 2016)

[18] "[A] global commitment to provide quality basic education for all children, youth and adults"; "164 governments pledged to achieve EFA and identified six goals to be met by 2015" at the World Education Forum in Dakar, 2000 (United Nations Educational Scientific and Cultural Organization (UNESCO), 2017).

[19] Derived from the Earth Summit in 1992, the Convention consists of Convention on Biological Diversity (CBD), United Nations Convention to Combat Desertification (UNCCD), and United Nations Framework Convention on Climate Change (UNFCCC)—all aiming to contribute to sustainable development (United Nations Environment Programme (UNEP), n.d.).

4.1.6.1 ICT4D evaluation models, theories or frameworks

Table 4.32 Journal articles: ICT4D evaluation models, theories or frameworks applied, suggested or mentioned (if any; multiple codes possible)*

Primary focus	ICT4D evaluation models, theories or frameworks**	Journal article examples
Generic	Framework to investigate the impact of ICTs in sub-Saharan Africa (Adam & Wood, 1999)	Mthoko & Khene (2018)
	Framework for the assessment of ICT pilot projects (Batchelor & Norrish, 2005)	Mthoko & Khene (2018)
	Guidelines for monitoring and evaluating information and communication for development (Myers, 2005)	Mthoko & Khene (2018)
	Morphological analysis model based on problem structuring methods to select ICT project	Plauché et al. (2010)
	ICT4D process approach (Walton & Heeks, 2011)	Osah et al. (2014)
	Outcome analysis methodology (of investigating the relationship between e-government project implementation and good governance)	Kettani et al. (2008)
Discipline/ Theoretical	Framework of understanding the relationship between ICTs and development based on notions of power and capabilities	Dasuki & Abbott (2015)
	Integrative framework of ICT in development (based on IT literature) (Sein & Harindranath, 2004)	Andersson & Hatakka (2010)
	Design-reality gap framework (developed from the literature on social construction of technology and contingency in organizational change), Gap archetype framework	Ayoung et al. (2016), Bass & Heeks (2011)
	Communication for social change: an integrated model for measuring the process and its outcomes (Figueroa et al., 2002)	Mthoko & Khene (2018)
	Framework for evaluating ICTs in empowering poor communities based on Capability Approach (Gigler, 2004)	Mthoko & Khene (2018)
	Communication for development (C4D) model (Heeks & Molla, 2009)	Prinsloo & de Villiers (2017)
	Framework for evaluating C4D (Lennie & Tacchi, 2013)	Lennie et al. (2015)
	Capabilities Approach based e-governance evaluation framework	Madon (2004)
	Stakeholder analysis based on stakeholder theory	Bailur (2006)
	Framework for conceptualizing the effect of media type and content source as determinants of power balance	Grimshaw & Gudza (2010)
Issue	Analytical framework on digital inequalities	Larghi et al. (2015)
Application	Guiding principles for sound telecentre evaluation	Reilly & Gómez (2001)
	Frameworks (e.g. summative, formative) and methods for designing and implementing telecentre evaluation (Hudson, 2001)	Osah et al. (2014)
	A framework for user centric evaluation of telecentres (Dey et al., 2010)	Osah et al. (2014)

Sectoral	e-government evaluation criteria	Alshawi & Alalwany (2009)
	Framework for assessing status of e-government projects	Gorla (2009)
	e-government impact assessment framework	Bhatnagar & Singh (2010)
	Rural ICT4D project development framework	Mamba & Isabirye (2015)
	Framework for measuring impact of information on rural development (Mchombu, 1995)	Mthoko & Khene (2018)
	Rural ICT evaluation framework	Mthoko & Khene (2018), Osah et al. (2014), Pade-Khene & Sewry (2012)
	Critical success factors for rural ICT project sustainability (Pade et al., 2008)	Osah et al. (2014)
	Impact-for-sustainable-agriculture framework	Prinsloo & de Villiers (2017)

*Excluded those cases where evaluation model or framework could not be fully understood, due to reasons e.g. not enough explanation on the article about the model or framework and unable to access the original source.
**Original sources mostly identified and re-cited from the reviewed journal articles.

As Table 4.32 presents, there were many reviewed articles which applied, suggested or mentioned ICT4D evaluation models, theories or frameworks. As an example of generic ICT4D evaluation, Myers (2005 cited in Mthoko & Khene, 2018) provides *guidelines on monitoring and evaluation of information and communication for development (ICD) programs* for topics such as planning, budgeting, and process/outcome/impact evaluations.

An example of discipline-oriented/theoretical ICT4D evaluation framework is presented in Madon (2004) for e-governance initiatives. *Based on Capability Approach*, the author suggests that four elements should be examined in evaluating e-governance initiatives: (1) range of ICT-generated applications; (2) what functionings are enabled through an initiative; (3) what people do with the opportunities created as a result; and (4) barriers to achieving functionings (i.e. factors inhibiting reaching the desired state through the engagement with ICTs offered under e-governance initiatives) (Madon, 2004: 5).

Larghi et al. (2015) studied the impact of the Connecting Equality Program (Programa Conectar Igualdad, PCI) on decreasing digital inequalities and promoting social inclusion. Through the program, young students received netbooks. In exploring the impact, the four

dimensions related to *digital inequalities*—"access and connectivity", "technological skills", "computer and Internet use", and "forms of appropriation of online virtual social networks"—and corresponding indicators were suggested (Larghi et al., 2015: 5). This can be viewed as a type of issue-specific ICT4D evaluation.

Reilly and Gómez (2001) present *guiding principles for sound telecentre evaluation* which was the output of International Development Research Centre's (IDRC) workshop in September 1999. It can be understood as a guideline for application-specific ICT4D evaluation. It suggests that telecentre evaluation should reflect the following ten aspects, for it to be "useful, financially responsible, build[ing] local capacity and enabl[ing] shared learning": participatory, social inclusive, locally grounded, public and transparent, methodologically appropriate, sustainability enhancing, capacity building, reflective of shared visions, strategically oriented, and gender sensitive (Reilly & Gómez, 2001: 1-2).

As a case of sectoral ICT4D evaluation framework, *Impact-for-sustainable-agriculture framework* for impact assessment of ICT for agriculture projects was introduced by Prinsloo and de Villiers (2017). The framework builds upon the dimensions of sustainability, communication for development (C4D) framework (Heeks & Molla, 2009), and 2008 World Development Report's (The World Bank, 2007) four policy objectives in agriculture—"improve market access", "enhance smallholder competitiveness", "improve livelihoods in subsistence agriculture", and "increase employment in agriculture" (Prinsloo & de Villiers, 2017: 13).

Table 4.33 Reports: ICT4D evaluation models, theories or frameworks applied, suggested or mentioned (if any; multiple codes possible)

Primary focus	ICT4D evaluation models, theories or frameworks	Report examples
Sectoral	e-government official development assistance (ODA) project evaluation model	Kookmin Institute for Strategic Governance (2012b, 2012a), Kookmin University (2013a, 2013b, 2014)

Compared to journal articles, there were a markedly less number of reports which applied ICT4D evaluation models, theories or frameworks (Table 4.33). Several reports on KOICA's e-government projects utilized *e-government official development assistance (ODA) project evaluation model*. The model combines OECD-DAC's criteria for evaluating development assistance (relevance, effectiveness, efficiency, impact, and sustainability) and e-government performance reference model (PRM). The latter lists six main performance areas ("[m]issions and projects, customers, processes and activities, human resources, information technologies, and associated resources") and 16 performance items on e-government projects (including customer satisfaction, work qualities, securities, user support, system qualities, etc.) (Kookmin Institute for Strategic Governance, 2012b: 33).

4.1.6.2 Program evaluation models, theories or frameworks

Table 4.34 Journal articles: Program evaluation models, theories or frameworks applied, suggested or mentioned (if any; multiple codes possible)

Primary focus	Program evaluation models, theories or frameworks*	Journal article examples
Generic	Theory of change	Jamison et al. (2013), Schmidt et al. (2012)
Discipline /Theoretical	Kirkpatrick model for training program evaluation (Kirkpatrick, 1996, 1998, 2006)	Negash (2010), Ochieng et al. (2017), Ruth (2000)
	The Center for Elementary Mathematics and Science Education (CEMSE) Fidelity of implementation (FOI) framework (Century et al., 2010)	Osah et al. (2014)
	Process evaluation for public health interventions and research: key process evaluation components, process for designing and implementing effective process evaluation efforts (Linnan & Steckler, 2002)	Osah et al. (2014)
Sectoral	Process evaluation of a country drug program (Mullany & Peat, 2008)	Osah et al. (2014)

*Original sources mostly identified and re-cited from the reviewed journal articles.

Several reviewed articles applied or referred to models, theories or frameworks of program evaluation (Table 4.34). *Theory of change* "explains how activities are understood to produce a series of results that contribute to achieving the final intended impacts." (Rogers, 2014: 1) The process and causal connections entailed in the theory of change can be presented in different ways, e.g. results chain (consisting of boxes representing inputs, outputs, outcomes, impacts) or logical framework (or logframe; placing the same information in the form of matrix) (Rogers, 2014). Schmidt et al. (2012: 89) explains the theory of change of a low-cost audio computer ("Talking Book") as the following: "(a) Residents listen to the recordings, understand the information, and retain the knowledge; (b) they trust the information and find it interesting and compelling enough to change their current practices; and (c) application of the knowledge results in improved livelihood".

Kirkpatrick model for training program evaluation was applied by a few reviewed articles. The model explains that there are four essential levels of training intervention evaluation

(Kirkpatrick, 1996, 2006 cited in Ochieng, 2017): "reaction" (satisfaction or perceptions of participants toward training), "learning" (knowledge or skills gained, or changes in attitude as a result of participating in the training), "behavior" (changes in job behavior), and "results" (end results of training, such as improved productivity). Ochieng et al. (2017) focused on "reaction" and "learning" levels as they evaluated digital archive system training workshops for youth in a community in South Africa.

Osah et al. (2014) selected several social program assessment approaches, IS evaluation approaches, and ICT4D implementation and evaluation case studies to develop Rural ICT4D project process assessment framework (RICTP-PAF). Century et al. (2010), Linnan and Steckler (2002), and Mullany and Peat (2008) were among the selected works for theoretical analysis in the area of social program assessment.[20] First, Century et al. (2010: 202) defined fidelity of implementation (FOI) as "[t]he extent to which an enacted program is consistent with the intended program model" and developed *FOI framework* for science and mathematics educational programs. The framework was built to identify and analyze "structural critical components" ("reflect the developers' intentions about the design and organization of the intervention itself", e.g. instructional materials) and "instructional critical components" ("reflect the developers' intentions about the participants'…behaviors and interactions as they enact the intervention") (Century et al., 2010: 204-205).

Linnan and Steckler (2002: 12) explain *process evaluation approach for public health interventions* and lists "key process evaluation components" as context, reach, dose delivered, dose received, fidelity, implementation, and recruitment. They also illustrate "a process for designing

[20] Osah et al. (2014) also selected Valadez & Bamberger (1994), but this was not included here because it was not clear which model, theory, approach or framework Osah et al. (2014) was referring to in Valadez & Bamberger's (1994) book.

and implementing effective process evaluation efforts" to involve the following stages: clarify underlying theory of intervention; create intervention; create process objectives; decide process evaluation questions; determine assessment tools to measure the objectives; undertake quality control assurances; gather and clean data; analyze data; create reports; improve theory, interventions, measurement and tools for analysis (Linnan & Steckler, 2002).

Mullany and Peat (2008: 497) identify four areas of *process evaluation of a country drug court program* as: "participant descriptors", "service provision", "participant compliance", and "participant outcomes".

Based on the above works and more, Osah et al. (2014) formed the RICTP-PAF with five guiding principles ("collaborative evaluator/stakeholder relationship", "programme theory specification", "validate assessment questions", "quality control throughout data collection and analysis", "ethical consideration") and three critical themes ("service utilization", "organizational function", "external project factors").

Table 4.35 Reports: Program evaluation models, theories or frameworks applied, suggested or mentioned (if any; multiple codes possible)

Primary focus	Program evaluation models, theories or frameworks	Report examples
Generic	Theory of change, logical framework, logic model, results matrix or framework	Ali (2013), Anh et al. (2004), Arenas (2016), Dianka (2017), Finnish Consulting Group (2012), Grossman et al. (2017), Harris et al. (2015), Hodge (2017), Janelidze (2017), Kookmin University (2013a, 2014, 2013b), Korean Association of ICT Professional Engineers (KAIPER) (2011), Kust (2012), Minges et al. (2011), Muthui & Wasige (2016), Pompi (2015), Ron (2016), Sangmyung University (2012)
Discipline /Theoretical	Kirkpatrick model for training program evaluation	Korea Global Development Consulting Center (KGDC) (2014)

A significant number of the analyzed reports applied *theory of change or related models and frameworks* (explained above)—*including logical framework, logic model, results matrix or framework* (Table 4.35). The reports were on projects carried out by aid/development agencies and donor governments including UNDP, Sida, Finland, USAID, and KOICA. For example, Muthui and Wasige (2016) conducted mid-term review of climate information and early warning systems in Uganda by evaluating against reconstructed theory of change and corresponding results chain.

Korea Global Development Consulting Center (KGDC) (2014) utilized *Kirkpatrick model* (explained above) in the ex-post evaluation of establishment of Bangladesh-Korea ICT Training Center for Education (BKITCE) and Morocco-Korean ICT Training Center for Moroccan Teachers (CMCF TICE). They used the model considering the domain of the project (i.e. ICT training) and to assess effectiveness and impact of the trainings carried out in the centers.

4.1.6.3 IS/IT evaluation models, theories or frameworks

Table 4.36 Journal articles: IS/IT evaluation models, theories or frameworks applied, suggested or mentioned (if any; multiple codes possible)

Primary focus	IS/IT evaluation models, theories or frameworks*	Journal article examples
Generic	Red, amber, green analysis	Akeel et al. (2013)
Discipline /Theoretical	Actor network theory (ANT)	Harry et al. (2014)
	A scheme of analysis for technological innovation systems (Bergek et al., 2008)	Sambo & Alexander (2018)
	IS success model (DeLone & McLean, 1992, 2003)	Borena & Negash (2016), Guclu & Bilgen (2011), Mtebe & Raisamo (2014), Mthoko & Khene (2018), Ndiege et al. (2012), Osah et al. (2014)
	e-readiness factors and issues for business (adapted from Economist Intelligence Unit (2003))	Lane et al. (2004)
	IS-impact measurement model (Gable, Sedera, & Chan, 2008)	Guclu & Bilgen (2011)
	Holistic framework on IS evaluation (Hallikainen & Chen, 2005)	Mthoko & Khene (2018)
	Analysis of the technological innovation systems functions (Hekkert, Suurs, Negro, Kuhlmann, & Smits, 2007)	Sambo & Alexander (2018)
	Strategic alignment model for IT in business organizations (Henderson & Venkatraman, 1999)	Odit et al. (2014)
	Quadrant grid of the IS applications portfolio based on strategic importance in current environment vs. predicted environment (McFarlan-Peppard model) (Ward & Peppard, 2002)	Akeel et al. (2013)
	Enterprise resource planning (ERP) systems and sustainable competitive advantage (SCA) analytical framework (based on works on IS in creating competitive advantage and ERP)	Molla & Bhalla (2006)
	Six stages of data processing growth (Nolan, 1979)	Akeel et al. (2013)
	Practice lens for studying technology in organizations (Orlikowski, 2000)	Osah et al. (2014)
	Process based IS assessment model (PB-ISAM)	Özkan et al. (2006)
	Six goals of a usable system (Preece et al., 2015)	Breetzke & Flowerday (2016)
	Sociotechnical perspective (application of)	Villanueva-Mansilla & Olivera (2012)

	Automate-informate-transformate distinctions to analyze impact of IS deployment (based on Zuboff (1988))	Akeel et al. (2013)
Application	Balanced usability checklist (BUC) for website evaluation	Abdinnour-Helm & Chaparro (2007)
	Two-dimensional framework for examining empowerment in evaluating participatory geographic information and multimedia systems (PGIMS)	Corbett & Keller (2004)
	Learning management system (LMS) evaluation model	Mtebe & Raisamo (2014)
Sectoral	Balanced scorecard (BSC) for private sector and public sector adaptation (Kaplan & Norton, 1996, 2006; Niven, 2008)	Guclu & Bilgen (2011)
	Four progressive stages of e-government maturity (Chatfield & Alhujran, 2007) and corresponding evaluation criteria for e-government websites and portals	Chatfield & Alhujran (2009)
	Strategic management model for public sector (government IS)	Guclu & Bilgen (2011)
	Guidelines for parliamentary websites (Inter-Parliamentary Union (IPU), 2009)	Hamajoda (2016)
	Analytical framework of health IS (based on completeness, fittingness, and actionability)	Latifov & Sahay (2012)
	Quality assessment of e-government websites based on public values perspective	Verkijika & De Wet (2018)
	e-government citizen satisfaction framework	Sigwejo & Pather (2016)
	Framework for evaluating online banking services (based on Southard & Siau (2004))	Andoh-Baidoo & Osatuyi (2009)

*Original sources mostly identified and re-cited from the reviewed journal articles.

Similarly to the case of ICT4D evaluation (Table 4.32), there were a number of articles which applied or referred to IS/IT evaluation models, theories or frameworks (Table 4.36). As an example of generic assessment model, Akeel et al. (2013) used *Red, amber, green analysis*, where processes or sub-processes of an IS were assessed by color notations—IS components were classified as red (a defective system which requires replacement), amber (a system which may need replacement) or green (an effective system) according to their soundness and need for replacement. Akeel et al. (2013) applied the model to analyze main business processes and IS profiling of a few Libyan oil companies.

DeLone and McLean (D&M) IS success model is an example of discipline-oriented/theoretical IS/IT evaluation model. The model was constructed with the aim of understanding and consolidating factors that contribute to IS success, based on a review of previous studies, including empirical works which assessed aspect(s) of management information system (MIS) success (DeLone & McLean, 1992). The model has been widely cited among the scholars and its founders updated the model around ten years after the initial publication (DeLone & McLean, 2003). The model can be summarized as the following: an IS can be assessed in terms of quality of information, system, and service involved, all of which would potentially influence (intention to) use and satisfaction; through IS use or user satisfaction, net benefits might be created; the benefits in turn would affect satisfaction and intention to continue use (Larsen & Eargle, 2015). Among the reviewed articles, Ndiege et al. (2012) utilized the updated version of the model to assess quality of IS used by seven SMEs in a town in Kenya.

Corbett and Keller (2004) presented a *two-dimensional analytical framework for assessing empowerment impacts observed as a result of participatory geographic information and multimedia systems (PGIMS) implementation*. The framework combines two social scales (individual and community) and four empowerment catalysts related to PGIMS (i.e. information, process, skills, and tools). It allows the analysis of how the catalysts associated with the PGIMS lead to empowerment impacts at each level of individual and community (i.e. empowerment of individuals or community, change in empowerment capacity in individuals or community). It is an example of application-specific IS/IT evaluation framework.

Based on previous works on stages of e-government development, Chatfield and Alhujran (2007, 2009: 153; italics added to the original text) suggested "*four progressive stages of e-government maturity*: one-way information flows; two-way interaction; payment transaction; and

e-democracy" and utilized it to create *evaluation criteria* for examining Arab e-government portals or relevant websites. This is a type of sectoral IS/IT evaluation framework.

Table 4.37 Reports: IS/IT evaluation models, theories or frameworks applied, suggested or mentioned (if any; multiple codes possible)

Primary focus	**IS/IT evaluation models, theories or frameworks**	**Journal article examples**
Sectoral	e-government performance reference model (PRM)	Kookmin Institute for Strategic Governance (2012b, 2012a), Kookmin University (2013a, 2013b, 2014)

Among the reviewed, only a handful of reports—all on KOICA's projects—applied IS/IT evaluation framework (Table 4.37). *e-government performance reference model (PRM)* was combined with OECD-DAC's criteria for evaluating development assistance (relevance, effectiveness, efficiency, impact, and sustainability) to create e-government official development assistance (ODA) project evaluation model (previously explained in Chapter 4.1.6.1). As briefly mentioned in Chapter 4.1.6.1, e-government PRM can be utilized to assess direct and indirect outcomes and effects of e-government investments, looking into six performance areas ("[m]issions and projects, customers, processes and activities, human resources, information technologies, and associated resources") and 16 performance items (e.g. customer satisfaction, work qualities, securities, user support, system qualities, etc.) (Kookmin Institute for Strategic Governance, 2012b: 33).

4.1.6.4 Aid/development evaluation models, theories or frameworks

Table 4.38 Journal articles: Aid/development evaluation models, theories or frameworks applied, suggested or mentioned (if any; multiple codes possible)

Primary focus	Aid/development evaluation models, theories or frameworks*	Journal article examples
Generic, Method**	Outcome mapping (Earl et al., 2001) and narrative enquiry evaluation framework	van der Vyver & Marais (2015)
Discipline/ Theoretical	Capability Approach***	Dasuki & Abbott (2015), Dasuki et al. (2017), Madon (2004), Nyemba-Mudenda & Chigona (2018)
	Sustainable livelihoods framework	Mthoko & Khene (2018), Prinsloo & de Villiers (2017)
Sectoral	Attributes of good governance (United Nations Development Programme (UNDP), 1997)	Kettani et al. (2008)

*Original sources mostly identified and re-cited from the reviewed journal articles.
**Both aspects viewed as of equal importance in terms of focus.
***Please see Chapter 2.1.1 for detailed explanation about the theory.

Table 4.38 lists aid/development evaluation models, theories or frameworks applied or suggested in the articles. The application of *outcome mapping and narrative enquiry evaluation framework* was illustrated in van der Vyver & Marais (2015), where narratives or anecdotes of the interviewees—among the users of digital doorways, which is a type of digital kiosk—were analyzed to examine short-term, immediate outcomes. van der Vyver & Marais (2015) mention that they referred to outcome mapping methodology developed by the members of IDRC in Canada (Earl et al., 2001).[21] Outcome mapping defines outcomes as "changes in the behaviour, relationships, activities, or actions of the people, groups, and organizations with whom a program works directly", focusing on analyzing contribution of a program to outcomes, rather than "claiming the achievement of development impacts." (Earl et al., 2001: 1)

Sustainable livelihoods framework describes different factors and paths leading to development outcomes. It illustrates how "certain vulnerability contexts link to policies,

[21] Which is the reason why the evaluation framework is placed under "Aid/development evaluation" rather than "Program evaluation".

institutions and processes by taking into account the different forms of capital,…forming in turn livelihood strategies and livelihood outcomes." (Prinsloo & de Villiers, 2017: 9-10)

Attributes of good governance explains "the components that would make up a potential scale of good governance" including participation, rule of law, transparency, responsiveness, consensus orientation, equity, effectiveness and efficiency, accountability, and strategic vision (Kettani et al., 2008: 6).

Table 4.39 Reports: Aid/development evaluation models, theories or frameworks applied, suggested or mentioned (if any; multiple codes possible)

Primary focus	**Aid/development evaluation models, theories or frameworks**	**Report examples**
Issue	OECD-DAC's criteria for evaluating development assistance (relevance, effectiveness, efficiency, impact, and sustainability) (Organisation for Economic Co-operation and Development (OECD), n.d.-b)	Andersson et al. (2014), Japan International Cooperation Agency (JICA) Bhutan Office (2013), Kookmin University (2013), etc.
Sectoral	Guidelines for UNDP-supported, Global Environment Facility (GEF)-financed projects (United Nations Development Programme (UNDP) Evaluation Office, 2012)	Ali (2013), Dianka (2017), Janelidze (2017), Kust (2012)

Around half of the reviewed reports applied *OECD-DAC's criteria for evaluating development assistance* consisting of relevance, effectiveness, efficiency, impact, and sustainability (Organisation for Economic Co-operation and Development (OECD), n.d.-b) (Table 4.39). The reports were on projects carried out by various aid/development agencies or government departments, including JICA, KOICA, UNDP, Sida, LuxDev, Danida, DFID, and Finland. *Guidelines for UNDP-supported, Global Environment Facility (GEF)-financed projects* was also utilized in forming the evaluation methodology of UNDP and GEF supported environment projects. The guideline (United Nations Development Programme (UNDP) Evaluation Office, 2012) sets out procedures and content of final/terminal evaluation for the concerned projects.

4.1.6.5 Other evaluation models, theories or frameworks

Table 4.40 Journal articles: Other evaluation models, theories or frameworks applied, suggested or mentioned (if any; multiple codes possible)

Primary focus	Other evaluation models, theories or frameworks*	Journal article examples
Generic	Multiple criteria decision making (MCDM) approach (Zionts & Wallenius, 1976)	Alam & Wagner (2016), Kivunike et al. (2015)
Discipline/Theoretical	Institutionalist theoretical framework	Bernardi & de Chiara (2011)

*Original sources mostly identified and re-cited from the reviewed journal articles.

A few journal articles utilized evaluation theories or frameworks that are outside ICT4D and the three evaluation fields (Table 4.40). *Multiple criteria decision making (MCDM)* is a methodology that guides a decision maker to choose the "best alternative" that most closely reflects one's preferences, based on "two or more criteria or attributes" (Alam & Wagner, 2016: 660, Dyer et al., 1992 recited from Alam & Wagner, 2016). Weights are placed for each criterion and "each alternative can be measured as to its utility for every given criterion"—an example application of the method is Technology acceptance model (TAM) (Alam & Wagner, 2016: 660). Alam & Wagner (2016) utilized MCDM to understand Bangladeshi sugarcane growers' decision to adopt a SMS-based digital procurement system, considering monetary and non-monetary factors.

According to Bernardi and de Chiara (2011 citing Greenwood et al., 2008), *institutional theory* views that behavior of individuals and organizations reflect commonly accepted norms, beliefs, and rules in an organization, groups of people or society, etc. The authors apply the theoretical lens in examining the gap between policy and stakeholder actions surrounding HIV/AIDS monitoring and evaluation systems (Bernardi & de Chiara, 2011).

Table 4.41 Reports: Other evaluation models, theories or frameworks applied, suggested or mentioned (if any; multiple codes possible)

Primary focus	Other evaluation models, theories or frameworks*	Report examples
Discipline/ Theoretical	Strengths, weaknesses, opportunities, and threats (SWOT) analysis	Gomez (2003), Hodge (2017), Korea International Cooperation Agency (KOICA) (2008), Muthui & Wasige (2016)

Several aid/development agency reports applied or mentioned *SWOT* lens in assessing ICT4D projects (Table 4.41). The analytical lens is commonly used to assess an organizations' strengths, weaknesses, opportunities, and threats (SWOT) for "strategic planning or decision-making" (University of Kansas Center for Community Health and Development, 2018), and is usually referred to in the business or management field. As an example, during the stakeholder workshop for KOICA's e-government project in Laos, SWOT analysis was used to examine the general ICT environment (e.g. capacity and attitudes toward ICT, etc.) in the country (Korea International Cooperation Agency (KOICA), 2008).

4.1.7 *Summary of content analysis findings*

From the content analysis, major areas of findings pertaining to the research questions include the aspects of ICT4D evaluation foci and the associations between ICT4D evaluation and the three evaluation fields (and other disciplines).

First, we found the aspects of ICT4D evaluation foci in terms of *continental or regional context* (Africa; Asia), *domain of ICT4D work* (education and skills training related fields; government; health; community; business/industry/markets; media, etc.), *research or evaluation approach and method* (interpretivist paradigm; qualitative method), *aim or rationale for evaluation* (examine results or effectiveness; for prospective reasons, etc.), *subject of evaluation* (results, outcomes, impact or effectiveness; influential factors; project design and implementation,

etc.), *target audience for evaluation* (government or policymakers; implementers; aid/development agencies or funders, etc.), *timing of evaluation* (after or near-end implementation), and *development notion* (human development).

Second, in terms of the associations between ICT4D evaluation and the three evaluation fields, we found that evaluation models, theories or frameworks from the three fields have been applied or referred to in the reviewed works. Moreover, in the reviewed articles, we found literature of other disciplines—such as design studies, health, organizational studies and management, political science, public administration and governance—were mentioned.

If content analysis provided an overview of ICT4D evaluation landscape in terms of the above two areas, findings from the interviews will more directly inform us about the major foci, gaps, and challenges of ICT4D evaluation, associations with other fields, ways to strengthen ICT4D evaluation, and areas for further discussion from the perspective of researchers in academic and/or practitioner spheres.

4.2 INTERVIEWS

There were 24 interviews of academics and/or practitioners in the ICT4D field. Throughout the interview process, it was realized that the academics and practitioners in the ICT4D field are often not exclusive to each other, e.g. an academic having experiences working with aid/development agencies, etc. This was not surprising considering the nature of ICT4D field with a heavy practical focus, but it became significant to the extent that it was decided not to focus too much on separating and comparing responses between academics vs. practitioners by occupational status, but rather examine how interviewees' responses (especially in cases where one possesses both identities) illuminate perspectives prevailing in the academic vs. practitioner *spheres*. Yet, in the presentation

of findings, this study specified occupational status of the interviewees whenever it seemed relevant.

Interview findings were organized by the following information and themes**: interviewees' occupational information and their areas of research**; **foci of ICT4D evaluation and its change over time**; **approaches in ICT4D evaluation**; **challenges in ICT4D evaluation**; **themes or issues for further discussion**; **ways to improve ICT4D evaluation (domain specific expertise)**; **and associations between ICT4D evaluation and the three evaluation fields (and others)**.

4.2.1 *Interviewee information*

Interviewees' country or regional focus of ICT4D work included: (regional response) Asia, South Asia, Africa, Central Africa, West Africa, sub-Saharan Africa, Latin America, Eastern Europe, former Soviet Union countries; (country specific response) Indonesia, India, Bangladesh, Nepal, Afghanistan, Egypt, Mozambique, Malawi, Rwanda, Uganda, Tanzania, South Africa, Brazil, Peru, Mexico, Cuba, and (low income communities in) the U.S. There were also broader responses such as the Global South and worldwide.

Domain of their ICT4D work included: health(care), mHealth, education, informal learning, digital literacy, civic participation / government citizen engagement, governance, e-governance, electronic democracy, electronic participation, policy, community centers (libraries, community technology centers), telecenters, accessibility to technology, public access to information and technologies, poverty, agriculture and nutrition, rural development (including technology and technological innovation in rural environment, ICT in rural schools for educational purposes), microfinance, mobile money, e-commerce strategy, IT industry development and IT human resource development, labor market, mobile technology, digital transformation, disruptive

technologies, ICT sector assessment for potential support by development agency, communication, media practices, perception of media and technologies in general, migration, indigenous people, gender, critical theory, and research methods in ICT4D. Also, there were more general responses such as development areas in general (i.e. the areas that the interviewee's aid/development agency focuses on) and many different domains (being a "generalist").

In terms of **interviewees' frequently adopted research method in ICT4D research**[22], there were largely qualitative strand (e.g. qualitative and design methods, ethnography, interviews, participant observations, focus groups, case studies, action research, qualitative analysis of trace data), quantitative strand (e.g. survey, network analysis), mixed methods strand (e.g. mixed methods but more qualitative aspect), and other types of responses such as interpretive design, positivist design (experimental design, randomized control trial (RCT)), software development, and "appropriate method for particular question."

Most of the interviewees had between six and 30+ years of **experience in the ICT4D field**. There was an interviewee who had only one ICT4D project evaluation experience, but the respondent was not excluded as he/she was an author of an aid/development agency report that was part of the content analysis and the evaluation involved multi-year planning and analysis (i.e. showing his/her involvement in ICT4D evaluation more than a year).

[22] This question was asked to those who were initially identified as academics, rather than practitioners. However, as mentioned in the beginning of 4.2, it became clearer during the interviews that a clear distinction between academics vs. practitioners cannot be made by occupational status.

4.2.2 *Foci of ICT4D evaluation and their change over time*

When asked the foci of ICT4D evaluation over the last few years, responses varied and were explained mostly in terms of **regional focus**, **methods**, **development notion**, and **evaluation focus**.

First, in terms of **regional focus**, the countries mentioned as have been receiving relatively more attention than others were those in Africa, South Asia (including India, Bangladesh, Pakistan), and Southeast Asia. In comparison, the interviewees mentioned that Latin America and the Global North have received less attention. One interviewee mentioned that language might have been a barrier for studies in Latin America to be more widely known.

For **methods**, an interviewee from the field of human-computer interaction for development (HCI4D) mentioned the use of mixed methods and experimental designs. Another interviewee who identified government and citizen engagement as his/her main ICT4D domain mentioned that there has been a mixed-method focus which utilize predetermined indicators in assessing impact—which lack the flexibility for capturing unintended outcomes or examining changes overtime. A different interviewee working in multiple ICT4D domains argued that there has been a qualitative focus with a few attempts to do field experiments or RCTs.

For those who responded in terms of **development notions**, there were a few interviewees who mentioned Capability Approach and Senian notion of development as significant. A different respondent said that socio-economic aspect of development has received attention. Moreover, one interviewee mentioned how evaluation was driven by neo-liberal emphasis on performance measurement and how the MDGs and SDGs have added complexity to the indicators to be measured. In comparison, there were a few interviewees who found it difficult to identify which development notion was at the core of ICT4D evaluation:

"I don't think they use any sort of development lens to measure development outcomes. It's mostly they identify a problem and develop a solution to tackle the problem and based on success or failure then they judge whether it was able to achieve development or some sort of empowerment but that's not based on specific notions of development. I think that has been a problem in ICTD. Basically, it's been ICTs to tackle social problems in developing countries."

"Even though people measure development, many people struggle to engage with the concept of development. Part of the challenge is about training. If you look at many ICT4D people, the ones I see, the ones I meet come from computer science, come from ICT background. They have good training about the technology, but they don't have training about development. What is development? How do you ensure development? How do you measure development? I think most of us struggle to measure development because we have got no training."

Some answered in terms of **evaluation focus**. In particular, there were some interviewees who talked about the significance of assessing outcomes in ICT4D evaluation, but also how this faced limitations. They included: difficulties in establishing a direct link between what took place and the changes noticed; outcomes to be assessed being determined by funding agencies and practitioners rather than being based on indigenous development goals; and a lack of practice in assessing outcomes for people and businesses that can be directly attributed to project implementation (e.g. "How did people's lives improve, how have the cost reductions benefited, how has the economy improved that can be directly attributed to the intervention") and relatively more attention on mere monitoring and tracking. Others mentioned how the evaluations tend to be short-term due to reasons such as budget constraints and a lack of patience of donors or researchers. The short-term evaluation misses out the assessment of social transformation as a result of ICT4D:

"I think the problem is short-term evaluation…what are the outcomes of the outcomes so to speak. What does it mean for a society to be transformed in a specific way…It's more than the impact—let's say they focus on the impact as such, but they don't focus on the transformation brought out of those impacts…What happens with the country that has suffered [from] that transformation, that's the question that nobody ask."

An academic interviewee with previous experience working at the World Bank argued that ICT4D evaluation tended to focus on output and not necessarily (longer term) outcome. He/she described the outputs as having technological aspects (e.g. the number of datasets opened using a particular platform, types of technological features, improvement of operability between two different systems).

Some who have worked with aid/development agencies described how the ICT4D evaluations have been done under respective organizations—which illuminates the foci of ICT4D evaluation in aid/development agencies. For example, an interviewee who has worked at a national aid/development agency described that they mainly refer to OECD-DAC's criteria for evaluating development assistance, which comprises of relevance, effectiveness, efficiency, impact, and sustainability (Organisation for Economic Co-operation and Development (OECD), n.d.-b). Moreover, the respondent mentioned how there has been a slow movement toward applying RCT in evaluations carried out by the agency, although this faced difficulties as there are not many staff who are knowledgeable about the method. An interviewee who had worked for several years in a United Nations (UN) agency informed that the UN (and other development) agencies use results framework which is like a matrix establishing connections between inputs, activities, outputs, and outcomes (reflecting theory of change). The framework becomes the basis of what is to be evaluated, especially in terms of outputs and outcomes.

On the other hand, an academic who has worked with an aid/development agency noted that he/she did not perceive significant differences in the evaluation or research questions that the donors vs. researchers were curious about—the gaps rather stemmed from structural constraints such as limited budget and time:

"The donors were interested in very similar questions to what the academics were interested…Who uses? Is it the case that ICT is exacerbating existing inequalities looking in to flatten access? Can it help improve service delivery? To what types of messages the government responds to? The questions that we care about and the questions that our donors cared about seems to be very much alike. I didn't feel like there's any tension. The tension sometimes arise[s] among methods where you have a preference, academics is going to have—RCTs because they want to randomize everything. The donor community doesn't always like randomizing things. Academics care about things like sample size because they need to work with big sample size in order to make statistical inferences. The donors, they don't always see that, they're like, 'Yes, let's go to these five places,' and we're like, 'No, with five places we won't learn anything. In order to have statistical power, we need to go to 80 places.' They're like, 'That's really expensive.' It's not that there's no tension, there's a lot of tensions around sample size, and around randomization, but none of that fundamental research questions. They want to know the similar questions that you care about, they just have sometimes different methods, and different scheme which they will operate."

When asked if there have been **changes in ICT4D evaluation over time**, there were responses in terms of development notions, research or evaluation approaches, and methods.

First, in terms of **development notions**, a few answered how there have been more focus on empowerment, gradual shift from economic development to human centered approach, and

movement away from techno-deterministic approach and increased attention on local contexts. An interviewee mentioned that amidst the growing interest in localized definition of development, there has been a decreasing level of interest on ICT4D projects by international funding agencies:

> *"when there was a lot of money to finance these projects, [it] was very eccentric in the sense that their center of attention didn't have much input into definition of what should we achieve. Now that it's more center[ed] in communities and nations,…there's less money, less interest, and the perception that the market has solved a lot of things…"*

Regarding **research or evaluation approaches**, a respondent argued that there has been more attention to critical theory and design science research (with a lack of cultural understanding). Moreover, another said that compared to the level of interest in outcome mapping, impact or outcome assessment, there has been a lack of progress in other types of evaluation (such as baseline needs assessment, purpose assessment, efficiency assessment). In contrast, a different interviewee mentioned how he/she was seeing more formative or process evaluations compared to summative or impact evaluation, due to the difficulty in assessing impact as it might take multiple years to show visible changes (such as maternal health outcomes) and it involves notions that are hard to measure such as empowerment, social aspects or justice. Similarly, another interviewee viewed that among the international development agencies, there has been some movement away from merely examining the *result* of technological development or implementation (asking questions such as: how do the stakeholders utilize technology? What kind of output can be achieved using the technology?) to its *process* (i.e. how a particular technology has been produced, who actually designed or developed the technology; placing more emphasis on stakeholders, in terms of collaborating with local stakeholders, agencies and citizens, and examining from user perspective).

Moreover, the interviewees who have worked in the UN or other aid/development agencies mentioned that the organizations' approaches to ICT4D evaluation have not largely changed over time in terms of type of evaluation framework or criteria applied. To illustrate, the UN has applied a broad development framework rather than ICT-specific evaluation framework. Moreover, a national aid/development agency has focused on OECD-DAC's criteria for evaluating development assistance (relevance, effectiveness, efficiency, impact, and sustainability). The reason behind the lack of focus on ICT-specific aspects could be found in the following comment by an interviewee who worked for a UN agency: *"The ICT for development is usually being looked as a cross-cutting issue. Meaning that you can apply in different sectors. ICT was not simply itself [a] sector."*

On **methods**, there were also some contrasting responses. On the one hand, there were a few who mentioned that there have been some movements toward using qualitative methods from quantitative methods, although the latter still reigns in the field. On the other hand, a different interviewee mentioned there has been more use of quantitative evaluation as a way to demonstrate impact whereas in the past it was dominated by qualitative methodology.

Additionally, one interviewee argued that there has been a regression in ICT4D "evaluation" and instead increasing attention to "prediction" based on data driven research through massive amount of data generated from monitoring—for him/her, this was a worrying trend:

> *"...we would imagine that ICTD evaluation would be a very important part of what happens in the major development agencies,...I don't think there's been that much of a change. I would say that it's regressed, in a way…the availability of a variety of different technologies and even machine learning and sensors and a variety of different type means through which a monitoring can occur and especially even in the humanitarian space, which is very close to*

development. The speed and volume through which so much data can be captured is almost seductive. It leads towards prediction. You're predicting something that researchers don't really understand that much. I think that it's quite worrying, very worrying for me as an academic."

4.2.3 *Approaches in ICT4D evaluation*

The interviewer also asked if the interviewees have seen much discussion in the ICT4D scholarly or practitioner community around each of the Heeks's (2018) six questions surrounding ICT4D evaluation: **what is the rationale for evaluation**; **who is the intended audience for the evaluation**; **what is to be measured**; **how are the selected indicators to be measured**; **at what point in the ICT4D project lifecycle are indicators to be measured**; and **how are evaluation results to be reported, disseminated, and used**.

On the **rationale for evaluation**, interviewees were divided between those who argue that there has been much discussion vs. those who claim there has not been. An interviewee mentioned that although it might have been discussed, there is a lack of clear consensus on the rationale. Also, a few argued that the rationale was driven by funders. On the ambiguity of rationale for ICT4D evaluation, the reason was explained as a lack of positionality of researchers:

"I think that there's a lot of positionality missing, reflection on positionality missing in ICTD —where I stand as a researcher and also what are the forces that pull me as a researcher? Who is funding me? Why am I doing this? Who am I working for and how does this play in the project and what kind of conflicts can this create within myself and with the people that I'm working with?...It's a deal that has been ignored for a very long time…."

Another argued that we need to look into more fundamental questions surrounding development to derive the rationale:

"I think that it flows out of some of the deeper philosophical questions about what is development, whom are intended to serve, what are the goals and the outcomes."

For **intended audience for evaluation**, a greater number of interviewees were confident in saying that there have been some discussions around the topic. Specific audience groups included policymakers, technology designers, academic audience, donors, practitioners, and whomever hires evaluators (including implementing organizations, funders, governments, development agencies). There was a normative response saying that *"we should be writing for the people who are in a position to use the knowledge"*:

"That is probably not the local people in Africa or Asia who need to be developed, I don't think it's them. It could be the policymakers, the government or in the private sector. People who create policy for technology or create policy for governments or create policy for mobile money, these kinds of things. That's one audience which is a practical audience. I suppose we are also writing for other researchers though others are interested to read our findings. Those will include Ph.D. students, that will include junior researchers who want to learn more… This means there are two audiences, one is a practical audience, one is a research audience."

On **what is to be measured**, most interviewees mentioned that this was widely discussed or there were at least some discussions. In particular, there were responses surrounding *impact*—that impact is what we should be measuring, that it can be differently defined according to the domain of ICT4D work, that there are limitations and challenges in assessing it, and that it should be defined and approached from bottom-up. Also, one mentioned that assessing impact or long-term outcomes is costly.

"I would hope they would measure impact, but usually, they don't measure the impact. Usually, they measure something very small, very trivial…The measure is also very much

limited to the design of the research… The researchers cannot think beyond their own context, they cannot think about bigger issues."

"What has to be measured is an impact. The impact of the project but the complexity is defining the impact of a project. Let's say we are talking about a telecenter…If I'm a donor, if I'm funding this thing, I'm looking for something tangible. So many people have been trained. So many people are now doing banking. Those things have to be measured. It makes sense but maybe for the people in the community, the benefits are not that…Maybe the prestige just a psychological issue is going on…We should be able to define the goals of evaluation bottom-up. Ask the people, what are the goals? Then we can go ahead and evaluate those goals."

For the question of **how to measure**, the responses were again divided whether it has been widely discussed or not. The responses often mentioned the discussions surrounding the use of quantitative vs. qualitative methods. An interviewee mentioned how the debate lacks more "granular" examination:

"…there's a little bit of a divide among the people who use qualitative methodology versus quantitative methodology…We often do not get into the more granular level discussion that other disciplines get into. For example, even if you use a quantitative methodology there are many ways that you can measure any one given metric. ICTD on the whole, I would say, does not get into too much of a discussion about that because I think we end up getting stuck on the broader discussions [of qualitative vs. quantitative methodology]"

Another interviewee mentioned the need for project participants to play a role in designing the evaluation criteria (a different interviewee confirmed that participants usually respond to questions asked by external parties and they do not design evaluation):

"We don't plan evaluation that much. We can discuss with people about design but maybe we should discuss with the people about evaluation at the beginning. What things do you want to be measured on? Then the people should come up with the parameters, with the things to be measured on…[When evaluators or researchers ask questions] people feel like these things are imposed on them to say, 'These are the measurements.' Often people don't do well on those measurements and we declare projects have failed. Maybe they're not that bad."

On the **point in the ICT4D project lifecycle that should be subject to evaluation**, respondents often mentioned that there has not been much discussion. Several provided responses based on their impressions from the field that evaluations tend to take place toward the end of projects, mostly assessing short-term outcomes. An interviewee provided a normative answer that, for ICT4D projects to be successful, evaluation should instead take an iterative reflective approach during the implementation. He/she argued that there should be a focus on interactive feedback process (described as different from formative evaluation per se), which is designed in culturally sensitive way so that one can hear honest opinions about what is going on:

"Even the formative is like I'm implementing now, but I don't reflect about what I'm doing. Then, when I'm done implementing now, I do a formative assessment…This is not the thing should happen. You should all the time be thinking about, 'What type of feedback do I need and should get from what I'm doing?'…It should be iterative the whole time. The missing gap there is how will you get feedback from someone that you don't know?...In American context and the European context, the culture is shaped in such a way that people will immediately tell you [when] things go wrong. They're very assertive. In the African context, they won't tell you. It's almost like reserving opinion as a sign of respect."

Lastly, on the topic of **reporting, disseminating, and using evaluation results**, there was a division between those who believe there has been much discussion and those who do not. The interviewees suggested the following as issues that need further discussion: how do we incentivize informal channels for disseminating the results?; how accessible are the information being disseminated (in terms of language and format)?; and how can we promote stories of success and failure which provide fine details of implementation and results, and better reflect African oral culture?

Moreover, a few talked about how there have been discussions on sharing the results with the communities (i.e. project participants):

"One of the main points of discussion I've seen is how do you disseminate evaluation results into the communities you have served? How do you tell people that their life has been changed by the project? How do you engage them into an understanding of their role in this process? Because that's another thing that's very important—what's the role of the populations being served in the process of innovation and development?"

An interviewee provided a specific example of how he/she designed a book that could be used to share results with the communities he/she studied:

"…after I finished my work in the slums of Brazil I published my book…which was 100% designed to be in short text…things that were going to be very accessible to the locals in the slums. I wanted to give back in that sense like that message should be in a language that they understand."

Another respondent mentioned how there is a close connection between the design or purpose of evaluation and how the results are disseminated. His/her comment implied that, to better engage

with the communities and funding agencies through sharing results, the nature of evaluation should be constructive, rather than punitive:

"It's back to the issue of maybe if evaluations were made to be constructive. If you had constructive evaluations, which means everybody including the community and the funding agency or the stakeholders, will sit together, agree on the evaluation, therefore the results will be reported back to them, to everybody. Maybe this takes us back to, how do we design the evaluation? When we should design the evaluation with all the stakeholders together to say, 'We are looking for A, B, C, D. Is everybody happy?'...In most cases evaluations will end up either with closing a project or giving more funding, additional funding. If we don't discuss this, they sound more punitive and not constructive."

4.2.4 *Challenges in ICT4D evaluation*

In terms of challenges in ICT4D evaluation, various issues were mentioned, including: those caused by **budget and time constraints**; **questions surrounding the relevancy of indicators**; **challenges related to evaluation design (on RCT)**; **challenges in discerning and avoiding political and commercial influences**; **difficulties in capturing the shared use of technology**; and **different stakeholders responding with different versions of the truth**.

Budget or time constraints were caused by different factors, including academic program structure and restricted amount of funding available from donors:

"...when we're dealing with PhD students who have a certain period of time for which they're doing PhD, they do have a limited time in which they can actually go through a project's entire life cycle…Even if we have best of intentions, I think academia is not really structured to provide us that kind of support."

"On the side of the relationship with donors, the challenge was, we were working with a relatively small budget. Again, this goes to the difference between what we thought is the appropriate sample size…the things that we care a lot about, like things like sample size, procurement, and at least [the name of aid/development agency which funded the project] cared not as much."

"It's pretty rare that you have the resources to really go that deep. I would say as another challenge, it's just the resources. The time and the money and the political will from any development organization to dedicate that kind of time and emphasis to really learn more about how people are engaging or what's actually happening with what you're doing."

Other interviewees mentioned how the constraints (potentially) influence evaluation process and results, in terms of depth and breadth of outcomes that can be examined:

"I'm constantly asking myself—okay, we are trying to learn about community engagement in primary healthcare. How can we explain this in different ways both to the beneficiaries themselves, but also to the other agencies who work closely? It's a big effort and…You need time for that. You need funding as well. Again, you're very instrumental. You're only looking to see, 'This is the ultimate thing I want to come out with and I'll move towards that' rather than actually thinking about the context and thinking about the players who are within that."

"…given limited resources, we could only look at so many outcomes, even if there were more that could potentially [have] been affected by the program."

"Sometimes you're doing well with a project, sometimes you're not doing so well. Single evaluation event doesn't necessarily capture this…Also, the actual timing in my experience working with the rural communities, you cannot impose an artificial time scale on a project for a rural community. They will do what they need to do in their own time."

In terms of questions surrounding **the relevancy of indicators**, interviewees mentioned how it is difficult to select indicators which can readily deliver meaningful implications of what is happening as a result of technology use. An interviewee claimed that ultimately outcome and impact are what evaluators are interested in examining. To the interviewee, principal outcome was about how technology is associated with behavioral change. However, he/she said that in the absence of counterfactual, impact cannot be established and one may discuss "contribution" of technology but not "attribution". Similarly, other interviewees mentioned:

"…[O]ne challenge is picking relevant tracking indicators that measure meaningful impacts…when there is tracking of some indicators, it is not clear that the project fully contributes to the change."

"[For the project which involves technology in participatory budgeting] Looking how many comments, how many people participated, but we don't know what does it mean. Whether 1,000 comments is better than 100 comments or you need 10,000 comments or you need 1 million people participation online or you need just—Nobody knows that."

"The challenge here is how would you have an indicator or some idea that technology has advanced, say, children's education? That's difficult to measure."

The root cause of the difficulty in finding relevant indicators was reflected in an academic's response that the impact of ICT4D is not direct and the connection between IS/IT and impact is difficult to be established, compared to other types of development projects where the link between intervention and change can be more readily noticed:

"The complexity or the difference between ICT4D from water or from earth is that the artifact ICT is very dynamic. In most cases, the impact is not direct. If you give me…a healthcare clinic. I know if I'm sick, I go there, I get medicine I get well. The link is so easy to measure if

you gave me a school, I know that we can say, 'Oh, now the kids in the village are educated', that's simple. There are lots of linear evaluations. ICT doesn't give you that linear evaluation or doesn't give you much of that. I could say, 'Oh, there's a data center or we have done a new intervention people are using it.' That's not a good measure of impact. It's only after the other level of being because of that indirect impact, some of these evaluations we do are not easy to apply for ICT4D."

A different interviewee also described the particular nature of IT as "an intellectual machine", being different from any other tool. Essentially, his/her argument implies that because ICT is not a mere tool, but rather a tool involving "appropriation", complexity in ICT4D evaluation is natural:

"…beneficiaries and an ICT project will take the technology from you and will start using it in ways that you haven't necessarily predicted or designed it for. When you do that I think you're onto something useful. It means that beneficiaries have appropriated the technology and they start using it for their own purposes, rather than those that you have devised for them. That's to do with the nature of IT which is like IT is an intellectual machine. It has multiple uses and each use represents a different device. Unlike an electricity generator or water pump…The key is how it's used and it's going to be used for purposes that are relevant most likely when those purposes chosen by the people actually using it."

On a related point to the relevancy of indicators, a different interviewee argued that there is too much data collected rather than carefully thinking about what we are actually learning from the data. This shows that it is not only the indicators per se that are of the issue, but how that lead to meaningful learning process in evaluation:

"Overabundance of data in most ICTD initiatives…Really, you need a minimum data set because what gets forgotten is every time we think about this exercise, there's somebody at

the other end having to collect the data, which is seen as a routine monitoring even though we have in mind for the learning. How much learning are we actually doing?"

Moreover, there was a practitioner who talked about **challenges in implementing RCTs in evaluation** and how it—if not carefully planned—might distort the project design. This in turn can potentially affect the accuracy of assessing the results.

"...when we do randomized controlled trials, sometimes those trials force the design of the system to have to change for the purposes of the evaluation. For instance, when we did that ICT in India for our agricultural work, we had to just focus our intervention on just one commodity, on the right producers, and just one practice. Whereas the typical thing that we do when we're doing our interventions is like, we're just telling farmers a lot of different commodities or better practices associated with them. We had to narrow it for the purposes of this impact evaluation that happened with India."

Another respondent who is both an academic and practitioner shared **the difficulties in discerning and avoiding potential political and commercial influences**. The political aspect pertains to evaluators being placed with the risk of losing their career depending upon the results of a project. They might be in a difficult position to clearly state the failure of a project. The commercial aspect is that there might be private companies involved in a project as sponsors and due to their position in funding the project, evaluators might face difficulties in keeping an independent stance.

One interviewee shared how evaluations might not be easy because researchers **cannot fully capture the shared use of technology by multiple people**. His/her example came from the incidences where multiple people shared a phone. The respondent also shared how he/she tried to overcome the challenge by combining different methods in an evaluation:

"In this instance, we use technology both for reaching people and for hearing back from them. We might use radio to push out content and then we might use call-in shows or SMS or interactive voice response to hear back from them…It's a very common phenomenon where people will share radios or have 30 people sitting around and listening to the same program or those share phones...We would track the phone numbers that would call into our interactive voice response in the instance of this television station in Nigeria. You would consider anybody who called back from that number as having already responded to the demographic questions. However, we didn't take into consideration that people would be sharing phones. Therefore, we could have up to five or six unique, different users for the same phone. Therefore, our demographics got skewed because we only asked the question the first time the phone was used…people use it [technology] in ways that you didn't anticipate. However, you can address some of that by simply pairing technology-enabled communication with traditional follow-up communication by meeting people and hearing more about their use of that technology."

In addition, there was an interviewee who shared his/her experience where stakeholder responses reflected **contrasting versions of what happened** in an ICT in schools project. This was described as contrasts between the administrative officials vs. the implementers on the ground. This implied the significance of examining views of stakeholders at different levels in an evaluation:

"You always have the story as told by the official saying they are doing their mandate and if you talk to the schools, they say, 'Well, if we are far away from the district office, it takes three hours to get to us with bad roads, we never see a subject adviser, because it's too much effort to get to the school.'…Within the system, there are frustrated groups of people that will

give you their version of the truth which might be bleaker than it is, at least it kind of balances the positive view you get from the people at the top because they are suffering in the system's processes."

4.2.5 *Themes or issues for further discussion*

Themes or issues that the interviewees would like to see further discussions regarding ICT4D evaluation included: **sustainability issues**; **engagement among researchers, practitioners, and policymakers and discussions at the policy level**; **sensitivity and ethical considerations of researchers in evaluation**; **participatory evaluation design**; **methodology**; and **the expansion of scope of ICT4D evaluation**.

The type of **sustainability** mentioned as currently lacking attention included: environmental sustainability, political or institutional sustainability, and social sustainability. One interviewee mentioned that there is a tendency to focus on temporal sustainability rather than other aspects listed on the above. A different interviewee viewed that there is a particular lack of interest on environmental sustainability in the field. He/she argued that it should be examined in terms of inputs, i.e. how the resources spent as part of broader ICT4D phenomenon can potentially influence natural environment, such as the increased use of minerals for production of mobile phones. Another respondent mentioned the current lack of attention to IT waste that can be generated in developing countries (such as from imported mobile phones, computers, batteries), where there might be no good infrastructure to properly handle the waste.

There was also a voice that there should be more **engagement between the practitioners, researchers, and policymakers**. On a related point, a different respondent mentioned how discussion at the policy level can be crucial in clarifying the direction of development, rather than data per se driving what we should do.

"Sometimes it's very difficult to find people that are able to simultaneously talk with the public policymakers and with the people on the ground. How do you find a way to connect those two different universes into one larger narrative that can be developed in a systematic way to find measurement and evaluation in a systematic but inclusive way?"

"…understanding how policy can absorb the need for long-term inquiry, long-term learning in international development…It's even more crucial at a time when technology is racing ahead when we don't really understand the issues, racing ahead to such an extent that technology is even defining the phenomenon these days…The use of big data for planning in different sectors. It's like big data is actually telling us that this is the theory that we should use for predicting resource allocation for different diseases, et cetera. That I think is very dangerous…"

However, an interviewee (who is both an academic and practitioner) mentioned how academics face constraints in engaging with the practitioners and policymakers, even if there might be some academics who are willing to:

"The institutions that the academics work for don't incentivize the practices that are deemed necessary for academic research to have policy and practice influence. You'll get your PhD partly based on your publications. You'll get a job as a lecturer if you want to stay in academic field also based on the strength of your publications. The fact of the matter is what you write is unlikely to be read by people who advise policymakers or people who make policy or people who actually practice ICT4D in the field…I'm not pointing a finger at anybody…Some [academics] are very interested in policy influence. Most academic influence in institutions, a quality assessment and assurance measures have, in most cases, do not have much space

for policy and practice influence. It's more the number of obligations and the supposed impact factor of quotes of the journals in which your publications appear."

Some interviewees mentioned how there should be more discussions on **the sensitivity and ethical considerations of researchers in evaluation**. Specific aspects included: engaging in the research for a prolonged period of time for a sustainable and respectful research; being attentive to one's views in ethics and values, and how that potentially influence evaluation; to move away from imposing models or theories onto a context, and instead paying more attention to stories from data; and to critically evaluate from an ethical standpoint to see if one's artifact or project really made an effect and not just someone using it once or twice.

An interviewee wanted to see further discussion on **designing evaluation in a more participatory way**, although this might be a complex issue:

"I think I would like to see much discussion on designing evaluation. How should we design evaluation tools in a participatory way? I think this is complex because there is often a cultural difference between the funding agency and the communities…The research we do is more on participatory in the designing of the project but I think we ignore how all these things should be evaluated at the end."

In terms of **methodology**, there were a few academics who mentioned that discussion for a more balanced approach involving both qualitative and quantitative aspects is necessary:

"I would say the biggest question that needs to be resolved and for which there could be more discussion within ICTD, is this interdisciplinary one which is instead of casting qualitative and quantitative methodology that is being opposing each other, to come to an agreement that mixed methods are the most complementary and ultimately useful."

In comparison, there was an interviewee currently working for an aid/development agency arguing that there needs to be more attention to the usefulness of statistics and quantitative approach which can help build a common and understandable language worldwide in sharing evaluation results:

"Before…, I didn't understand statistics and…I didn't understand the importance of RCT or impact evaluation but now I think it's very obvious to show the results. It's very convincing approach for all over the world…[If evaluations mainly focus on context and qualitative measures] I think even if we share the report to other donors, they cannot understand or they cannot measure the real impact of the project. If we have a common sense of project achievement all over the world, quantitative one may be better…"

Moreover, there was a concern around **the lack of accumulation of knowledge in ICT4D evaluation**. The comment partly mirrors another interviewee's concern on how there has been too much attention paid on development target creation (e.g. the MDGs and SDGs) instead of continuous reflection and learning (quote mentioned later in Chapter 4.2.7):

"…I see too many studies which are just a single isolated study and they have no connection to the past and they have no connection to the future. There is literature, there's data, there is some implication but nobody really listens. I feel that we don't have any accumulation of knowledge…"

In terms of **scope of ICT4D evaluation**, an interviewee argued that there has been too much focus on micro and meso level research—which may be beneficial for the developing countries but may cause to ignore the problem of worldwide inequality or power imbalance between the beneficiaries and multilateral IT companies. Moreover, he/she added that the scope of ICT4D evaluation can be broadened to examine not only ICTs in the developing countries context, but

also digital divide within the developed countries, or issues related to struggle, fear or resistance against accepting to use certain technology in the advanced economies—essentially extending the scope of "D" in ICT4D from the narrower context of the Global South.

4.2.6 *Ways to improve ICT4D evaluation: Domain specific expertise*

Some interviewees' responses illuminated **the importance of domain specific expertise in ICT4D evaluation**. An interviewee from an NGO which utilizes ICTs in agriculture in the Global South context shared his/her frustrating experience working with ICT experts without specific domain knowledge:

> *"...the generalist ICT, the evaluators, are not as helpful as compared to subject matter evaluator, people who are specialized in the field of, say, nutrition, specialized for the field of agriculture. Whereas they may have evaluated totally non-ICT related interventions in the past that were related to their fields, but that's much better than the generalist ICT guys, where they're trying to look at almost like a domain agnostic lens. You end up losing a lot of nuance, both in terms of how the designs of that trials or evaluations are treated, as well as the analysis and even the presentation. They're not able to communicate with, say, Ministry of Agriculture, and ICT computer sciences type of person is not capable of building a sense of understanding with a Ministry of Agriculture person compared to an agriculture college researcher who specialized in that for, say, the last 15 to 20 years. It's just a totally different level."*

Similarly, an academic who has been working in government and citizen engagement areas of ICT4D mentioned how domain specific knowledge and collaborative work with relevant domain's experts are important in evaluation:

"...though it's changing quite a lot actually but in the past it tended to be an IS person or computer science person will go and implement the project, but if for instance, you are going to implement a project on government what I've been doing a lot on is, you're very limited in your knowledge area around how government functions, how citizen engagement actually takes place. You need to apply a very transdisciplinary approach to understand those things that are essential to actually evaluate—you bring in a sociology person, a politics person, journalist. I've learned so much from them in terms of, what are those things that you need to look into when you're evaluating that particular project?"

In alignment with the points above, an interviewee with a significant number of years working in a UN agency mentioned that the UN agencies utilize a broad framework where development projects in general can be evaluated against, but that there is no evaluation framework specifically used for ICT4D projects. He/she mentioned that domain specific evaluation framework for ICT4D projects would be useful:

"I think that specific guidelines for assessing the impacts of each technology for development purposes, of course, would be very much welcomed. I fully agree that having very, very broad evaluation frameworks now would be not sufficient because if we look back, that was probably 10 years ago or 15 years ago and technology was just emerging. Now, we see how technology is everywhere and we have to learn more about that. Because if you look how technology is used in agriculture, how technology is used in other sectors, so maybe even that should be sector-specific use of ICT or in healthcare. I would probably even look at that because the way technology is applied and the type of technology could depend on particular sector. Therefore, it might be useful to have particular those guidelines for evaluation concerning

different sectors, meaning ICT in, not just in development, but ICT in agriculture, ICT in healthcare, ICT in small business development, ICT in environmental management."

Moreover, the interviewee added further explanation about how there is a lack of coordination of interest on ICT4D evaluation in general amongst the UN agencies, although there might have been domain specific works done across the agencies:

"If you check UNESCO, for example, which we know is in charge of education, they might have those specific guidelines, how to assess the use of technology in education, for example. That might be happening, but I'm pretty sure that it's not coordinated at all. There is no talk about that per se…You can check the ITU, International Telecommunication Union, the ITU-D, development they call it, ITU-D. They do have some, but still ITU's major mandate is telecommunication infrastructure. They don't really look at heart of those issues. They all have this mandate limitation. If you take UN Secretariat, UNDESA [United Nations Department of Economic and Social Affairs], which publishes the annual e-government reports where all the countries are ranked according to e-government…They also have something, but they're focusing on those measurement and ranking. While they're doing a very good job, but they also don't really look at issues of evaluation. There is not any agency which really, to my knowledge, is looking hard at that."

4.2.7 *Associations between ICT4D evaluation and the three evaluation fields or other disciplines*

When asked the interviewees about the associations between ICT4D evaluation and the three evaluation fields (i.e. program evaluation, IS/IT evaluation, aid/development evaluation), several interviewees mentioned that the associations do exist. However, perceived degree of the

associations differed among the interviewees and some of them also mentioned the limitations of examining just the three evaluation fields in understanding ICT4D evaluation.

Some interviewees mentioned how there has been relatively greater **association between ICT4D evaluation and one or two of the three evaluation fields**. An interviewee from academia mentioned that he/she has seen relatively more incidences where IS/IT evaluation and aid/development evaluation related models or theories were applied in ICT4D evaluation:

> *"...from the IS or computer science field, you typically find TAM [Technology acceptance model], Diffusion of innovations... you find out a lot of that there, so yes, definitely…they are always trying to link the evaluation to some development aspect and that aspect, Capability Approach, a lot of researchers have been so comfortable adapting to that."*

An interviewee who has worked in a UN agency also responded that, although he/she does not have accurate statistics, there seems to have been relatively more focus on IS/IT evaluation.

In contrast, one who has worked in an aid/development agency said that there has been more attention to program evaluation and aid/development evaluation (particularly the SDGs), but relatively less on IS/IT evaluation. He/she mentioned that it might be useful to have more application of IS/IT evaluation and other domain specific evaluation. The response to an extent mirrors other interviewees' opinions on how ICT has been viewed as a cross-cutting issue in the UN agencies and that domain specific expertise in ICT4D evaluation is significant:

> *"Lately, we have to collect everything through SDGs otherwise we cannot get fund…I think that [the application of] information system [evaluation] are very short. These have to be done, but I think we don't use this point too much…If we can include the information system type evaluation, that may be useful. The same to other sectors. For education project, this kind of specific will may be added in addition to our evaluation. Then in terms of ICTD, you*

have to add this one, agriculture, add this one. Such kind of flexibility if we have, then yes, that may be better. Now, we have only one single criteria [OECD-DAC's criteria for evaluating development assistance]."

There were some interviewees who shared their understanding of **relationships among the three evaluation fields, in the context of ICT4D**. One argued that what can be set as a goal at the program level (pertaining to program evaluation) may not sufficiently reflect the goals of the stakeholders involved in the project (related to aid/development evaluation). A different interviewee mentioned that IS/IT evaluation is subordinate to program evaluation in ICT4D setting because the establishment of social goals is needed in the context:

"IS/IT evaluation is fundamental but at the same time has to be subordinate to the first level [program evaluation], in the sense that you have to evaluate in terms of public policies and public goals and social goals first. You have to define your baselines based on how do you want to improve quality of life. Then you have to define that your information systems, your computer solutions, your devices work in an efficient way, in a way that actually results in systems that are trustworthy, because those are good investment and that are, let's say, worthwhile of continual investment, because they are working in a way that is efficient, cost-effective, but also, in a way that changes a society for the best. You need to balance those two approaches. You cannot just use IS/IT evaluation because that's empty…It doesn't say anything at all about the 'D' part ['development' part] of ICTD, but you need to use the IS/IT evaluation because there's a lot of money involved and it's going to be a lot of money involved in the coming years and you need to do it in the best possible way, subordinate to the 'D' part of ICTD."

Another respondent similarly explained that IS/IT evaluation, aid/development evaluation, and ICT4D evaluation are all types of program evaluation. He/she understood IS/IT evaluation distinct from program evaluation and aid/development evaluation in the sense that it is process- and output-oriented (rather than outcomes, unlike the other two) and it focuses on "assessing the technology itself and technology's role within the program". He/she added that the three evaluation fields are associated with each other and the decision to utilize one type of evaluation among the three really depends upon which aspect of a program you are looking into:

"...you can have an ICT4D program evaluation, if you did an ICT4D information systems evaluation you'd be looking more at the channel or the mechanism and you could have an aid/development ICT4D evaluation if your program was funded by aid money. All three of these could be associated, it just depends on whether your emphasis is the economic aspect, the technological aspect or the…overall outcome aspect."

On a related point, another interviewee mentioned that although he/she perceives that ICT4D evaluation has drawn from all of the three evaluation fields, the classification of the three fields and trying to examine their associations with the ICT4D evaluation have limitations because the three fields overlap:

"I think you're right that there are disciplinary traditions [in] the three evaluations in this way, but they're overlapping. Taking this classification too seriously, I don't think is necessarily helpful in understanding what's actually happening. For example, there is plenty of what you're calling aid and development evaluations are actually just program evaluations."

There were other interviewees who described **the limitations of examining the three evaluation fields in studying ICT4D evaluation**. First, an interviewee mentioned that the three

evaluation strands lean toward quantitative focus, rather than qualitative, and their assessment tends to be short-term oriented. He/she argued that this would not capture the "whole story" of ICT4D projects and might not effectively capture "the richness of development".

Another respondent mentioned how the three evaluation fields were developed in the Global North which causes limitations by imposing external values in evaluation:

"The three of them have been developed in the Global North. Again, I think that what's missing is trying to understand if whatever they say is something that also resonates well with the people that you're working with because again, otherwise, it's always an imposition of what we think that we should do and evaluate. Again, I think that now that we talk a lot about having participatory research that the Global South should be involved also in this in deciding about this, and I'm not sure if this would change at all, this way of evaluating, but it could."

A different interviewee made a similar point, but more specifically on the MDGs and how they reflect Western value system:

"The international development agenda, it's the Millennium Goals. [MDGs] They have a Western European value system embedded in them…developed countries dictating how development should look like in developing countries and most of them aren't aware of the local culture and way of doing things. Do them in the Millennium Development Goals, talk to the need for people to feel belonging? I don't know about your context but in the African context is that there's a strong concept called 'ubuntu'. Ubuntu means 'I am because we are, but I protect my social relationships' and the question then is '[is] this reflected in the Millennium Development Goals?' I don't think it would be. For all three of those things [the three evaluation fields] there are areas we need to continue questioning things. I'm not saying reject it [the three evaluation fields], I'm saying keep on questioning."

There were a few others who also mentioned the limitations of the MDGs and SDGs. One interviewee from academia claimed that while the MDGs and SDGs provide a guideline as development agenda, there is a gap between the agenda and how it can be practically measured and assessed in research:

"...I think that when you speak academic there are sometimes gaps in what is actually meant in a lot of cases like how do you actually see and measure certain things because I think that academia deals with much more precise terms in a lot of cases than the MDGs or SDGs do. I do think that they do have a value because they keep us together. You can accept them or not, you can agree with them or not, but they give guidelines that are clear. Then the problem is how you actually apply them that might become tricky in research sometimes, I think.

On a related point, a different academic argued how too much attention has been paid in target creation in the MDGs and SDGs rather than continuous monitoring, reflection, and learning:

"It's not just the question of firing off lots and lots of targets but continuously monitoring. I mean, the SDGs have been published, I don't know how much discussion that has taken place at the high-end policy level of whether or not it—we had to the same discussion in the millennium with the MDGs and it wasn't resolved…We are still doing the same thing with the SDGs but it's even worse because we have even more quantifiable targets and less reflection on what we should be doing, which is learning from all the data that we're obtaining."

Another academic mentioned how the MDGs and SDGs become straitjackets which restrict the ways to contribute to development:

"I don't have any specific thing against the Millennium Development Goals or the Sustainable Development Goals, but the many cases I've written about that, they tend to be sort of straitjackets, that governments tend to use as a way to limit their choices and to simplify the

policy making process. You just spend a lot of money trying to alienate or align or harmonize your actions with the Millennium Development Goals or the Sustainable Development Goals or whatever, and that energy and those resources are wasted because they are not used in actual development…How could you get people to live a better life? That's the starting point. The Millennium Development Goals are basically as a result of a give and take from international arena between states and something doesn't make much sense for some countries and other things make a little more sense whatever."

An academic's comment pertained to the current limitations in applying aspects of aid/development evaluation in ICT4D setting—more specifically on the case of Capability Approach and challenges in its operationalizability due to the variety of context:

"I'm sure you've heard the Capability Approach…that is fundamental, [in] ICTD they are always trying to link the evaluation to some development aspect and that aspect, Capability Approach, a lot of researchers have been so comfortable adapting to that…There are a lot of limitations also associated with actually making it a reality and implementing it…you know there are a lot of contextual aspects that are not taken into consideration. Each context is different when it comes to the evaluation, if I look at development in South Africa and then I look at development in India, it is different you know."

When asked if there are **other disciplines or practices that might be worthwhile to examine for improving ICT4D evaluation**, education, sociology, anthropology, capacity assessment, empowerment, and psychology were mentioned. An interviewee argued that educational assessment are done for constructive purposes ("In education, the aim is not that if you fail today they check you out—they give you a bit more time to improve and change") rather than being punitive, and this can help inform how ICT4D evaluation should be. Another respondent who

mentioned sociology and anthropology argued that the two disciplines can inform ways to assess social capital and how to apply qualitative approaches in evaluations, respectively. A practitioner interviewee highlighted that, in the UN agency he/she worked in, there have been capacity assessments in development projects across different sectors, and stated how he/she perceived this as an important step to check the readiness of implementing and utilizing a technology in a given setting. A different interviewee mentioned empowerment, which is often discussed theoretically in ICT4D and is widely recognized as taking place in the projects. However, he/she explained that because empowerment cannot be easily quantified, its assessment rarely appears in practice and there has been a lack of advancement in ways of measuring it. Moreover, an interviewee claimed the need to explore psychology to understand why people feel passionate for, or are resilient against, technological resources, and find out ways to support people so that changes can be brought about from technology utilization. Another interviewee argued that there is no formulaic answer to which area of practice or academic discipline one should look into when evaluating ICT4D projects. He/she argued that it instead depends upon which end outcome the project is aiming to achieve, and aspects of intervention and its context which significantly influence the type of methodology that can be used for evaluation.

4.2.8 *Summary of interview findings*

Interview findings revealed that the major foci of ICT4D evaluation could be described in terms of *regional focus* (Africa; Asia), *methods* (mixed methods; qualitative focus*), development notions* (human development notion; socio-economic development; neo-liberal emphasis on performance measurement; lack of development lens in ICT4D evaluation), and *evaluation focus* (outcome assessment; output assessment). Changes in foci were also described in terms of *development notions* (more toward human centered approach), *research or evaluation approaches* (more

attention to critical theory and design science research; some progress in outcome or impact assessment; more formative or process evaluations compared to summative or impact evaluation; a shift from result- to process-oriented evaluation), and *methods* (quantitative to qualitative; qualitative to quantitative in assessing impact).

Moreover, challenges and gaps in ICT4D evaluation were identified by the interviewees, including: *budget and time constraints*; *questions surrounding the relevancy of indicators*; *challenges related to evaluation design (on RCT)*; c*hallenges in discerning and avoiding political and commercial influences*; *difficulties in capturing the shared use of technology*; *different stakeholders responding with different versions of the truth*; and *the lack of accumulation of knowledge in ICT4D evaluation*.

In terms of associations between ICT4D evaluation with the three evaluation fields, although the interviewees mentioned that there have been associations, *there are limitations in examining just the three to understand and strengthen ICT4D evaluation*. Other disciplines or practices that might be worthwhile to examine for improving ICT4D evaluation were suggested, including: education, sociology, anthropology, capacity assessment, empowerment, and psychology.

As a way to improve ICT4D evaluation, the importance of *domain expertise in ICT4D evaluation* was mentioned by those in academic and practitioner spheres. Moreover, possible areas for further discussion included: *sustainability issues*; *engagement among researchers, practitioners, and policymakers and discussions at the policy level*; *sensitivity and ethical considerations of researchers in evaluation*; *participatory evaluation design*; and *methodology*.

4.3 Feedback on the preliminary findings from content analysis and interviews (Change Seminar)

4.3.1 *Presented preliminary findings*

Preliminary findings that were presented during the Change Seminar were around five main points: (1) there have been changes in ICT4D evaluation foci in terms of development notions, research or evaluation approaches, and methods; (2) there are challenges in ICT4D evaluation and there has been a lack of accumulation of knowledge; (3) domain expertise in ICT4D evaluation is important; (4) the three evaluation fields (i.e. program evaluation, IS/IT evaluation, aid/development evaluation) have had some associations with ICT4D evaluation but they alone have limitations to strengthen the concepts of ICT4D evaluation; and (5) further discussion is needed on sustainability, participatory evaluation design, and engagement between practitioners/researchers and policymakers.

4.3.2 *Responses to "How well does the findings reflect your understanding or experience in the ICTD field?"*

In general, the findings seemed to well align with participants' understanding of ICT4D (evaluation) field. Some comments reflected subjective feelings about the findings. On changes in the foci of ICT4D evaluation, they shared the following comments. A noticeable number of comments reflected thoughts on changes in development notions (number of years in the quotes indicate number of years of interest in the ICT4D field):

- *[The points that align with my understanding are that:] ICT as cross-cutting, not a field unto itself; [ICT4D evaluation reflecting a] quant focus (which is unfortunate).* (Research scientist, 15 years)

- *Agree with more focus on HCD [human-centered development].* (Doctoral student, ten years)
- *I am not surprised that development notions are changing—many articles say they should change. But I wonder, since the initial wave of "World Bank-style development (circa 1980s) is bad," have development notions changed much? And I wonder how many evaluations now use strictly-economics lenses?* (Doctoral student, three years)
- *I think the changes you're talking about are well accepted and understood by the greater ICTD community.* (Faculty member, two to three years)
- *The findings mirror my understanding of the field in the following ways:*
  -does seem to be moving away from technodeterminism. However, there's still too much.
  -qualitative still struggles for recognition
  -love for big data is troubling (Research coordinator, less than a year)
- *I have relatively little experience in ICTD but I think overall I agree and am happy to hear your results. I feel especially good about how evaluation is moving from techno-deterministic approach to a more human-centered one.* (Master's student, less than a year)

On challenges in ICT4D evaluation, comments generally reflected how the findings confirmed their understanding or experience of the field in terms of budget and time constraints, a lack of accumulation of knowledge, and differences in funder priorities and local community:

- *I agree with the challenges, especially not much learning. A lot of evaluation just to fulfill requirements but not to learn, reality too complex.* (Faculty member, 20 years)
- *I agree with the finding for example, ICTD projects takes longer to get results from the field but our funding as well as our doctoral program does not easily allow us to run a project for many years like 3-5 yrs.* (Doctoral student, nine years)

- *My understanding/experience in the field is very limited, but they mostly mirror what I understand about the field. For example, I've seen that time / budget constraints can be a major hindrance to measuring long-term impact and ensuring sustainability since there is often more excitement about an initial proof-of-concept than maintaining the project long-term.* (Master's student, one year)
- *The findings mirror my understanding of the field in the following ways:… -disconnect with funder evaluation priorities + local community.* (Research coordinator, less than a year)

There was also a response stating how the importance of domain expertise knowledge in ICT4D evaluation mirrors one's understanding or experience in the field.

On areas for further discussion, a few participants mentioned that the issues around sustainability and its notion reflected in the findings were somewhat different from their understanding:

- *The findings about the language around sustainability are different from my experience because in cellular network deployments we hope the service will continue to be provided as long as needed. We are always aiming for sustainability.* (Doctoral student, five years)
- *Agree with sustainability but would not have guessed an emphasize on environmental* (Doctoral student, five years)

4.3.3 *Responses to "Were there findings that you expected? Were there other findings that you were surprised to see?"*

Of the findings, participants answered that it was not surprising to see: more focus on data driven methods and quantitative measures (e.g. number of beneficiaries, number of users, big data or data science); less emphasis on qualitative measures; the possible distortions caused by the use of

particular evaluation methods (regarding the interview finding that implementing RCTs can distort the ICT4D project design); the importance of domain expertise in evaluation; concerns with evaluation metrics of the three evaluation fields coming from the Global North; changes in development notions; no significant change in aid/development agencies' approach in ICT4D evaluation; and how there are challenges in establishing causal relationships in evaluation.

- *These were generally in line with experience. I have a high degree of cynicism about donor project evaluation. A combination of evaluation for the sake of evaluation, and evaluation to be ignored. A significant amount of evaluation is just positioning for refunding. Also, I feel that much evaluation is just abstracted to a few meaningless numbers, and no one reads the reports.* (Faculty member, 20 years)

- *In alignment, the evaluation[s] are not being used by funders to improve program design in comprehensive or cohesive manner—probably not different from other fields' use of evaluation.* (Research scientist, two years)

- *I think they align well. I appreciate the need to emphasize domain knowledge as well as a need to build sustainable solutions. I think that each of these terms can be unpacked since they have different meanings across different cultures.* (Master's student, less than a year)

In contrast, they were surprised to see: the change of focus toward outcomes; the three evaluation fields not being sufficient for strengthening ICT4D evaluation; not much learning taking place in the field through evaluation; a shift away from techno-centric approach to agency and other more nuanced ways of understanding ICT's role in development; and the recognition of expanded notion of sustainability (e.g. beyond financial sustainability; mentioned this was "good to see").

- *In contrast to my expectation, people found that there is not much learning. In my opinion, though our projects are short lived, we learn quite a lot from it. I guess there is more we can learn from longitudinal studies but those studies rely on findings from smaller scale projects.* (Doctoral student, nine years)

- *In contrast to my expectations, there is a lot of learning because data suggests that the challenges of SDG exist. But the absence of a control evaluative framework is the reason the learning cannot be measured.* (Master's student, less than a year)

- *Surprised to see that the three evaluation fields were seen as not enough. I am curious what other fields could be drawn upon to fill in those gaps.* (Research coordinator, less than a year)

4.3.4 *Responses to "What are holes in the findings? What would you want to explore further? What clarification is needed?"*

Areas that participants would like to explore further included: the change of focus toward the outcomes; the three main topics mentioned by the interviewees as they would hope to see further discussion on, i.e. sustainability, participatory evaluation design, and engagement between practitioners/researchers and policymakers; the difference between development projects in general vs. ICT projects in terms of how they are evaluated; how different types of ICT projects are evaluated; more evidence from the content analysis and interviews; specific examples of projects evaluated that had issues; layered responsibility and answerability of issues surrounding ICT4D evaluation; reasons behind the problem of a lack of accumulation of knowledge in ICT4D evaluation and ways to address the challenge; and the implications surrounding the rise of big data in ICT4D evaluation.

- *Further studies could try and explore what experts see as improvements needed, alternatives and ways to do better. E.g. what is needed to address current challenges, sustainability, environmental sustainability? Also, engagement is proposed as something to invest more on. But is engagement enough? Isn't it always something proposed by the Global North with the participation of the Global South? Wouldn't it be better to have the Global South leading and make the Global North participate, in case?* (Faculty member, nine years)
- *Most ICTD projects are top down. So is the evaluation design & who is answerable to whom. So look at layered responsibility & answerability.* (Doctoral student, ten years)
- *One thing I'm curious about is how ICT projects are evaluated differently from other development projects. For example, how is funding the building of a clinic or road different / the same as funding a telecenter or computer lab? Also, how are different types of projects evaluated differently—for example, an SMS campaign for male circumcision vs. workshops to train women how to run their business more efficiently with cell phone tools.* (Doctoral student, nine years)
- *Why is knowledge not being built upon? Investigate whether or not researchers are referencing previous results as benchmarks. Where is the field going? What is needed to gain more knowledge in the field? Small gains can compound into more funding available for larger RCTs.* (Master's student, six years)
- *Just for my own understanding (this may be obvious to people with more experience), it would be nice to see specific examples of projects that had issues being evaluated, as well as how the evaluation process could be improved (at least in some experts' opinion)—for*

example using domain specific expertise effectively and how to do this. (Master's student, one year)

- *The idea that more collaboration needs to [happen] between two existing universes [i.e. practitioners/researchers and policymakers]—we hear this often—why doesn't it happen? What are the true limitations or burdens that hinder these interactions?* (Master's student, less than a year)

Some responses asked for clarifications (e.g. the scope of ICT4D field) or suggested questions to think about (e.g. the association between evaluation and implementation, the meaning of "domain agnostic"-ness of technicians in ICT4D evaluation (in response to the finding that technicians lack domain specific knowledge in evaluation)):

- *I needed more context in what types of ICTD projects you were considering. The definition of "ICTD evaluation" is critical. Is ICTD a field?* (Faculty member, 20 years)
- *Does any attempt to develop a consensus around ICT evaluation require first a broader consensus on what constituted ICTD? (Put another way) If ICTs are being mainstreamed, and evaluators draw on multiple approaches from development studies, etc., is there a need for an ICTD specific approach to evaluation? If so, how would it be unique? It seems some of the finding / quotes shed light on this.* (Research scientist, 15 years)
- *Can we separate evaluations from implementations? I worked on a project that ran a large, expensive implementation of a project (as a RCT) with the primary intent being the evaluation. The implementation was problematic, in order to make the evaluation more "rigorous." So it seems wrong to analyze their evaluation without thinking about the whole project. Is "domain agnostic"-ness of tech generalists a privileging of tech above "mere domains"?* (Doctoral student, three years)

4.4 SUMMARY OF FINDINGS: ADDRESSING THE RESEARCH QUESTIONS

In this chapter, we will summarize how the findings from content analysis and interviews addressed each of the research questions. The areas explained here will be further expanded and examined in Chapter 5 (discussion).

4.4.1 *RQ1-1. What have been at the major foci of ICT4D evaluation? RQ1-2. Have there been changes in the major foci of ICT4D evaluation over time?*

From the content analysis, we found that the foci of ICT4D evaluation could be explained in terms of *continental or regional context* (Africa; Asia), *domain of ICT4D work* (education and skills training related fields; government; health; community; business/industry/markets; media, etc.), *research or evaluation approach and method* (interpretivist paradigm; qualitative method), *aim or rationale for evaluation* (examine results or effectiveness; for prospective reasons, etc.), *subject of evaluation* (results, outcomes, impact or effectiveness; influential factors; project design and implementation, etc.), *target audience for evaluation* (government or policymakers; implementers; aid/development agencies or funders, etc.), *timing of evaluation* (after or near-end implementation), and *development notion* (human development). This was supported to an extent by interview findings—the interviews showed that the major foci of ICT4D evaluation could be described in terms of *regional focus* (Africa; Asia), *methods* (mixed methods; qualitative focus*), development notions* (human development notion; socio-economic development; neo-liberal emphasis on performance measurement; lack of development lens in ICT4D evaluation), and *evaluation focus* (outcome assessment; output assessment).

From the interviews, changes in the foci of ICT4D evaluation over time were found in the aspects of *development notions* (more toward human centered approach), *research or evaluation*

approaches (more attention to critical theory and design science research; some progress in outcome or impact assessment; more formative or process evaluations compared to summative or impact evaluation; a shift from result- to process-oriented evaluation), and *methods* (quantitative to qualitative; qualitative to quantitative in assessing impact).

4.4.2 *RQ2. What have been the associations between ICT4D evaluation and (a) program evaluation, (b) IS/IT evaluation, and (c) aid/development evaluation?*

Content analysis findings hinted us that there have been associations between ICT4D evaluation and the three evaluation fields. We found that *evaluation models, theories or frameworks* from the three fields have been applied or referred to in the reviewed works. In general, there was a more variety of evaluation models, theories or frameworks (particularly those pertaining to ICT4D evaluation and IS/IT evaluation) applied, suggested, or mentioned in the reviewed journal articles compared to the analyzed reports.

However, it was mentioned during the interviews that although there have been associations between ICT4D evaluation and the three evaluation fields, *there are limitations in examining just the three to understand and strengthen ICT4D evaluation*. The reasons included: quantitative and short-term evaluation foci of the three fields; the three fields' origin and development in the Global North which may imply their lack of attention to local values associated with development (e.g. feelings of belonging); limitations in applying the MDGs and SDGs in research and operationalizing aid/development evaluation aspects in ICT4D setting, such as applying Capability Approach.

In addressing the interviewees' comment above, content analysis and interview findings informed us which disciplines we can potentially examine to strengthen the conceptual underpinnings of ICT4D evaluation, in addition to the three evaluation fields. First, in the reviewed

articles of content analysis, we found that literatures of other disciplines were referred to—such as design studies, health, organizational studies and management, political science, public administration and governance—which can be the areas we can further study. Also, interviewees suggested other disciplines or practices that might be worthwhile to examine for improving ICT4D evaluation, including: education, sociology, anthropology, capacity assessment, empowerment, and psychology.

4.4.3 *RQ3. What conceptual elements can be suggested from the three evaluation fields' (and others') theories and practices to help enrich the conceptual elements of ICT4D evaluation?*

The research question can be addressed by examining the responses to the interview question on areas for further discussion. In particular, participatory evaluation design was mentioned during the interviews as an area that need further discussion. As we will see in more detail in Chapter 5, this study argues that practices or theories of program evaluation (deliberative democratic evaluation, empowerment evaluation) and aid/development evaluation (Capability Approach) fields can potentially contribute to: (1) deriving ways to design and implement evaluation with participatory approach (e.g. applying deliberative democratic evaluation or empowerment evaluation) and (2) providing theoretical understanding of why participatory evaluation design can be significant in ICT4D evaluation (as it reflects human development notion which has been at the major foci of ICT4D evaluation, and the theory can explain the importance of evaluation capacity building (ECB) of project participants in ICT4D evaluation).

4.4.4 *Other findings on challenges, gaps, and ways to improve ICT4D evaluation*

In addition to the findings directly related to the research questions, there were also findings that informed us challenges, gaps, and ways to improve ICT4D evaluation which help us think about the current gaps and future directions in ICT4D evaluation.

First, the interviewees identified the following as challenges and gaps in ICT4D evaluation: *budget and time constraints*; *questions surrounding the relevancy of indicators*; *challenges related to evaluation design (on RCT)*; c*hallenges in discerning and avoiding political and commercial influences*; *difficulties in capturing the shared use of technology*; *different stakeholders responding with different versions of the truth*; and *the lack of accumulation of knowledge in ICT4D evaluation*. In Chapter 5, we will examine how the challenges can be classified and how the challenges and gaps can possibly be addressed.

Second, the interviews also revealed the importance of *domain expertise in improving ICT4D evaluation*. The significance of domain-oriented approach in ICT4D evaluation will also be highlighted as a possible way to address the current gaps in the field—i.e. lack of accumulation of knowledge in ICT4D evaluation—in Chapter 5.

Chapter 5. DISCUSSION

In this chapter, we will go through six major themes found in analyzing the findings which address the research questions. They are: **foci and changes in foci of ICT4D evaluation**; **current challenges and gaps in ICT4D evaluation and possible ways to address them**; **implications of findings for improving connections among academic and practitioner spheres, and decision makers**; **associations between ICT4D evaluation and the three evaluation fields (and other disciplines)**; **other areas for further discussion**; and **Capability Approach and ICT4D evaluation**. We conclude this chapter with limitations of this study.

5.1 FOCI AND CHANGES IN FOCI OF ICT4D EVALUATION

As we saw in Chapter 4.2.2, some interviewees explained *foci of ICT4D evaluation* in terms of *regional focus* (Africa; Asia), *methods* (mixed methods; qualitative focus*), development notions* (human development notion based on Sen's Capability Approach; socio-economic development; neo-liberal emphasis on performance measurement; lack of development lens in ICT4D evaluation), and *evaluation focus* (outcome assessment; output assessment).

On *changes in foci*, except for *development notions* (a few interviewees viewing that there has been a shift from techno-deterministic approach to human centered approach and local context), answers diverged among the interviewees in the areas of *research or evaluation approaches* (more attention to critical theory and design science research; some progress in outcome or impact assessment, but lack of improvement in other evaluation types; more formative or process evaluations compared to summative or impact evaluation; a shift from result- to process-oriented evaluation) and *methods* (quantitative to qualitative; qualitative to quantitative in assessing impact).

We can derive from the above that, because ICT4D is multidisciplinary and/or interdisciplinary (as the literature informs us in Chapter 2.1.1), perceived evaluation foci is difficult to be converged among the researchers. Academic and/or practitioner interviewees come from various disciplinary fields with a range of domain of ICT4D work (as illustrated in Chapter 4.2.1). Therefore, their views toward major foci of ICT4D evaluation may naturally diverge. On the other hand, we can examine the areas exception to this trend where at least a few interviewees' response converged—i.e. regional focus on Africa and Asia, and more attention to human centered approach (and human development notions) and local contexts. Both were also supported by content analysis findings—in terms of the reviewed works' continental or regional context (i.e. many associated with Africa and Asia, compared to other continents or regions) (Chapter 4.1.1.2), paradigmatic stance in alignment with the emphasis on contextual understanding (i.e. predominance of interpretivist strand) (Chapter 4.1.2.2), and development notions (i.e. significant presence of human development notion) (Chapter 4.1.5.1). Also notable was that sentiments of researchers are involved in viewing the changes in foci over time. For example, during the feedback session, a respondent mentioned, "I feel especially good about how evaluation is moving from techno-deterministic approach to a more human-centered one." (Chapter 4.3.2)

What the findings also inform us is that there is also a need to pay attention to not just the *changes* in ICT4D evaluation foci *over time*, but also the *divergence in perceived foci at a point in time* and what this implicates in addressing the research questions of this study. The divergence in perceived foci stemming from the multidisciplinary or interdisciplinary nature of ICT4D may be the fundamental reason why conceptual underpinnings of ICT4D evaluation have been difficult to be clearly established. A possible remedy can be disaggregating ICT4D evaluation by a *sub-level* of knowledge and examine major foci, gaps, challenges, and associations with other fields at

the sub-level to strengthen the conceptual basis of the field. This approach to an extent responds to a few comments received in the feedback session about the need to draw a boundary or a scope of what constitutes ICT4D, before we delve into ICT4D evaluation (Chapter 4.3.4)—supposedly because the ICT4D field is very broad. This study argues that a possible sub-level can be the *domain* of ICT4D work and this will be explained in more detail below.

5.2 CURRENT CHALLENGES AND GAPS IN ICT4D EVALUATION AND POSSIBLE WAYS TO ADDRESS THEM

5.2.1 *Challenges to be addressed with social-technical lens and development notion–impact connection*

The interviews highlighted current challenges in the areas of: budget and time constraints, relevancy of indicators in assessing implications of technology use, implementation of experimental design methods, relationships with external sponsors, difficulties in fully capturing the shared use of technology, and the problem of diverging perspectives from different stakeholders in depicting project's implementation and outcome (Chapter 4.2.4). The challenges can largely be divided into *structural issues* (e.g. PhD students' limited engagement in the project in terms of time), *stakeholder issues* (e.g. relationships with funders, eliciting an accurate picture of what is happening from project participants), and *methodological issues* (e.g. choosing indicators to capture meaningful changes, deploying experimental design to assess impact, capturing the unexpected type of technology use and its implications). Experiences around the above three types of issues were also corroborated by comments from the feedback session (Chapter 4.3.2).

There can be some implications in terms of how we can address the three types of challenges in ICT4D evaluation. First, it implies which type of analytical perspective we need—considering the nature of issues, it is reasonable to apply *socio-technical lens* to address the challenges. Structural, stakeholder, and methodological aspects together entail that the difficulties prevailing in ICT4D evaluation mostly stem from the feasibility of carrying out certain types of evaluation in the structural context of ICT4D, diverging stakeholder interests, and unexpected ways of technology use—all of which requires understanding of the interactions and relationships among technology, people, and social context. Therefore, it would be a misalignment, for example, to resolve the challenges by referring to other disciplinary evaluation practice that solely examines technical/functional or economic/financial aspects. It is also notable that the above challenges run parallel to the shift in ICT4D evaluation foci over the years explained in the literature (Chapter 2.1.2), from "readiness", "availability"—more technology and infrastructure oriented—to "uptake"—more context and people oriented (Heeks, 2018).

Second, structural and methodological issues are related to assessing 'impact' and thus *how we define and conceptualize 'impact' can be a starting point* in resolving the challenges. Structural issues such as budget or time constraints are problematic mainly because they hinder examining the long-term impact of ICT4D projects. Methodologically, as one interviewee mentioned, difficulties in choosing indicators arise as one seeks to assess meaningful changes associated with impact ("[O]ne challenge is picking relevant tracking indicators that measure meaningful impacts…when there is tracking of some indicators, it is not clear that the project fully contributes to the change.") (Chapter 4.2.4). Therefore, at the core of the challenge is what 'impact' entails and how this can be assessed. Yet, we also learned from the interviews that while the impact of projects has been recognized as an important aspect to be assessed, it is complex to define it in

reality ("What has to be measured is an impact. The impact of the project but the complexity is defining the impact of a project.") (Chapter 4.2.3). To define what impact entails, we have to first look at what notion of development one adopts—essentially answering 'impact in terms of what'?

If we recall findings from the reviewed articles and reports, we can see that the notion of human development has been relatively more frequently adopted compared to others (Table 4.28, Table 4.29). Accordingly, as an example, let us examine how human development notion and corresponding aspect of impact can be assessed. For example, let us assume that an evaluator or researcher applies human development lens based on Capability Approach and defines impact as meaningful intangible changes in project participant's 'capability' to achieve one's life goals. The evaluator or researcher can address the focus on capability by working with participants to develop their own evaluation skills (i.e. evaluation capacity building (ECB); explained in more detail in Chapter 4.1.2.2). This involves handing off the assessment authority from an external evaluator to project participants themselves, and the former taking a role of evaluation 'facilitator'. This helps to address both structural—there may be gradually less need for the presence of an external facilitator in carrying out the evaluation as the project participants' evaluation capacity develops over time—and methodological issues—the participants can identify what meaningful impact means for themselves and which indicators can best assess that.

What the above example of 'structural and methodological challenges–notion of development–impact' connection argues is that challenges of ICT4D evaluation associated with assessing impact is essentially less about what 'impact' entails per se, but more about how it is assessed in alignment with the development notion adopted. In other words, 'impact' can be defined in various ways among academics and practitioners—as we have seen in Chapter 2.2.2.2 and during the content analysis process (please see the rationale to remove the code for "stage of

evaluation" in Appendix E). This is reasonable considering that ICT4D projects situate in various domains, each of which may involve different breadth and depth of what 'impact' covers (e.g. what 'impact' means in education vs. agriculture domains may be different in terms of scope of stakeholders involved and the length of time needed for impact to arise). What needs more attention is making a solid and reasonable connection between impact and one's adopted notion of *development*—the ultimate goal of ICT4D. Then the complexity surrounding what 'impact' entails can be at least partially be resolved.

5.2.2 *Gaps to be addressed with domain-specific ICT4D evaluation*

From the interviews, one of the main gaps in ICT4D evaluation was mentioned as *a lack of accumulation of knowledge* ("…I see too many studies which are just a single isolated study and they have no connection to the past and they have no connection to the future. There is literature, there's data, there is some implication but nobody really listens. I feel that we don't have any accumulation of knowledge…") (Chapter 4.2.5). During the feedback session, this was found to be somewhat surprising by a few respondents—"In my opinion, though our projects are short lived, we learn quite a lot from it." (Chapter 4.3.3) The comments imply that there has been knowledge generated from ICT4D evaluation, but it is questionable whether the organization and dissemination of knowledge have been clear and effective. The literature echoes this, describing the ICT4D experiences as "hype and uncorroborated stories" (Heeks, 2008: 27) and "scattered anecdotes of success" (Gomez & Pather, 2012: 8). Essentially, we arrive at the question—*what causes* this impression that 'it seems like we have learned *something* from ICT4D evaluation over time, but it is not clear *what* we have learned'?

A possible explanation comes from the implications of *context* in ICT4D. As we have seen in Chapter 2.1.2, researchers have highlighted the significance of context in influencing ICT4D

project success. As previously mentioned in Chapter 2.1.2, context—similarly to 'impact'—involves complex interdependent factors coming from various areas such as geographical, social, cultural, political, and economic circumstances. The complexity of context makes it not only difficult to unravel, but also challenging for the ICT4D community to gather and clearly organize the knowledge earned from ICT4D evaluation—which can lead to a general and vague conclusion of ICT4D evaluation as 'the success depends on context.'

Then what can be a possible way to consolidate knowledge gained from ICT4D evaluation without disregarding the significance of context? We can specify and choose which aspect of context we accumulate the knowledge onto. Based on the interviews and content analysis, we can look into *domain* of ICT4D project as a possible aspect of context. Interviews from both academics and practitioners highlight that applying domain specific knowledge can be a way to improve ICT4D evaluation—for example, one argued that evaluating through domain agnostic lens "los[e] a lot of nuance, both in terms of how the designs of that trials or evaluations are treated, as well as the analysis and even the presentation." (Chapter 4.2.6). If the interview responses illustrate the significance of domain specific approach in ICT4D evaluation, content analysis findings suggest which domains we can look into. This was revealed in the domain of ICT4D work of the reviewed articles and reports (Chapter 4.1.1.3), academic disciplines examined in the literature review section of the reviewed articles (Chapter 4.1.1.3), and discipline-specific or theoretical evaluation models, theories or frameworks referred to in the reviewed works (Chapter 4.1.6). Moreover, in determining the areas onto which the knowledge earned from ICT4D evaluation can be consolidated within each domain, we can refer to the interview findings. Interviewees viewed that there has been a lack of discussion among the ICT4D community on the rationale for evaluation, methods (i.e. how to be measure), point in the ICT4D project lifecycle that should be subject to

evaluation, and how to report, disseminate, and use evaluation results (Chapter 4.2.3). Within each domain, these areas can be examined with priority in accumulating knowledge earned from ICT4D evaluations.

The domain-oriented approach within ICT4D evaluation (e.g. evaluation of ICT4D in healthcare, evaluation of ICT4D in education, etc.) can also help address the overlooked ICT-specific evaluation practice among aid/development agencies as they have generally perceived ICT as a cross-cutting theme: "The ICT for development is usually being looked as a cross-cutting issue. Meaning that you can apply in different sectors. ICT was not simply itself [a] sector." (a comment by an interviewee who worked for a UN agency) (Chapter 4.2.2).

5.3 Implications of findings for improving connections among academic and practitioner spheres, and decision makers

As mentioned earlier at the beginning of Chapter 4.2, there is a blurred line between 'academics' and 'practitioners' in the ICT4D field—it was found that a notable number of interviewees were academics who work as researchers with aid/development agencies. Therefore, in analyzing the findings, it would be more appropriate to derive implications from the similarities and differences between the academic vs. practitioner *spheres*.

Content analysis findings reflect the similarities and differences between the ICT4D evaluation foci of academia vs. practitioner spheres (described throughout Chapter 4.1) Similarities were seen in the continental/regional focus (on Africa and Asia), domain of ICT4D work (notably education, skills development, and government), paradigmatic stance (application of interpretivist lens), research method (qualitative, although more appearance of quantitative methods in the articles), subject of evaluation (attention to project results, outcomes, impact or effectiveness), the type of areas examined through each of IS/IT evaluation approaches (i.e.

technical/functional, economic/financial, and interpretive), and development notion (attention to human development). Differences were seen in ICT or related subject to study, aim or rationale for evaluation (except the highlight on results or effectiveness), target audience for evaluation, timing of evaluation, links to development agenda such as the MDGs and SDGs, and the type and extent of evaluation models, theories or frameworks applied. Moreover, there was less clarity in statement of research methods and research or evaluation questions in many reports compared to journal articles (Chapter 4.1.2).

The gaps can be explained by differences in the purpose of evaluation. Whereas the articles largely aim to create transferable or generalizable knowledge in the ICT4D field, the reports in general are geared toward producing project-specific evaluation for assessing success and facilitating decision making process, e.g. analyzing what was done, identifying room for improvement, and deriving lessons to improve implementation. This was also evident from the content analysis—we can see from Chapter 4.1.3.1, that a notable number of the reviewed articles had the aim of examining technology, ICT access, acceptance, adoption or influential factors, whereas a significant number of the analyzed reports were written for prospective purposes related to a project, assessing success in achieving goals, and examining what was done. Therefore, the gaps can be understood as inherent, stemming from the differences in purpose and not necessarily problematic. What the gaps instead imply is that there is a room for building connections between academic and practitioner spheres by complementing knowledge generated over time based on the different foci. For example, project-level lessons (from the reports) can be complemented with contextual understanding and transferrable or generalizable knowledge derived by academic studies.

Then what is needed to complement knowledge? To begin with, academic and practitioner spheres need to speak similar—if not the same—level or type of language in research and evaluation. More specifically, there can be two aspects. First, in terms of language in research, reports should provide clear explanations of research or evaluation method and questions. This is an essential step in establishing the ground for transferability and generalizability of findings across the broader ICT4D community. Second, evaluation models, theories, or frameworks used should accommodate both venues. As we have seen in Chapter 4.1.6, many of the reviewed reports applied the broad OECD-DAC's criteria for evaluating development assistance (relevance, effectiveness, efficiency, impact, and sustainability) whereas in the articles evaluation lenses specific to a project's aspects (i.e. application-, discipline-, issue-, sector-specific) were applied or referred to. The two spheres can be reconciled by, for example, assessing each of the five OECD-DAC criteria with models, theories or frameworks closely associated with a project's domain attributes. In fact, an example of this practice was seen in one of the reviewed reports—Kirkpatrick model for training program evaluation was utilized to assess effectiveness and impact of a project on establishing ICT training center to produce computer teachers in middle and high schools (Korea Global Development Consulting Center (KGDC), 2014) (Chapter 4.1.6.2). When the language in research and evaluation of the two spheres is homogenized, next possible step can be taking domain-oriented accumulation of knowledge which was explained above—for example, consolidating the lessons learned from mobile-based projects in healthcare.

Then why is this process—complementing and consolidating knowledge from the two spheres' ICT4D evaluation—ultimately needed? It is to promote the engagement between researchers (of both academic and practitioner spheres) and policy or decision makers. To facilitate the engagement, the significant imbalance and differences in interests need to be resolved between

the researchers and the decision makers. In ICT4D field, the decision makers are largely the donor community—who have control over allocating budget and time, and determining which evaluation agenda should be pursued—in fact, the organization which produced the five criteria that is widely used among aid/development agencies, OECD-DAC, is part of the donor community. We will now see how the complementary knowledge can possibly contribute to the greater engagement.

In Chapter 4.2.4 (and partly Chapter 4.2.2), we have seen tensions experienced by researchers working with aid/development agencies (which are also of donor community) due to budget and time constraints in evaluation undertaking (e.g. we have seen an interviewee's experience where it was a challenge to suggest an evaluation with a sufficient sample size for randomization because the donor viewed it as too costly). Moreover, we have seen a few interviewees' comments on the need for researchers to work more closely with policymakers in evaluation and yet how this is limited by the academic institutional structure which do not facilitate nor incentivize engagement in policy space ("You'll get your PhD partly based on your publications. You'll get a job as a lecturer if you want to stay in academic field also based on the strength of your publications…It's more the number of obligations and the supposed impact factor of quotes of the journals in which your publications appear.") (Chapter 4.2.5).

Based on the above, to promote engagement between the decision makers (i.e. donor community) and researchers, the latter needs a leverage based on *a clear evidence* to insist research method and approach that would produce on-target evaluation and to help them sustain in research with rigor. The evidence for leverage can come from the complemented and consolidated knowledge of both academic and practitioner spheres based on homogenized language in research and evaluation. The knowledge developed from the past evaluations' trials and errors would inform method, scope, and length of time necessary to effectively capture outcomes, impact,

strengths, weaknesses, etc. of a project. In other words, the complemented and consolidated knowledge across the ICT4D community can play an important role as an agreed reference for researchers and decision makers to accommodate both of their priority interests and promote collaboration—producing evaluation with high practicality without reinventing the wheel (saving cost and time for donors) and not satisficing rigor in research.

5.4 ASSOCIATIONS BETWEEN ICT4D EVALUATION AND PROGRAM EVALUATION, IS/IT EVALUATION, AND AID/DEVELOPMENT EVALUATION FIELDS

Findings from the content analysis and interviews illustrate that there have been associations between ICT4D evaluation and program evaluation, IS/IT evaluation, and aid/development evaluation fields. Firstly, this was evidenced by evaluation models, theories or frameworks from the three evaluation fields that were applied, suggested or mentioned in the reviewed articles and reports (Chapter 4.1.6, Chapter 4.1.4.2). However, there were some similarities and differences between the reviewed articles and reports. In general, it seems that the articles have referred to a more variety of models, theories or frameworks from the three evaluation fields compared to the reports—particularly from IS/IT evaluation. On program evaluation, it is notable that both the articles and reports refer to similar type of models, theories or frameworks, including theory of change (and its variations) and Kirkpatrick model for training program evaluation. For IS/IT evaluation, in contrast to a variety of analytical lenses and theories (e.g. IS success model, learning management system evaluation model, analytical framework of health IS, Technology acceptance model (TAM), Unified theory of acceptance and use of technology (UTAUT), etc.) referred to in the articles, there was only one type of IS/IT evaluation model found in the reports (e-government performance reference model (PRM)). For aid/development evaluation, in contrast to generic, method-, discipline- and sector-specific frameworks referred to in the articles, there were a

significant number of reports applying institutional guidelines (i.e. OECD-DAC's criteria for evaluating development assistance, Guidelines for UNDP-supported, Global Environment Facility (GEF)-financed projects). In particular, OECD-DAC's criteria was adopted in around half of the reviewed reports.

There can be possible reasons behind the differences between the venues. First, academics might have more freedom in deciding which models, theories or frameworks to apply in evaluation compared to aid/development agencies where they may have to follow stricter guidelines at international level (e.g. for the purposes of consistency and comparison of performance across the agencies). Also, we have to take into account that more than 80% of the reviewed reports are associated with four agencies (Chapter 4.1.1.1)—JICA, USAID, UNDP, and KOICA. Therefore, the content analysis findings of this study might not be generalizable or transferrable to all aid/development agencies.

The interview findings concur that there have been associations between ICT4D evaluation and the three fields (Chapter 4.2.7). However, views toward the degree of association with the three fields differed across the interviewees—for example, an academic highlighted the close associations between ICT4D evaluation and IS/IT evaluation and aid/development evaluation, whereas a practitioner viewed more attention to program evaluation and aid/development evaluation but less to IS/IT evaluation. Moreover, limitations were revealed during the interviews in examining the associations between ICT4D evaluation and the three fields for the purpose of strengthening conceptual basis and improving practices of the former. The reasons included: quantitative and short-term evaluation foci of the three fields might not effectively capture the aspects of development; all three fields were developed from the Global North and thus may not look into local values associated with development (e.g. feelings of belonging); there exist

limitations in practically applying the MDGs and SDGs in research; and challenges prevail in operationalizing aid/development evaluation aspects in ICT4D setting, such as applying Capability Approach. Furthermore, the interviewees suggested disciplines or practices other than the three fields that are worthwhile to explore for improving ICT4D evaluation, including education, sociology, anthropology, capacity assessment, empowerment, and psychology. Items to the potential list of disciplines for exploration can be added from the content analysis findings—from academic disciplines examined in the literature review section of the articles (Chapter 4.1.1.3; e.g. design studies, health, organizational studies and management, political science, public administration and governance) and evaluation models, theories, or frameworks referred from fields other than the three (Chapter 4.1.6.5; e.g. Multiple criteria decision making (MCDM) approach, Institutionalist theoretical framework, Strengths, weaknesses, opportunities, and threats (SWOT) analysis).

A point that would require further exploration is the views for or against applying a certain analytical or theoretical lens (and associated research approach) in ICT4D evaluation. One example is the stance of EJISDC journal editors. On the webpage which introduces the journal's aims and scope, it mentions that they are interested in works examining "actual behavior" of using technology with "contextual detail"—rather than merely testing if "a well-established theory (such as TAM, UTAUT, ISSM [Information systems success model], TPB [Theory of planned behavior])" applies in a developing country context without "situat[ing] the theory/model in the new context" (The Electronic Journal of Information Systems in Developing Countries (EJISDC), 2019).

Editors of EJISDC would not be the only members of ICT4D community who have a view against adopting certain approaches in ICT4D studies. The example above implies that not only

ostensible relevance and proximity to ICT4D evaluation but also views of the community built over time (from trials and errors of applying theories and frameworks) are important in understanding the associations with the three fields (and other disciplines). In addition, since around half of the reviewed articles came from EJISDC, the content analysis findings on the extent of IS/IT model or theory application (including TAM, UTAUT, etc.) in ICT4D evaluation should be carefully considered in terms of its generalizability to ICT4D scholarly community as a whole.

To summarize, we see that there have been associations between ICT4D evaluation and program evaluation, IS/IT evaluation, and aid/development evaluation fields. However, there exist limitations in referring to only the three fields. The finding that 'the three is not enough' was a surprise to a respondent during the feedback session: "Surprised to see that the three evaluation fields were seen as not enough. I am curious what other fields could be drawn upon to fill in those gaps." (Chapter 4.3.3) As a response to his/her question, a list of other disciplines can be derived from the findings of this study (mentioned above) for further exploration to strengthen the conceptual basis of ICT4D evaluation.

5.5 OTHER AREAS FOR FURTHER DISCUSSION

From the interview findings, we derived other areas for further discussion in ICT4D evaluation. These included: examining sustainability (including environmental sustainability, political or institutional sustainability, and social sustainability); engagement among researchers, practitioners, and policymakers and discussions at the policy level; ethical considerations and sensitiveness of researchers; participatory evaluation design; more balanced approach of qualitative and quantitative aspects in methods; and the expansion of scope of ICT4D evaluation (Chapter 4.2.5).

What is notable is that some of the above areas reflect the ICT4D discourse over the years—which we briefly covered in Chapter 2.1. For example, the topic of ethical considerations in evaluation is linked to discussions in reflexivity in ICT4D research. Also, the need for more balanced research approach aligns with recognizing the significance of intangible impacts, moving away from the dominant focus on quantifiable and tangible outputs and outcomes. Moreover, more attention to human development and empowerment notions in the ICT4D field illuminates in the interest for developing participatory evaluation design.

On sustainability, a few interviewees highlighted the lack of attention to environmental sustainability and this was supported to an extent by the content analysis findings. Among the reviewed works, some articles and many reports had sustainability as a subject of evaluation (coded under "prospective aspects" in subject of evaluation, please refer to Table 4.21 and Table 4.22). However, attention to environmental sustainability was rarely seen (appeared in e.g. Hodge, 2017; Muthui & Wasige, 2016) or lacked much detail in examination. Yet, the range of sustainability examined were quite diversified, including project's technical, financial, socio-political, economic, and institutional sustainability, and looking at factors which would influence a project's continued operation.

On participatory evaluation design, the findings from content analysis suggest that there has been some attention to evaluation capacity development (ECD) of project participants and stakeholders in communication for development (C4D) field (Chapter 4.1.2.2). Also, relevant references can come from program evaluation literature, for example on deliberative democratic evaluation and empowerment evaluation. We will briefly overview each. First, for *deliberative democratic evaluation*, House and Howe (1999, 2000 cited in Fitzpatrick et al., 2011) were concerned about social justice and equality in evaluation, due to possible power imbalance among

stakeholder groups (Fitzpatrick et al., 2011). They emphasized three criteria: "inclusion" implying equitable and democratic participation, "dialogue" to ensure different stakeholders' contributions are carefully addressed and no one's views are misrepresented, and "deliberation" to generate a plausible program assessment (Christie & Alkin, 2013: 37; Stufflebeam & Coryn, 2014). As an example, Howe and Ashcraft (2005) apply the evaluation approach in examining school choice policy in the Boulder Valley School District. The authors depict how the principles of inclusion (surveying and having focus group sessions with representative groups of key stakeholders, i.e. parents, teachers, and school administrators), dialogue (probing for focus group participants' views on the influence of school choice system on the schools and its positive and negative consequences on the district), and deliberation (critical dialogue which mostly took place after the completion of evaluation report and the dissemination of findings) were incorporated or reflected throughout the evaluation (Howe & Ashcraft, 2005).

A type of participatory evaluation design at the further end of transformative paradigm (briefly explained in Chapter 4.1.2.2) spectrum is *empowerment evaluation*—i.e. shifting the evaluative authority from an external evaluator to project participants and stakeholders themselves. Empowerment evaluation has emphasized self-determination of participants in shaping and conducting their own evaluations and finding solutions for the problems concerned (Christie & Alkin, 2013; Fetterman, 2001). Based on examining more recent work (Fetterman & Wandersman, 2005), it is argued that there has been a shift away from a sole focus on self-determination or empowerment in empowerment evaluation to a greater attention to capacity building and internal evaluation systems in organizations (Fitzpatrick et al., 2011). To illustrate, Schnoes et al. (2000) applied empowerment evaluation lens in assessing three Comprehensive Community Initiatives (CCIs) in Nebraska funded by Family Preservation and Support grants. The evaluation's three

main steps closely reflect core characteristics of empowerment evaluation: (1) form connections with each CCI to develop and facilitate a sense of partnership; (2) motivate the CCIs to "think about where they were, where they wanted to end up, and what their expectations were for the projects" and provide guidance in creating "evaluation plans, instruments, and data collection tools, and in identifying potential sources of archival data"; and (3) offer training of relevant assessment methods and techniques to be used during data collection and analysis phases (Schnoes et al., 2000: 58). Content analysis findings on paradigmatic stance of the reviewed works show that there has been only minimal attention to the types of evaluation reflecting transformative paradigm (Chapter 4.1.2.2).

5.6 CAPABILITY APPROACH AND ICT4D EVALUATION

Capability Approach has been referred to in different chapters of this study. First in the literature review (Chapter 2), we examined how Capability Approach has been discussed and applied in the ICT4D field in general (Chapter 2.1.1) and how it has connections with aid/development evaluation (Chapter 2.4.3). Moreover, in the findings chapter (Chapter 4), we saw how the theory has been cited in the analyzed articles and reports, and mentioned by the interviewees.

Based on the literature review and findings of this study, the utility of Capability Approach in understanding ICT4D evaluation can be explained in terms of two main aspects: (1) it can be used as a theoretical lens in understanding the broad associations between ICT4D evaluation and the three evaluation fields, i.e. program evaluation, IS/IT evaluation, and aid/development evaluation and (2) it can also be used as a lens to understand the need for more attention to participatory evaluation design (as mentioned by the interviewees).

First, Capability Approach can be applied in understanding the broad associations between ICT4D evaluation and the three evaluation fields. If we recall from Chapter 2.5, we saw from the

literature review that there have been key parallels in historical trends across the three evaluation fields which can be summarized as: (1) higher awareness on context; (2) movement away from techno-centric or techno-deterministic approach; and (3) greater attention to interpretivist or human-centered notions. Moreover, during the interviews, we found that a few interviewees described major foci of ICT4D evaluation in terms of Capability Approach and Senian notion of development (Chapter 4.2.2). Also, in terms of changes in the major foci of ICT4D evaluation overtime, a few responded how there have been more focus on empowerment, gradual shift from economic development to human centered approach, and movement away from techno-deterministic approach and more attention to local contexts (Chapter 4.2.2). To sum, the movement away from quantifiable, economic-oriented, and tangible aspects and the increased attention toward human centered approach and notions draw a significant parallel across all of the four evaluation fields (i.e. ICT4D evaluation, program evaluation, IS/IT evaluation, and aid/development evaluation). This broad trend can be interpreted through the Capability Approach or Senian notion of development to say that there has been a growing interest in the four evaluation fields to examine *the process* of development centered around individuals and their lives—and the socio-cultural context surrounding the process—rather than assessing achievement toward *a defined state of advancement.* The distinction between the process and the defined state of advancement can also be understood in terms of the differences between "capability" and "functioning" in Capability Approach (explained in Chapter 2.1.1).

Second, we saw that participatory evaluation design was mentioned during the interviews as one of the areas that need further discussion in ICT4D evaluation (Chapter 5.5) and this can be interpreted through the lens of Capability Approach. The attention to participatory evaluation design can be understood as the increased interest in supporting the development of *capability* of

project participants to carry out evaluation. This entails shifting the power and primary control over the evaluation process from external evaluators to project participants. Moreover, it implies that the goal of evaluation becomes not only judging merit of the project, but also supporting the critical thinking capability of project participants.

To sum, the above indicates that Capability Approach can potentially serve as a theoretical lens (1) to understand the *past and present* of ICT4D evaluation—in terms of its increased associations with human centered approach and notions—and (2) to guide the *future* of ICT4D evaluation practice—in theoretically supporting the capability-centered approach of participatory evaluation design.

5.7 SUMMARY OF RECOMMENDATIONS

Before we move on to explain the limitations of this study, we will summarize recommendations for researchers in ICT4D evaluation practice, based on the discussion presented throughout Chapter 5 (Table 5.1).

Table 5.1 Summary of recommendations to researchers

Presented chapter	Issues in ICT4D evaluation	Recommendations	Target audience
5.1	Divergence in perceived foci of ICT4D evaluation among researchers	Examine the foci of ICT4D evaluation at domain level (e.g. evaluation of ICT4D in education) so that it would be more feasible to capture trend in foci.	Researchers in both academic and practitioner spheres
5.2.1	Structural, stakeholder, and methodological challenges (e.g. the feasibility of carrying out certain types of evaluation in the structural context of ICT4D, diverging stakeholder interests, and unexpected ways of technology use)	All three types of challenges require understanding of the interactions and relationships among technology, people, and social context. Therefore, apply socio-technical lens to address the challenges.	
5.2.1	Structural and methodological challenges surrounding assessing impact	Specify what 'impact' entails before evaluating it, so that one can find the most appropriate way to measure impact given the budget and time constraints. This can be done in the following steps: (1) define which development notion is adopted in an ICT4D evaluation; (2) clarify 'impact' according to the selected development notion; (3) come up with indicators and ways to assess 'impact' (defined according to the chosen development notion) within the budget and time constraints.	
5.2.2	A lack of accumulation of knowledge in ICT4D evaluation	Consolidate knowledge earned from ICT4D evaluation at domain level so that it would	

		be more feasible to aggregate knowledge.	

5.3	Differences in ICT4D evaluation foci between academic vs. practitioner spheres	The difference is inherent due to differences in the purpose of evaluation.
		What is more important is complementing the knowledge earned from each of the spheres by:
		(a) providing clear explanations of research/evaluation method and questions
		(b) exploring ways to utilize evaluation models, theories, or frameworks to accommodate both spheres.
			For (a), researchers in practitioner sphere should provide more detailed explanations of research/evaluation method and questions in the reports
			
			For (b), for example, academics should explore how OECD-DAC criteria can be combined with models, theories, frameworks closely associated with a project's domain attributes

5.4	Interviewees suggested to look into disciplines other than program evaluation, IS/IT evaluation, and aid/development evaluation	For the list of disciplines to further look into, refer to the findings of this study: -Content analysis (Chapter 4.1.1.3): e.g. design studies, health, organizational studies and management, political science, public administration and governance; -Interviews (Chapter 4.2.7): education, sociology, anthropology, capacity assessment, empowerment, and psychology.	Researchers in both academic and practitioner spheres
5.5, 5.6	Areas for further discussion include: examining sustainability; engagement among researchers, practitioners, and policymakers and discussions at the policy level; ethical considerations and sensitiveness of researchers; participatory evaluation design; more balanced approach of qualitative and quantitative aspects in methods; and the expansion of scope of ICT4D evaluation	-For developing participatory evaluation design in ICT4D evaluation, one can explore how (1) deliberative democratic evaluation and empowerment evaluation in program evaluation literature and (2) Capability Approach in aid/development evaluation literature can potentially contribute in theoretical and practical aspects.	

5.8 LIMITATIONS OF THIS STUDY

A limitation of this study comes from the selection of articles and reports and the scope of interviewees. First, on content analysis, the articles come from a selected basket of journal venues and thus they might not cover all relevant data. For example, there might be articles that can provide valuable insights in addressing the research questions, and yet do not come from the selected journals or which do not contain words "evaluation" or "assessment" (or their variations) at least once in title, abstract, or keywords sections. Moreover, the reports were gathered from publicly available websites (DAC Evaluation Resource Centre (DEReC) and EvalNet members' websites). However, there might be reports that are only circulated internally within aid/development agencies that could not be accessed by the author of this study. There can also be other articles or reports written in language other than English (although a few reports written in Korean were covered) that were relevant and yet could not be accessed and/or analyzed. All of these can influence percentage figures in quantitative and qualitative analyses in terms of e.g. the range of different evaluation models, theories or frameworks applied, etc. Moreover, we recall that applying the inclusion/exclusion criteria resulted in a majority of the reviewed works coming from three journal venues and four aid/development agencies (Chapter 4.1.1). This has implications in transferability and generalizability of findings to represent a range of perspectives existing across different journal venues or aid/development agencies. Consequently, this study might be capturing only an incomplete or inaccurate picture of ICT4D evaluation's foci or its associations with the three evaluation fields. In addition, due to the limited number of the articles and reports reviewed, we have seen that it was not possible to analyze changes in ICT4D evaluation foci over time through content analysis (Chapter 4.1.1.1).

For interviews and feedback session responses, due to the limited number of respondents, transferability of findings to the broader ICT4D community should be carefully approached. Moreover, the findings do not directly reflect the perspectives of one of the key stakeholders of ICT4D, i.e. project participants in the Global South. It does not convey what the participants see as major foci, gaps, and challenges in ICT4D evaluation. It is possible that their views could have been indirectly reflected through the academics and practitioners' perspectives and their work—however, this study acknowledges that the approach may not depict a holistic picture. The limitation partly stems from the research design which reflects the author's motivation for the study—based on the past brief work experiences in the development field and now as a student in academia, the author has been interested in finding ways to contribute to facilitating discussions between academic and practitioner spheres in ICT4D.

Despite the limitations, the author believes that this study and related future research can serve as a ground for supporting discussions among key stakeholders in ICT4D—including academics, practitioners, and project participants who can also be represented by NGOs and civil society organizations in the Global South—on the issues of evaluation, how the field can be improved, and how it can accommodate different perspectives and interests of the ICT4D community.

Chapter 6. CONCLUSION

In the previous chapters, we have examined perceived foci and changes in foci of ICT4D evaluation, current challenges and gaps in ICT4D evaluation, implications of the study's findings for improving the engagement among those in academic and practitioner spheres and decision makers, associations between ICT4D evaluation and the three evaluation fields, other areas for further discussion, and Capability Approach's (potential) contribution to ICT4D evaluation. We saw that due to the multidisciplinary or interdisciplinary nature of ICT4D in terms of domain of work and researchers' backgrounds, perceived foci and changes in foci generally diverged among the interviewees. Also, we highlighted the application of socio-technical lens, clarification of development notion–impact connection, and emphasis on domain-specific ICT4D evaluation as possible ways to address the current challenges (structural, stakeholder, and methodological issues) and gaps (lack of accumulation of knowledge) in ICT4D evaluation. Moreover, the study argued that complementing and consolidating knowledge across academic and practitioner spheres in ICT4D evaluation may provide a valuable reference for more leveraged discussions among the researchers and policy or decision makers. Furthermore, we have seen that program evaluation, IS/IT evaluation, and aid/development evaluation fields have been associated with ICT4D evaluation—e.g. evaluation models, theories, and/or frameworks from each field were found to have been utilized in ICT4D evaluation. However, we also found that limitations exist in examining the associations between ICT4D evaluation and the three fields for the purpose of strengthening conceptual basis and improving practices of the former, and based on the findings we suggested other possible disciplines for exploration. Also, the findings informed us that ICT4D evaluation topics and practices such as sustainability, participatory evaluation design, and ethical considerations of researchers need more attention by the ICT4D research community. Lastly, we

saw how Capability Approach can (potentially) contribute to ICT4D evaluation as a theoretical lens in understanding: the broad associations between ICT4D evaluation and the three evaluation fields; and the attention to participatory evaluation design.

This study further suggests that the areas considered for coding the articles and reports (Appendix E) can be utilized as a reference or checklist for the researchers, for their reflexivity in ICT4D evaluation practice and defining the type of evaluation that one aims to carry out. The list of areas can be used to plan and design evaluation by addressing a series of questions. To begin with, one can ask: whom are we evaluating for?; what information does the target audience need? Based on the answers, one can define the aim or rationale for evaluation, and in alignment with the aim, clarify pursued development notion and type of research or evaluation questions to be addressed. Then one can identify what subjects need to be evaluated at which stage of the ICT4D project lifecycle. As a next step, one can determine which paradigmatic stance and research method or approach one will we take to address the questions. According to the domain of ICT4D work to be evaluated, one can identify which discipline(s) should be looked into in choosing evaluation models, theories or frameworks to be applied.

Possible areas for future research—that were not covered by the scope of this study—were informed by comments received from the feedback session. This included: the difference between development projects in general vs. ICT4D projects in terms of how they are evaluated; and case studies of ICT4D evaluations that had issues. Moreover, based on the discussion presented in this study (Chapter 5), one can address this study's research questions within a choice of ICT4D domain, as a step toward accumulating knowledge by domain e.g. evaluations of ICT4D projects in healthcare, education or agriculture, etc.

As a concluding remark, this study refers back to one of the interviewees' comment that there recently has been an increasing attention to data-driven "prediction" in ICT4D rather than "evaluation" and that ICT4D evaluation has regressed over time. He/she expressed a concern and mentioned that this data-driven prediction in ICT4D is a worrying trend ("You're predicting something that researchers don't really understand that much.") (Chapter 4.2.2). His/her comment signifies the importance of identifying and strengthening ICT4D evaluation as a field, to prevent it from being taken over by an unguided data-driven approach. This study, despite the limitations stated in the previous chapter, is an effort to alert the research community for the need to gather and solidify the knowledge earned from ICT4D evaluations over time. For all of the above findings to contribute to the improvement of ICT4D evaluation, continued attention and discussion on the topic by the stakeholders—e.g. researchers, policy or decision makers, and local stakeholders in the Global South—would be most important.

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APPENDIX A. SELECTING TOP JOURNALS FROM PROGRAM EVALUATION, IS/IT, AND DEVELOPMENT FIELDS

Selecting a top journal from each of program evaluation, IS/IT, and development fields involved largely two steps: (1) forming a *pool* of journals that are highly cited in the field (2) gathering the latest *journal impact factor* figures (as of February 14th, 2018, the latest figure was that of 2016) from Journal Citation Reports (JCR; https://jcr.incites.thomsonreuters.com) and choosing the journal with the highest figure. Below shows the pool of journals and respective journal impact factor of 2016, for each of the three fields.

1. Program evaluation

(1) Pool: University of Michigan library's research guide for program evaluation (University of Michigan, n.d.)

(2) Journal Citation Reports (JCR) – Journal impact factor 2016

Pool of journals	Journal impact factor 2016
Evaluation	**1.362**
American Journal of Evaluation	1.356
Evaluation Review	1.293
Evaluation & Program Planning	1.137
Evaluation & Health Professions	Not in JCR
New Directions for Evaluation	Not in JCR
Practical Assessment, Research on Evaluation (Open Access)	Not in JCR
Journal of Multidisciplinary Evaluation (Open Access)	Not in JCR
Advances in Program Evaluation	Not in JCR

2. IS/IT

(1) Pool: Association for Information Systems (AIS) website – Senior scholars' basket of journals (Association for Information Systems (AIS), n.d.)

(2) Journal Citation Reports (JCR) – Journal impact factor 2016

Pool of journals	Journal impact factor 2016
MIS Quarterly	**7.268**
Journal of Information Technology	6.953
Information Systems Journal	4.122
Journal of Strategic Information Systems	3.486
European Journal of Information Systems	2.819
Information Systems Research	2.763
Journal of MIS	2.356
Journal of AIS	2.109

3. Development

(1) Pool: Development studies journal ranking table provided by Heeks (2010b) combined with Tulane University library's research guide for international development (Tulane University, n.d.). The latter is mostly a subset of the former with a few exceptions. The journals which only appeared in the latter are indicated with an asterisk (*) in the below table.

(2) Journal Citation Reports (JCR) – Journal impact factor 2016

Pool of journals	Journal impact factor 2016
World Development	**2.848**
Sustainable Development	2.167
Information Development	1.691
World Bank Economic Review*	1.431
Development and Change	1.353
Third World Quarterly	1.156
Journal of Development Studies	1.134
European Journal of Development Research	1.110
Progress in Development Studies	1.085
African Development Review	1.000
Studies in Comparative International Development	0.977
Economic Development and Cultural Change*	0.875
Public Administration and Development	0.860
Journal of International Development	0.786
Canadian Journal of Development Studies	0.738
Development Policy Review	0.700
International Development Planning Review*	0.652
IDS Bulletin	0.538
Information Technology for Development	Excluded (Already included)
Information Technologies and International Development	Excluded (Already included)
Electronic Journal of Information Systems in Developing Countries	Excluded (Already included)
Oxford Development Studies	Not in JCR
Development	Not in JCR
Development in Practice	Not in JCR
Gender and Development	Not in JCR
Enterprise Development and Microfinance	Not in JCR
Forum for Development Studies	Not in JCR
Journal of Third World Studies	Not in JCR

APPENDIX B. LIST OF EVALNET MEMBERS

*Source: Compiled from headings and subheadings in Organisation for Economic Co-operation and Development's (OECD) (2016) report

1. International / multilateral organizations

African Development Bank Group (AfDB): Independent Development Evaluation (IDEV)

Asian Development Bank (ADB): Independent Evaluation Department (IED)

European Bank for Reconstruction and Development (EBRD): Evaluation Department (EvD)

European Commission (EC): Evaluation Unit, Directorate General for International Cooperation and Development (DG DEVCO)

European Investment Bank (EIB): Operations Evaluation (EV)

Inter-American Development Bank (IADB): Office of Evaluation and Oversight (OVE)

International Monetary Fund (IMF): Independent Evaluation Office (IEO)

United Nations Development Programme (UNDP): Independent Evaluation Office (IEO)

World Bank Group (WBG): Independent Evaluation Group (IEG)

2. OECD development cooperation ministries and agencies (of donor countries)

Australia: Office of Development Effectiveness (ODE), Department of Foreign Affairs and Trade (DFAT)

Austria: Evaluation Unit, Austrian Development Agency (ADA), Austrian Development Cooperation (ADC); Division for Evaluation, Development Policy and Strategy, Federal Ministry for European and International Affairs (FMEIA)

Belgium: Special Evaluation Office (SEO)

Canada: Development Evaluation Division (DED), Global Affairs Canada

Czech Republic: Development Cooperation & Humanitarian Aid Department, Ministry of Foreign Affairs (MFA)

Denmark: Evaluation Department (EVAL), Danish International Development Agency (Danida)

Finland: Unit for Development Evaluation (EVA–11), Ministry for Foreign Affairs

France: Evaluation and Knowledge Development Unit (EVA), French Development Agency (AFD); Evaluation and Performance Unit (EVA), Directorate General for Globalisation, Culture, Education and International Development (DGM), Ministry of Foreign Affairs and International Development (MAEDI); Development Activities Evaluation Unit, Treasury Directorate General (DG Treasury), Ministry of Economy and Finance

Germany: German Institute for Development Evaluation (DEval); Evaluation and Research Division, Federal Ministry for Economic Cooperation and Development (BMZ); Corporate Evaluation Unit,

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ); Evaluation Department, KfW Development Bank

Iceland: Icelandic International Development Agency, ICEIDA (closed); Ministry of Foreign Affairs

Ireland: Evaluation and Audit Unit / Department of Foreign Affairs and Trade

Italy: Evaluation Unit/Ministry of Foreign Affairs and International Cooperation (MFAIC), Directorate General for Development Co-operation (DGDC)

Japan: ODA Evaluation Division/Ministry of Foreign Affairs (MOFA); Evaluation Department/Japan International Cooperation Agency (JICA)

Republic of Korea: Evaluation Office/Korean International Cooperation Agency (KOICA); Evaluation Team/Economic Development Cooperation Fund (EDCF)

Luxembourg: Monitoring, Audit and Evaluation, Quality Control Division, Ministry of Foreign and European Affairs (MFEA); Expertise and Quality Directorate, Luxembourg Development Cooperation Agency (LuxDev)

Netherlands: Policy and Operations Evaluation Department (IOB), Ministry of Foreign Affairs (MFA)

New Zealand: Evaluation and Research Team/Ministry of Foreign Affairs and Trade (MFAT)

Norway: The Evaluation Department, Norwegian Agency for Development Cooperation

Poland: Development Cooperation Department (DCD)/Ministry of Foreign Affairs (MFA)

Portugal: Evaluation and Audit Unit (Gabinete de Avaliação e Auditoria - GAA), Institute for Cooperation and Language (Camões, I.P.)

Slovakia: Development Cooperation and Humanitarian Aid Department (DCHAD), Ministry of Foreign and European Affairs of the Slovak Republic (MFEA)

Slovenia: Directorate for Multilateral Affairs, Development Cooperation and International Law, Ministry of Foreign Affairs (MFA)

Spain: Division of Development Policy Evaluation and Knowledge Management (DEGCO), Ministry of Foreign Affairs and Cooperation (MAEC)

Sweden: Unit for Planning, Monitoring and Evaluation/Swedish International Development Co-operation Agency (Sida); The Expert Group for Aid Studies (EBA)

Switzerland: Department of Economic Cooperation and Development (WE), State Secretary for Economic Affairs (SECO); Evaluation and Corporate Controlling Division, Swiss Agency for Development Cooperation (SDC)

United Kingdom: Department for International Development (DFID)

United States: US Department of State; US Agency for International Development (USAID); US Millennium Challenge Corporation (US MCC)

APPENDIX C. INCLUSION/EXCLUSION CRITERIA FOR CONTENT ANALYSIS

1. Included articles/reports on ICT4D *program or project level* intervention (at borderline was evaluation of websites, which were included in the analysis). Excluded those on penetration, policy reviews/guidelines/master plan, diffusion, use of an ICT(s), IT law making, e-readiness (assessment of e-readiness without any association with a project or program). Excluded articles/reports which assess the following without any association with a specific ICT4D project or program: preconditions to use a certain ICT; ICT4D thematic or sectoral work without much specificity to the type of ICT4D project; IT adoption or IT investment decisions *in general*. Excluded systematic literature reviews or surveys not focused on a specific ICT4D project or program. Excluded if multiple projects or programs are examined within a single article or report and it is difficult to fully understand individual projects due to a lack of detailed explanation (e.g. meta-evaluation of multiple ICT4D projects with little or no explanation for each).

- Rationale: The study addresses research questions in relation to ICT4D projects or programs with an element of identifiable ICT intervention. Also, the study explores potential association between ICT4D evaluation and *program* evaluation.

2. Included articles/reports where *main subject matter* is ICT4D project or program evaluation. Excluded cases where ICT is a very insignificant component of a development project or program.

- Rationale: The study addresses evaluation of *ICT4D* projects or programs rather than other types of development projects in general. It also explores potential association between ICT4D evaluation and *IS/IT* evaluation.

3. Included articles/reports where a project or program took place in the *Global South context*. However, included articles/reports where a country or countries in the Global North was in collaboration with a country or countries in the Global South in the project.

- Rationale: Limiting the scope of development setting to the context of Global South. This is based on the assumption that discussions on development within the Global North setting might entail different considerations from those of the Global South.

4. Included journal articles which *introduce or suggest an evaluation framework(s)*, if the framework was applied to assess a specific project case(s). However, included journal articles which state or explain that a framework(s) is proposed for ICT4D projects in a specific development context (e.g. in a specific sector, or for cases of a certain type of ICT/IS project or program in development context such as rural ICT), even if application to a specific project was not illustrated.

- Rationale: If an article just proposes an evaluation framework without any case or specificity of its applications, it cannot be analyzed for other areas of interest related to the research questions of this study (e.g. cannot be coded for "domain of ICT4D work").

5. Excluded works focusing on models or frameworks that do not have any component related to ICT4D *evaluation* (e.g. IS design process, etc.).

- Rationale: The inclusion/exclusion criteria described in Chapter 3.1.2 was devised to select articles/reports on ICT4D evaluation, in alignment with what the research questions aim to address. However, there were cases where e.g. an article contains

"evaluation" and/or "assessment" (or their variations) at least once in title, abstract or keywords section, but the content of the article was not on ICT4D evaluation.

6. Excluded aid/development agency reports on money loans, debt facility or projects where loans or financial support is a significant part of the project.

- Rationale: The cases above are not comparable to ICT4D projects or programs that are addressed by academic journal articles. The reports on loans or debt facility also often lacked detailed analysis or assessment of ICT intervention.

APPENDIX D. LIST OF JOURNAL ARTICLES AND AID/DEVELOPMENT AGENCY REPORTS REVIEWED

1. Reviewed journal articles

- **The Electronic Journal of Information Systems in Developing Countries (EJISDC)**

Abdinnour-Helm, S., & Chaparro, B. S. (2007). A balanced usability checklist approach to evaluate Palestinian hotel websites. *Electronic Journal of Information Systems in Developing Countries*, *31*(2), 1–12.

Akeel, H., Wynn, M., & Zhang, S. (2013). Information systems deployment in Libyan oil companies: Two case studies. *Electronic Journal of Information Systems in Developing Countries*, *59*(4), 1–18.

Alanezi, M. A., Mahmood, A. K., & Basri, S. (2012). E-government service quality: A qualitative evaluation in the case of Saudi Arabia. *Electronic Journal of Information Systems in Developing Countries*, *54*(3), 1–20.

Ali, M., & AlHinai, Y. S. (2013). Assessing the use of information and communication technologies for learning in emerging countries. *Electronic Journal of Information Systems in Developing Countries*, *57*(3), 1–14.

Al-Moalla, A., & Li, D. (2010). Organisational issues with electronic government procurement: A case study of the UAE. *Electronic Journal of Information Systems in Developing Countries*, *41*(3), 1–18.

Andoh-Baidoo, F. K., & Osatuyi, B. (2009). Examining online banking initiatives in Nigeria: A value network approach. *Electronic Journal of Information Systems in Developing Countries*, *38*(1), 1–14.

Ayoung, D. A., Abbott, P., & Kashefi, A. (2016). The influence of intangible ('soft') constructs on the outcome of community ICT initiatives in Ghana: A gap archetype analysis. *Electronic Journal of Information Systems in Developing Countries*, *77*(3), 1–22.

Bass, J. M., & Heeks, R. (2011). Changing computing curricula in African universities: Evaluating progress and challenges via design-reality gap analysis. *Electronic Journal of Information Systems in Developing Countries*, *48*(5), 1–39.

Baumüller, H. (2015). Assessing the role of mobile phones in offering price information and market linkages: The case of M-Farm in Kenya. *Electronic Journal of Information Systems in Developing Countries*, *68*(6), 1–16.

Breetzke, T., & Flowerday, S. V. (2016). The usability of IVRs for smart city crowdsourcing in developing cities. *Electronic Journal of Information Systems in Developing Countries*, *73*(2), 1–14.

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APPENDIX E. AREAS FOR CODING JOURNAL ARTICLES AND AID/DEVELOPMENT AGENCY REPORTS ON ICT4D EVALUATION

Category of codes	Areas of codes
1. General	1.1. Year 1.2. Publisher (name of journal venue or aid/development agency) 1.3. ICT subject to study 1.4. Country or regional context (if specified) 1.5. Scope or level of analysis 1.6. Research methods
2. Areas of foci based on Heeks's (2018: 126) six questions of ICT4D evaluation	2.1. Rationale for evaluation 2.2. Target audience for evaluation 2.3. Subject of evaluation 2.4. Evaluation procedure* 2.5. Timing of evaluation in the ICT4D project lifecycle 2.6. Forms of reporting/disseminating/utilizing evaluation results*
3. ICT4D evaluation	3.1. Types of research questions (descriptive, measurement and improvement, social change, technology, conceptual, access, learning, etc.) 3.2. Approaches in ICT4D evaluation: generic, discipline-specific, issue-specific, application-specific, method-specific, and sector-specific* 3.3. Domain of ICT4D work 3.4. Specific ICT4D evaluation models, theories or frameworks applied, suggested or mentioned (if any)
4. Program evaluation	4.1. Purpose of evaluation (formative, summative, both)* 4.2. Stage of evaluation (needs assessment, process, outcome, impact)* 4.3. Paradigmatic stance in program evaluation (interpretivist strand, positivist strand, pragmatic, critical-transformative strand) 4.4. Specific program evaluation models, theories or frameworks applied, suggested or mentioned (if any)
5. IS/IT evaluation	5.1. Approaches in IS/IT evaluation (technical/functional, economic/financial, interpretive) 5.2. IS/IT adoption, acceptance, use models or theories applied (if any) 5.3. Specific IS/IT evaluation models, theories or frameworks applied, suggested or mentioned (if any)
6. Aid/development evaluation	6.1. Notions of development 6.2. Development agenda mentioned (if any; e.g. links to MDGs, Paris Declaration principles, SDGs, etc.) 6.3. Specific aid/development evaluation models, theories or frameworks applied, suggested or mentioned (if any)
7. Other	7.1. Other evaluation models, theories or frameworks**

*Codes removed from the initial code list (please see below for the rationale for removal for each).
**Code added to the initial code list.

Rationale for removal of codes

2.4. Evaluation procedure

- Original intention: Following Heeks's (2018: 126) explanation on six questions on ICT4D evaluation, the intention was to capture how the selected indicators were measured—for example, "the extent of participation of project users in measurement (and in more upstream processes such as selection of indicators)."
- Rationale for removal: Just by reading through the articles and reports, it was difficult to capture the extent of participation of users in measurement or selection of indicators. Yet, among the reviewed journal articles, there was a notable work that explains and illustrates an example of evaluation capacity building of project participants and stakeholders (i.e. Lennie et al., 2015)—the study was described in more detail in Chapter 4.1.2.2 as an exemplary work illustrating critical-transformative paradigm in evaluation.

2.6. Forms of reporting/disseminating/utilizing evaluation results

- Original intention: Following Heeks's (2018: 126) explanation on six questions on ICT4D evaluation, the code was intended to capture, for example, "whether indicators are reported 'as is' or are communicated via causal models, case sketches, stories, etc."
- Rationale for removal: Just by reading through the articles and reports, it was difficult to capture how the evaluation was reported, disseminated or utilized. This could have been more feasible if the question was included in the interviews of authors of the articles and reports.

3.2. Approaches in ICT4D evaluation

- Original intention: Following Heeks's (2018: 126-128) explanation on different approaches to ICT4D evaluation, it was intended to code whether an article or report reflects one or more of the following characteristics of evaluation: generic, discipline-specific, issue-specific, application-specific, method-specific, and/or sector-specific.
- Rationale for removal: While the typology is very useful for understanding different approaches of ICT4D evaluation, it was realized during the coding process that it is not

easy for a reader or coder to precisely determine to which type an evaluation belongs to. Instead, where evaluation models, theories or frameworks from ICT4D evaluation, program evaluation, IS/IT evaluation, aid/development evaluation, or other disciplines were found to be applied, suggested or mentioned, each was categorized under one of the six types (please see tables in Chapter 4.1.6).

4.1. Purpose of evaluation

- Original intention: It was intended to capture if an article or report is summative or formative evaluation or both.
- Rationale for removal: During the coding process, it was found that the purpose of evaluation (in terms of formative, summative or both) was often ambiguous and could not be clearly determined just by reading the articles and reports. Sections of the reviewed articles and reports on implications, possible future research, conclusion and/or recommendations often blurred the distinction between formative vs. summative, or implications of both. "2.5 Timing of evaluation in the ICT4D project lifecycle" could be regarded as a proxy code for understanding the purpose of evaluation (e.g. mid-term evaluation is likely to be done for formative purposes whereas ex-post evaluation tends to be carried out with summative purposes), with the limitation that they might not always be equivalent to each other (e.g. in case where an ex-post evaluation is done for formative purposes of implementing future phases of the same project).

4.2. Stage of evaluation

- Original intention: It was planned to code each work according to the assessment focus of ICT4D project stage, i.e. needs assessment, process, (short-term, immediate) outcome, and (long-term) impact.
- Rationale for removal: There were significant challenges in coding for 'outcome' and 'impact', due the differences across authors of the reviewed works in (implicitly) defining what 'impact' (vs. 'outcome') entails. To illustrate, there were cases where the authors of the reviewed works described and named certain types of short-term or immediate outcome as 'impact'—e.g. travel cost saved as a result of e-government service, changes in students'

computer skills as a result of One Laptop per Child (OLPC) intervention. There was also a case where outcome was explained as "the impact of outputs" (Fagbenro, 2005: 25). The divergence in defining 'outcome' vs. 'impact' was also mentioned in the program evaluation literature (please see Chapter 2.2.2.2). The diversity in the conceptualization was difficult to be reconciled with the definitions this study was trying to consistently adopt—i.e. 'outcome' as immediate and short-term result and 'impact' as long-term result or effect. The challenge per se can be a part of findings—that there exists little consensus among the researchers in academic and practitioner spheres in defining what 'impact' means vis-à-vis 'outcome'.

APPENDIX F. EXAMPLES OF INTERVIEW QUESTIONS

The following list includes examples of interview questions asked and it is not a comprehensive list. Due to the nature of semi-structured interviews, not every question was asked to each interviewee, nor every interviewee was asked the questions in the same way. Sometimes the wordings of the questions were adapted or modified according to the interviewees' occupation, domain focus, level of expertise in the ICT4D field, etc.

1. Basic participant information

- Country or regional focus of your work in the ICT4D field.
- Which domain of ICT4D you most closely identify your work with.
- Your experience years in the ICT4D field.
- Broadly which type of research method you frequently adopt: quantitative, qualitative or mixed methods (or other categories)?

2. Foci of ICT4D evaluation

- In your opinion/experience, what has been at the major foci of ICT4D evaluation over the last few years? (example areas of "foci": methods, theories or models, type of ICT, sectoral focus, development notions, regional focus, etc.)
- What do you think have been some important changes in the foci of ICT4D evaluation over time, if any?

3. Six questions

- Heeks (2018) suggests six key questions for ICT4D evaluation. I'll read each of the six questions, and please respond if you think it has been widely discussed among the ICT4D researchers, or not:
  - "What is the rationale for evaluation?";
  - "Who is the intended audience for the evaluation?";
  - "What is to be measured?";
  - "How are the selected indicators to be measured?";
  - "At what point in the ICT4D project lifecycle are indicators to be measured?"; and
  - "How are evaluation results to be reported, disseminated and used?"
- Based on your answers above, how do you think ICT4D evaluation can be improved?
- Are there any themes, issues, and concerns in ICT4D evaluation (whether related to the six questions or not) that you would like to see more discussions on, among academics and/or practitioners?

4. Challenges or gaps in ICT4D evaluation

- What are challenges or gaps in ICT4D evaluation, if any?

5. Associations with other evaluation fields, academic disciplines or practices

- Do you think ICT4D evaluation has been associated with the three evaluation fields (program evaluation, IS/IT evaluation, aid/development evaluation)?
- What other academic disciplines and practices do you think can be helpful to resolve challenges or gaps in ICT4D evaluation, if any?

APPENDIX G. FEEDBACK RESPONSE SHEET DISTRIBUTED AND COLLECTED DURING THE CHANGE SEMINAR SESSION

1. Participant information (name not collected)

- Gender: _____ (OR refuse to answer: ____)
- Occupation:

❑ Master's student ❑ Doctoral student ❑ Faculty member

❑ Other (please specify): _____

- Number of years of interest in the ICTD field: _____year(s)

OR if less than a year, please leave "X" here: _____

- Interested domain(s) of ICTD work (e.g. education, health, mobile money, etc.):
- Experience(s) in ICTD project evaluation (if any, please briefly describe a rough number of project(s) evaluated, what the evaluated ICTD project(s) were, etc.):

2. Feedback

Q1. How well does the findings reflect your understanding or experience in the ICTD field?

e.g. The findings mirror / contrast my understanding or experience in the field...for example…

Q2. Were there findings that you expected? Were there other findings that you were surprised to see? e.g. In contrast to my expectations, I found…OR In alignment with my expectations, I found…

Q3. What are holes in the findings? What would you want to explore further? What clarification is needed? e.g. The study needs to examine XYZ areas further...

APPENDIX H. TYPES OF RESEARCH OR EVALUATION QUESTION (ADAPTED FROM GOMEZ (2013))

As mentioned in Chapter 4.1.2.1, for coding types of research or evaluation question in content analysis, types found in Gomez (2013)—as a result of analyzing 948 ICTD/ICT4D papers published in selected peer reviewed journals and conferences between 2000 and 2010—were used as an initial list of codes. They included: "access", "conceptual", "descriptive", "measurement and improvement", "social change", "technology", and "learning". The broad categories—with some adaptation of what each entailed—generally well captured the types of research question in the reviewed articles and reports. The table below shows the original explanation of each type (directly quoted from Gomez (2013)) and their adaptation in this study.

Types	Original description in Gomez (2013: 8-9)	Adaptation
Access	"[M]ostly related to characteristics of the infrastructure, types of access (mobile, telecenter, cybercafé, school lab, etc.), and management of facilities and service delivery."	Applied the code when a work addresses questions or topics on types of access (mobile, telecenter, cybercafé, school lab, etc.).
Conceptual	"[F]ocused on formulating or testing theories, models, methods, and frameworks."	In addition, for journal articles: -Includes where it presents, formulates or tests theories, models, methods, and frameworks, rather than just simply mentioning that a work used certain frameworks or lens as an analytical tool.
Descriptive	"[I]ncluded case studies or comparisons, usually of specific countries, describing experiences, projects, process, production, and context, often defining roles or answering 'what is' questions."	In addition, for journal articles: -Includes examining or exploring status or use; -Includes similarities and differences comparisons (e.g. across different types of public access venues); -For works on e-governance or e-government projects, includes cases of exploring current status of e-readiness or current state of e-government development; -Includes cases examining opportunities or potentials; -Includes analyzing best practices; -Includes exploring reactions of participants.

		For reports: -Includes cases deriving lessons learned without a linkage to improve implementation (cf. if it entails recommendations for improvement: coded under "Measurement and improvement") -Includes when it explores strengths or weaknesses (cf. challenges or barriers: coded under "Measurement and improvement"); -Includes cases where it asks or explores next steps; -Includes exploration of actions taken, project or program design aspects that are <u>not</u> related to technical or technological aspects (cf. project or program design aspects related to technical or technological aspects: coded under "Technology"); -Includes cases where they document project implementation; -Includes where it explores attitudes toward a project or a program; -Includes state of use; -Includes description of context; -Includes discussions of issues observed (as part of experiences); -Excludes where contexts are examined as influential/success/failure factors (coded under "Measurement and improvement").
Measurement and improvement	"[P]rimarily concerned with assessment and evaluation of effectiveness, performance, productivity, efficiency, results, and ways to improve project implementation. They also included studies of benefits, barriers, success factors, risk assessment and applicable results; and to a lesser degree, they were concerned with government recommendations, roles and policies, improving implementation, and sustainability."	In addition, for journal articles: -Includes cases examining the role of an ICT or its contribution in leading to certain result/outcome/impact as part of possible influential/success/failure factors; -Includes identification or examination of challenges; -Excludes cases of simple validation of framework, models, and theories, and where they examine a case study to apply the framework, model, theory, etc. (coded under "Conceptual"). For reports: -Includes contextual factors influencing success or failure; assessment of relevance; assessment of (e.g. unintended, negative, positive) impact; extent of use; extent of alignment with plans; -Includes cases of assessing value or worth.
Social change	"[G]enerally broad in focus, looking at social issues and implications; they often formulated 'how' and 'why' types of questions, and addressed issues of empowerment, democratization, (sustainable)	In addition, for reports: -Coded if intention to examine social change was clearly stated rather than merely implied (e.g. excludes cases where a theme(s) related to social change is just included as an aspect to be evaluated, rather than as a clearly stated subject in research or evaluation question); -Includes cases where an element of social change

	development, participation, collaboration, governance and public benefit, and also in some cases, diffusion, computerization, and commercial development."	is described as a result of a project implementation; -Excludes cases where they examine impact on target organization or group; includes cases of broader (social, sectoral) influence; -Excludes cases where they assess whether gender or environment is considered in design and implementation.
Technology	"[R]esearch questions revolved around software and technology issues, including testing, development, design, and open source software."	In addition, for journal articles: -Includes comparisons of different ICTs as a means to achieve a certain outcome; -Includes acceptance or adoption (factors) of an ICT, testing, development, design, etc.; -Excludes assessing impact or effectiveness of a certain technology (coded under "Measurement and improvement").
Learning	"[C]oncerned with literacy (computing, digital or information literacy), skills training, needs assessment and gaps, learning, and capacities to use ICT."	Excluded this type from the code list. The rationale was that, from the inclusion/exclusion criteria, I excluded works examining the precondition to use ICTs (e.g. assessing ICT use skills) to focus on works which evaluate ICT4D *projects or programs*.

VITA

Moonjung Yim's research interest is on information and communication technology for development (ICT[4]D) evaluation, impact of ICT use on individuals and society, program evaluation, information systems/information technology (IS/IT) evaluation, aid/development evaluation, human development, and information science in general. Before attending the University of Washington, she attended Yonsei University where she earned Bachelor of Arts in Economics and Master of Global Affairs & Policy.