

A guide to apply the Capability Approach in ICT4D based on a systematic literature review

by

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10 April 2019

DECLARATION

I declare that this dissertation, submitted by me, is my own work, that I have referenced all the sources that I have used and that no part was previously submitted at any tertiary institution.

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Date: 10 April 2019

ETHICS STATEMENT

The author, whose name appears on the title page of this dissertation, has obtained, for the research described in this work, the applicable research ethics approval.

The author declares that she has observed the ethical standards required in terms of the University of Pretoria's Code of ethics for researchers and the Policy guidelines for responsible research.

ABSTRACT

Information and communication technologies (ICTs) have been regarded as having the potential of changing the way people live their lives. Particularly in developing countries, ICTs are believed to be the path to social and economic development. Substantial investments are made into ICT4D (information technology for development) projects because of their perceived value. However, the impact of such projects has been a point of concern for investors and ICT4D scholars. The mainstream perspective has been to measure development in terms of economic growth by looking at gross national product or per capita income. However, this approach is changing as there are increasing calls for a more expanded concept of development. Human-centred approaches to ICT4D measurement are being called for. One such way of evaluating impact that has been gaining attention over recent years is Amartya Sen's Capability Approach. This approach moves away from the dominant economic growth perspective and focuses on individuals, what they value, and what they are able to choose. While some scholars have developed ways to operationalise the capability approach, there are disparities in how the approach is applied across ICT4D studies. This study, through a systematic literature review, examines how the capability approach has been applied in ICT4D studies. Findings from the literature show the different nuances that can be associated with human development. It also highlights a stark theme in access and use, namely, that access does not mean automatic use and that conversion factors determine use. Furthermore, this paper synthesises the findings into a flowchart that is intended to guide engagement with the capability approach within the field of ICT4D.

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GLOSSARY OF TERMS

Term/Abbreviation	Description
AEF	Alternative Evaluative Framework
CA	Capability approach
CCD	Capable and Convivial Design
CDI	Center for Diversity and Inclusion
CEMS	Computerised Electricity Management System
CLIQ	Community-based Learning, ICTs, and Quality-of-life
CSSF	Community Shaping Solution Framework
CWO	Community Wellness Outcomes
DFID	Department for International Development
HDI	Human Development Index
ICT	Information and communication technology
ICT4D	Information and communication technology for development
IS	Information Systems
IT	Information Technology
MSSM	Mobile System for Safe Motherhood
Systematic literature review	“A review that aims to comprehensively identify all relevant studies to answer a particular question and assesses the validity of (or “soundness”) of each study taking this into account when reaching conclusions” (Pettirew & Roberts, 2006:57)
TAM	Technology Acceptance Model
UNDP	United Nations Development Program

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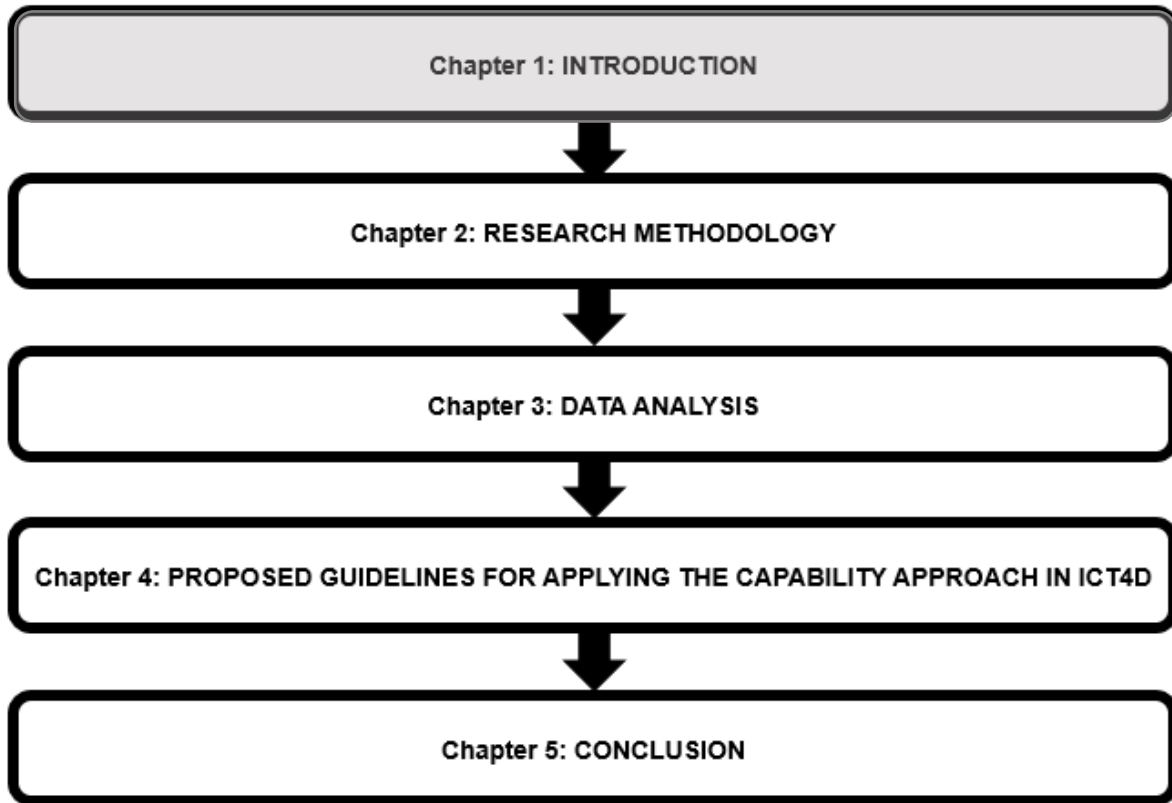
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1. INTRODUCTION



1.1 Introduction

Information and communication technology for development (ICT4D) is built on the premise that information and communication technologies (ICTs) bring with them socioeconomic improvements to developing communities (Avgerou, 2008; Avgerou, 2010; Gigler, 2015; Heeks, 2010). The use of ICTs for development practice is often not argued; instead, the reasons and the manner in which ICT should be used for development are the focus points of argument (Andersson *et al.*, 2012). Development itself as a concept has been debated over the years (Avgerou, 2008). Scholars of ICT4D have shown interest in challenging the neoliberalism development discourse, and are moving away from measuring development only in terms of economics (Andersson *et al.*, 2012). Amartya Sen's capability approach is one such alternative of measuring development (Heeks & Molla, 2009). It is an approach that places the human at the centre and considers development in a holistic manner, not just in terms of economic growth.

1.1.1 Capability approach

The capability approach is concerned with conceptualising and evaluating aspects of a person's wellbeing, such as inequality and poverty; however it does not explain these phenomena. The capability approach has been a subject of interest amongst many scholars over the last few decades (Robeyns, 2005), and has become increasingly popular in practice and policy making (Robeyns, 2006). It is said to be one of the most influential development theories (Hatakka & De, 2011; Kleine, 2010). Amartya Sen is the economist and philosopher who pioneered the capability approach as it is known presently, although Aristotle, Adam Smith, and Karl Marx have influenced some of its aspects (Nussbaum, 1988, 2003; Sen, 1999). Sen recognised the strong connections of his capability approach to Aristotle's theory of political distribution, along with his analysis of "human flourishing" (Clark, 2005). For Aristotle, man chooses particular actions stemming from the idea that he must pursue what is for his own good (Younkins, 2003). Sen, like Aristotle, reiterated the familiar notion that the good one pursues is not wealth, but that wealth is a useful

means of achieving other ends (Clark, 2005). However, agreeing with Adam Smith, Sen emphasises that, in order for human development to take place, economic growth and the expansion of goods and services are necessary. Thus, Sen acknowledged strong connections with Smith's analysis of necessities and living conditions (Smith, 1776). Karl Marx's Theory of Alienation reflects a concern for humans and their natural abilities that need to be fulfilled in order for these to shape the lives of individuals and their societies (Ferguson & Lavalette, 2004). Karl Marx was concerned with freedom and emancipation, and Sen also recognised a strong connection to this perspective (Clark, 2005). His ideas of political economy are related to recognising human success in fulfilling the needed human activities (Sen, 1990). These activities include being adequately nourished, escaping mortality and morbidity, and achieving self-respect. It is interesting to note that while Smith and Marx are on opposite sides of the ideological spectrum, they still agree on aspects of human development. The capability approach has been utilised in various fields, predominantly in studies concerned with development, social policy, welfare economics, and political philosophy (Robeyns, 2005). Its evaluation of wellbeing not only focuses on individuals, but also on the average wellbeing of a group.

Unlike other approaches in philosophy that are concerned with consumption, income, or the happiness of individuals and their desire-fulfilment, the capability approach focuses on what one is able to do and be, which is referred to as capabilities (Robeyns, 2005; Zheng & Walsham, 2008). It also offers a way of conceptualising development not as economic growth, but as individual freedom (Kleine, 2010). "Freedom", as Sen (1999) broadly describes it, refers to the opportunities that one has to live the life he/she values. This is the main concern of the capability approach (Zheng & Walsham, 2008). Using the capability approach, poverty is considered as the deprivation of freedom to make choices, rather than as low income. The capability approach allows for an evaluation framework that focuses beyond superficial variables such as usage or access; its focus is on ends rather than means, and the local context as well as the process for development are

highlighted as important variables (Gigler, 2004; James, 2006; Madon, 2004; Zheng & Walsham, 2008). It is therefore not surprising that the approach was in part adopted by the United Nations Development Program, thus imbuing it further with a political impact (Robeyns, 2006). Sen added the Human Development Index to the Human Development Report, the idea of economist Mahbub ul Haq (Marais, 2015).

1.1.2 Functionings and Capabilities

The capability approach consists of two main concepts, namely, “functionings” and “capabilities”. Functionings are the “beings and doings” of a person, while “a person’s capabilities entail the various functionings available for them to achieve” (Zheng & Walsham, 2008). Sen (1987) differentiates between functionings and capabilities:

“A functioning is an achievement, whereas a capability is the ability to achieve. Functionings are, in a sense, more directly related to living conditions, since they are different aspects of living conditions. Capabilities, in contrast, are notions of freedom, in the positive sense: what real opportunities you have regarding the life you may lead” (Sen, 1987:36).

Thus, a functioning is what a person is and what he can do; it refers to realised achievements, while capabilities refer to what is possible for a person to be and do. The fulfilment of these capabilities may require financial resources, but others will require institutions to be in place, the political climate to be conducive, and for cultural and social structures and practices to allow for the fulfilment of these capabilities. Thus, while a person may have certain functionings, the person may not be able to achieve certain capabilities if the structural conditions and other social and environmental factors are limiting.

1.1.3 Commodities and freedom

In the capability approach, it is also important to understand the relationship between commodities, freedom, and capabilities. Commodities refer to goods and services that provide a means to an end – they enable people to do and to be.

These goods and services can be used only to the extent that it is allowed by the conversion factors, which are personal, social, and environmental (Hatakka & Lagsten, 2012; Robeyns, 2005; Zheng & Walsham, 2008). These conversion factors determine the person's ability or freedom to choose between functionings.

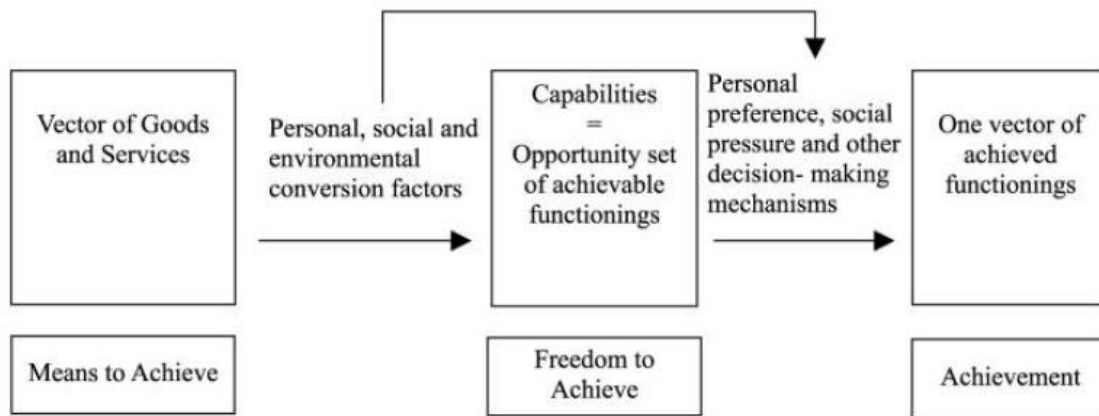


Figure 1.1 Zheng's (2007) adaptation of a stylised non-dynamic representation of the core aspects of the capability approach (from Robeyns, 2005)

Figure 1.1 is a diagrammatic representation of the main components of the capability approach:

- Goods and services (commodities): these are the means by which to achieve;
- Conversion factors: these are enabling or restricting factors that determine whether valued functions can be achieved;
- Capabilities: this is the opportunity set of achievable functioning;
- Decision-making mechanisms: these consist of aspects such as personal preferences and societal pressures; and
- Achieved functionings: these are what a person is able to be and do.

1.1.4 Criticisms of the capability approach

As much as the capability approach is influential and has been the subject of interest among scholars, it is not without criticism.

Although it is philosophically strong in that it has rich concepts about wellbeing, it has been criticised for being methodologically vague (Zheng & Walsham, 2008). However, Sen (1993) intentionally defined it as such, so that it would apply to various purposes. Academically, the capability approach has been engaged with abstractly and philosophically, and it has also been used in empirical studies. In the field of economics, it has been used for the evaluation of development. An example is the United Nation's Development Program's Development Index (UNDP, 1990 – 2005). In ICT4D, "the capability approach has also been introduced as an evaluative framework" (Madon, 2004), which is used to evaluate the impact of ICT4D interventions.

Another criticism of the capability approach is that it has too much of a focus on the individual; it does not focus much attention to groups and social structures (Robeyns, 2005; Zheng & Walsham, 2008) nor does it describe collective action and collective decision-making (Kleine, 2010). However, Robeyns (2005) deals with these criticisms by arguing that the capability approach does, on a theoretical level, take into consideration social relations as well as the factors that constrain and provide opportunities for individuals in two ways. The first way is that it recognises factors in the environment that determine whether or not commodities will be converted to functionings. Second, it accounts for social structures by distinguishing between functionings and capabilities, which indicates an act of choice. This is the ability to choose functionings from one's capability set.

Another issue with the capability theory pertains to the question of a capabilities list. Nussbaum (2003) has been the advocate for a capabilities list; she has created one over the years, and has criticised Sen for not endorsing it. Some economists have agreed with Nussbaum, saying that it is important to identify certain capabilities in order to make the capability approach operational (Robeyns, 2005). However, Sen responded to these assertions by saying that is not his place as a theorist to come up with or endorse a list, but that the task should rather be left to a democratic process. Sen argues that no one list can satisfy all contexts; there would be a need

for a list for each culture, society, and geographical setting (Sen, 2004). However, Nussbaum (2000, 2003) has been adamant that her list would be generic enough, and that it would be up to the local context to customise it.

These criticisms and their rebuttals demonstrate how engaging the capability approach is. It has also been identified as having the potential to add significant value in ICT4D impact assessment.

1.1.5 ICT4D Impact Assessment

Heeks and Molla (2009) provided the ICT4D value chain, which places impact assessments in context. The ICT4D value chain (Figure 1.2) is broken down into four assessment areas.

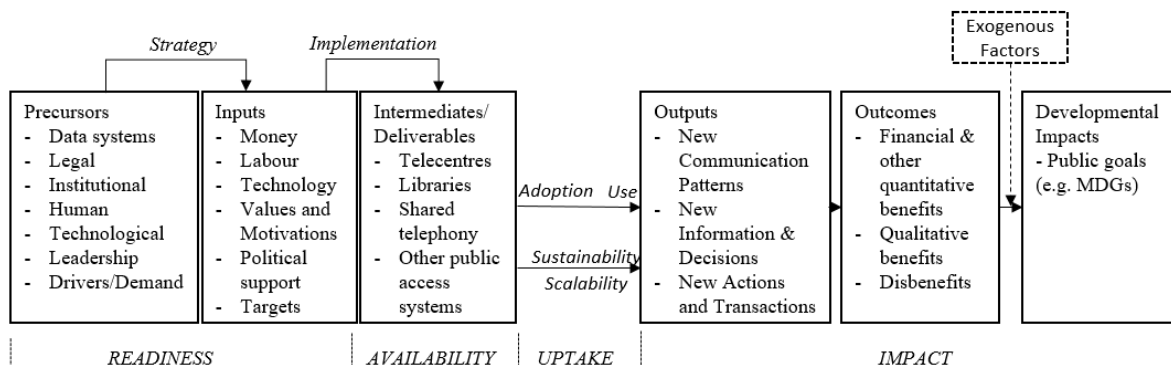


Figure 1.2 The ICT4D Value Chain (adapted from Heeks & Molla, 2009)

The four areas of assessment are (Heeks & Molla, 2009):

- **Readiness:** refers to the assessment done on the prerequisites of ICT4D projects, for example, people with leadership, values and motivation, labour ICT infrastructure, ICT skills, and ICT policies;
- **Availability:** refers to the assessment of the presence of intermediate resources that are used as input in the implementation of ICT4D initiative;
- **Uptake:** refers to the assessment that considers the extent to which the ICT4D deliverables are being used by its target audience; and
- **Impact:** refers to assessment of the impact of an ICT4D project, and can be divided into three sub-elements:

- Outputs: refers to the changes in behaviour at a micro-level as a result of the ICT4D initiative;
- Outcomes: refers to the costs and benefits related to the ICT4D initiative; and
- Development Impacts: refers to what ICT4D initiatives offer to the broad goals of development, which include public goals such as the Millennium Development Goals (MDGs).

The further to the right one progresses on the ICT4D value chain when trying to assess impact, the more difficult, more costly, but certainly more valuable the assessment becomes (Heeks & Molla, 2009). Heeks and Molla (2009) further suggest that the capability approach can be used to assess development impacts.

The difficulty in ICT4D impact assessment has been around defining and measuring success. One of the challenges of assessing whether a project has succeeded or failed is subjectivity of evaluation (Heeks, 2002); one's success may be another's failure if viewed from different perspectives (Lyyntinen & Hirschheim, 1987; Sauer, 1993).

Another challenge of impact assessment is the timing thereof (Heeks, 2002). The cross-sectional rather than longitudinal of analysis of reported cases often provides an inaccurate evaluation of impact. Many studies focus on adoption and usage, but fail to go further to understand the socio-economic effect of that usage at the community and individual levels (Ashraf *et al.*, 2015).

Ashraf *et al.* (2015) mention that, in the past, most interventions have focused on implementation rather than impact, because the emphasis has been on the supply side instead of the demand side. This means that interventions have been focusing on, for example, building infrastructure rather than responding to whether people have the ability to access and utilise the services (Ashraf *et al.*, 2015).

1.2 Problem Statement

International agencies, national governments, and other global institutions such as the World Bank make large investments into development initiatives, including ICT4D projects (Andersson *et al.*, 2015; Aruajo & Reinhard, 2014; Dasuki & Abbott, 2015; Madon, 2014; Wakunuma & Masika, 2017). Annually, significant amounts of money are invested into ICT4D projects with the belief that ICTs will improve the quality of life for poor people (Asraf *et al.*, 2008). Yet, the impact of these initiatives is not clear. Impact assessment in ICT4D has been highlighted as important in the ICT4D value chain (Heeks & Molla, 2009); it is important to assess whether the investments are yielding the intended developmental outcomes. Thus, there is a need for this assessment, even though Heeks and Molla (2009) lament that it is a difficult undertaking.

As highlighted in Tshivhase *et al.* (2016), the capability approach is a powerful approach that could be used to that end. It places the human at the centre of the assessment, and moves away from the mainstream economic growth perspective of development. However, it does not have set measurable variables, which makes it methodologically vague (Hatakka & Lagsten, 2012; Zheng & Walsham, 2008) and difficult to understand and use practically (Heeks & Molla, 2009).

There have been attempts by numerous scholars to operationalise the capability approach in order to make it more accessible for those who value its concept and wish to use it in their studies (Tshivhase *et al.*, 2016). However, the capability approach is not used in a consistent way in the field of ICT4D. Newcomers to the ICT4D field that are required to make use of the capability approach may find it difficult and confusing. Further, seasoned researchers in the field may still need guidance on how to use the capability approach. Thus, there is a need for more investigation into how the capability approach has been used, so as to guide its use in ICT4D.

1.3 Main Research Questions

The main question for this research is:

What guidelines for using the capability approach in ICT4D research and application can be developed from existing research?

This question can be broken down further as follows:

- How has the capability approach been used to date in ICT4D research?
- Which operationalisation frameworks have been developed to apply the capability approach in ICT4D?

1.4 Research Approach

This study adopted a systematic literature review as research approach. The review assisted in answering the research questions, based on what is already available in the body of knowledge of the capability approach in ICT4D. Okoli and Schabram (2010) indicated that literature reviews have different purposes, such as setting the theoretical foundation of a study, or forming part of a graduate thesis. However, there is also a stand-alone literature review, which is used in this work. Although it shares aspects with the other types, its distinguishing features are its scope and rigor. It is concerned with summarising existing literature, identifying gaps, and providing guidelines for positioning research projects (Okoli & Schabram, 2010). Guidance for undertaking this literature review was mainly drawn from Petticrew & Roberts (2006) and Okoli & Schabram (2010). Papers were sought from electronic resources, namely journals and online databases. Papers that demonstrated engagement with the capability approach within the context of ICT4D were of interest to this study. Thus, keywords containing both concepts (i.e., capability approach and ICT4D) were used in the search process.

Following the retrieval of all articles from the search process, a thorough screening for relevance was undertaken for articles that met the inclusion criteria, and duplicate articles were removed (Okoli & Schabram, 2010). Papers were then

assessed for quality; thereafter, data was extracted from each article and synthesised (Okoli & Schabram, 2010).

Lastly, a proposed guiding flowchart for the use of the capability approach in ICT4D is presented.

1.5 Assumptions

The following assumptions were made in this research:

- The literature found in the selected journals, conferences proceedings, and databases provide a thorough representation of the use of the capability approach in ICT4D;
- The search criteria used to find the literature suffice for the intended use of the literature;
- The criteria used to include and exclude literature from this study are sufficient; and
- The analysis methods used to categorise and analyse literature are sufficient for this study.

1.6 Limitations

The following are the limitations of this study:

- The study is limited to articles that use the capability approach in ICT4D specifically;
- The study is limited to only the journals and databases listed in this report;
- The systematic literature review is limited to articles published from the commencement of the respective journals or databases until August 2018; and
- The proposed guidelines for using the capability approach in ICT4D were derived solely from the literature used in this study.

1.7 Ethics

Although ethical approval has been granted for this research, the study comprises a systematic literature review, which does not require participation of research subjects. Thus, consent was not required from research participants. However, this systematic literature review was conducted in an ethical manner, following literature review guidelines from various scholars.

1.8 Chapter outline

This research paper is organised into five chapters, as follows:

Chapter 1: Introduction – This chapter introduces the research by providing context and highlighting some aspects of the topic that will be uncovered in later chapters. It also provides guidance on what is to be expected from the rest of the report.

Chapter 2: Research Methodology – This chapter provides a detailed account of how this research was carried out. The research paradigm, data collection method, and data analysis are described.

Chapter 3: Research Analysis – This chapter provides an analysis of the research undertaking. It presents a synthesis of results and a discussion of prominent themes found during the research. It seeks to provide some of the answers to the research questions.

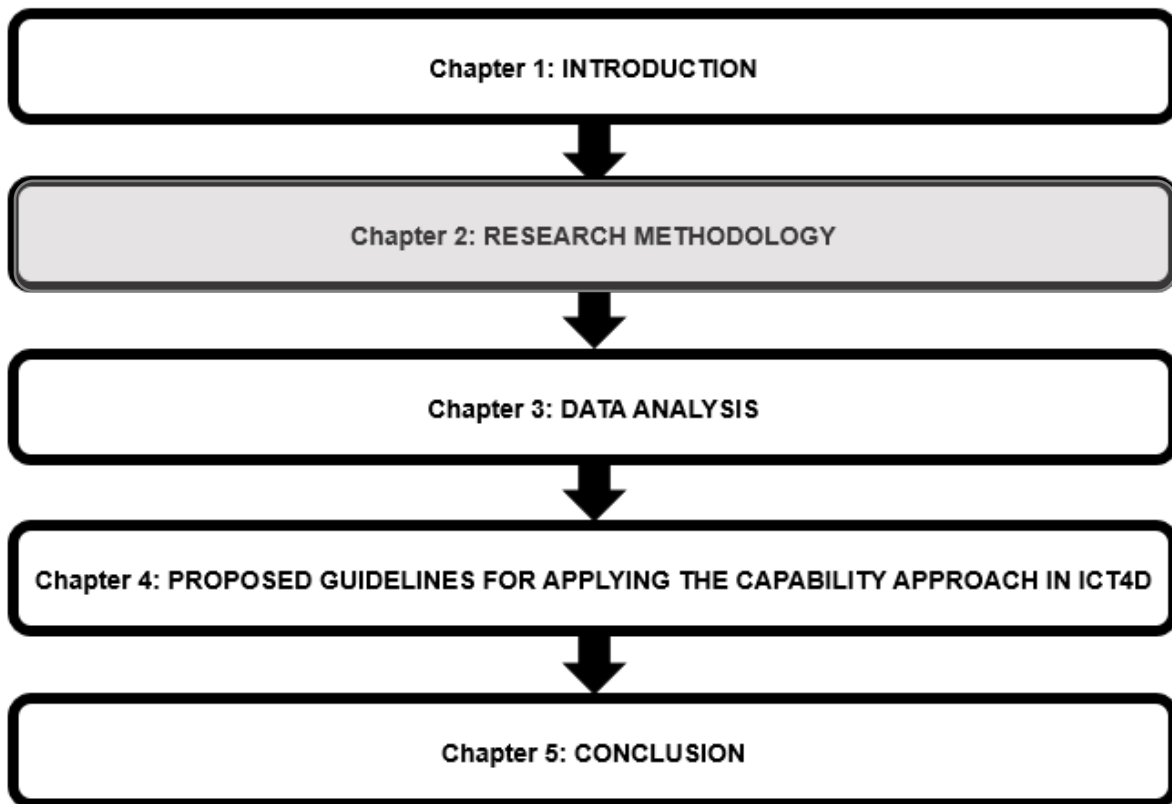
Chapter 4: Presentation of Proposed Guidelines – This chapter presents the proposed guidelines for applying the capability approach in ICT4D research. It shows how the capability approach has been and can be applied in ICT4D research, and also provides a guide that is believed to be helpful for those seeking to apply the capability approach in ICT4D research.

Chapter 5: Conclusion – This chapter summarises the research. It highlights work to be added to the body of knowledge in ICT4D research, and shows how the research questions were addressed.

1.9 Conclusion.

This chapter provided the introduction to the study by describing concepts of the capability approach and its relation to ICT4D. Further, it provided the research problem and articulated the main research questions. The following chapter describes the methodology used for this research.

2. RESEARCH METHODOLOGY



2.1 Introduction

This chapter presents the research methodology for this study. It commences by motivating the paradigm through which this research is undertaken. It describes the research strategy of the study, namely, a systematic literature review. It also highlights the different types of literature reviews and focuses on the one that is appropriate for this study. It describes how the data was collected and analysed.

2.2 Research paradigm

Three dominant research paradigms are found in information systems research, namely, positivism, interpretivism, and critical research.

In positivism, the underlying assumption is “that reality is objectively given and can be described by measurable properties independent of the researcher” (Myers, 1997). Studies in this paradigm seek to understand phenomena by testing theory for predictability (Myers, 1997). A study is “positivist if there is evidence of formal propositions, quantifiable measures of variables, hypothesis testing, and drawing of inferences about a phenomenon from a sample” (Myers, 1997) from a stated population.

Critical research has the underlying assumption that history creates the social reality; people produce and reproduce it (Myers, 1997). Political, social, and cultural domination constrain the ability of people to change their economic and social circumstances. Thus, the aim of critical research is social critique; it highlights alienating conditions of the status quo (Myers, 1997).

Interpretivist research assumes that reality is socially “constructed through social constructions such as language, consciousness, and shared meanings” (Myers, 1997). Hermeneutics, which is the art of interpretation, and phenomenology are the philosophical bases for interpretivism. Phenomena are understood “through the meanings people assign to them” (Myers, 1997). Thus, interpretivist IS research attempts to appreciate the environment in which ICTs exist and the processes that impact and are impacted by ICTs (Walsham, 1993).

The philosophical perspective of this study is interpretivism. Through a systematic review, the study assesses the work that has been done in ICT4D research associated with the capability approach. Interpretivism is the most appropriate paradigm for this study as it will primarily review studies done from the interpretivist perspective. Further, the role of the researcher will partly be to interpret the findings and create new meaning.

Researcher's subjective position

The researcher is aware of the dangers of two levels of interpretation – the interpretations of the studies included in this review, as well as the interpretation of the researcher. The researcher creates a new consolidated meaning from various studies in which other researchers have already interpreted and created meaning in their own way. The danger is the possible distortion of meaning.

2.3 Research strategy

This section defines a systematic literature review, and the types of literature reviews that can be found. It concludes by presenting the systematic literature review process to be followed in this study.

2.3.1 Systematic Literature Review

This study takes the form of a systematic literature review. It seeks to make sense of a large body of information, and to ascertain what works and what does not work (Petticrew & Roberts, 2006) with regards to the capability approach. A systematic literature review is valuable in that it allows researchers to make sense out of a plethora of information “by allowing large amounts of research information to be distilled into a manageable form” (Petticrew & Roberts, 2006). It also highlights areas where false certainty abounds. Furthermore, it highlights the current state of knowledge in an area and any inconsistencies, and clarifies what remains to be known. A systematic literature review needs to be rigorous (Okoli & Schabram, 2010) and “there must also be an element of analytical criticism” (Hart, 1999), not just a mere summary of available literature.

2.3.1.1 Petticrew and Roberts' (2006) literature review types

Petticrew and Roberts (2006) identified nine alternatives to a systematic literature review. These are:

1. **Narrative review:** this review employs a narrative style of describing literature, instead of doing a meta-analysis. The review involves extracting information on methods and results systematically, after which it is evaluated and summarised.
2. **Conceptual review:** this review aims to bring about a better understanding of subjects by synthesising areas of conceptual knowledge. This specifically considers conceptual rather than empirical. The objective is to provide a high-level perspective of literature done in a particular field, including debates, models, and prominent ideas.
3. **Rapid review:** this is a review carried out within limited time (a couple of weeks or months), and within limited scope, for example, by focusing on a particular country or a particular year.
4. **Realistic review:** this review involves synthesising individual studies in order to produce generalisable theories. This differs from systematic reviews, which synthesise information across various studies.
5. **Scoping review:** this review is used for scoping available literature, and thus precedes the complete literature review. This is done to examine and locate existing literature, which helps in narrowing the research question and in planning the resources that are required to undertake the full systematic review.
6. **Traditional review:** this kind of review does not use systematic review methods. It provides an excellent overview of the broader literature and available concepts; it does not limit the review to the outcomes alone.
7. **Critical review:** this review examines a hypothesis or theory. It does so by critically assessing the methods and results used for primary studies. Instead

of using the systematic review approach, it requires the use of a lot of contextual information and a rich background.

8. **Expert review:** this review is written by an acknowledged expert in the field – basic science and medicine often use this review type.
9. **State of the art review:** this review is intended to bring to the fore recent research. It focuses on a particular subject, and is a prevalent review type in technical fields such as engineering and transport.

Any of the above-mentioned review types may be used in, for example, refining the research question. However, for the purposes of this study, a systematic review is undertaken. It is defined as follows (Pettirew & Roberts, 2006:57):

“A review that aims to comprehensively identify all relevant studies to answer a particular question and assesses the validity of (or “soundness”) of each study taking this into account when reaching conclusions”

2.3.1.2 Okoli and Schabram’s (2010) literature review types

Okoli and Schabram (2010) distinguish between three different types of literature reviews:

1. **Literature review to set the theoretical foundation:** this literature review constitutes the majority of literature reviews. It provides the theoretical underpinning for a research article. There is value and a place for this literature review as it provides an anchor for the scholarly article; it shows the importance of work done previously, and the quality of the knowledge that exists. This should not merely be a regurgitation of the subject matter; a synthesis of the material and a critique of theory are important for an academic review.
2. **Literature review for graduate thesis:** the purpose of the literature review in a thesis or dissertation is to synthesise the understanding of a student in their chosen field of study. It shows the rigorous dedication of the student towards the research, justifies current and future research, and welcomes the student

to how studies are done in academia (Hart, 1999). Authors need to present themselves as subject matter experts.

3. **Stand-alone literature review:** while this review has many aspects in common with the other categories of literature reviews, its scope and rigor are the distinguishing features. This category of review summarises existing work, identifies gaps present in existing research, and provides a framework for positioning research endeavours. It is also beneficial as a means to inform policy and support practice (Petticrew & Roberts, 2006).

The ten alternatives distinguished by Petticrew and Roberts (2006) can be more or less fit into the broad categories described by Okoli and Schabram (2010). Table 2.1 maps the various reviews identified by the authors.

Petticrew and Roberts (2006)	Okoli and Schabram (2010)
Conceptual review Traditional review	Literature review to set theoretical foundation
Conceptual review Narrative review	Literature review for graduate thesis
Critical review Expert review Rapid review Realistic review Scoping review State of the art review Systematic review	Stand-alone literature review

Table 2.1 Literature review types: mapping of the classification of Petticrew and Roberts (2006) to that of Okoli and Schabram (2010)

The purpose of this study is to summarise, appraise, and disseminate the results and implications (Petticrew & Roberts, 2006) of the body of knowledge pertaining to the use of the capability approach from various publications. It is a scientific tool that intends to search through all relevant journals, databases, and conferences with an ICT4D focus to identify how Sen’s capability approach has been used. This is done to recommend guidelines for applying the capability approach in ICT4D research.

Petticrew and Roberts (2006) suggest the following steps in carrying out a systematic literature review:

1. Define the question that the review seeks to answer;
2. Determine the study types needed to address the question;
3. Search through literature to find the studies;
4. Screen the results by sifting through retrieved studies and deciding which ones meet the inclusion criteria;
5. Critically evaluate the studies that are included;
6. Synthesise the studies and find similarities between the study findings; and
7. Distribute what the study found.

Figure 2.1 is a diagrammatic representation of the steps outlined above.

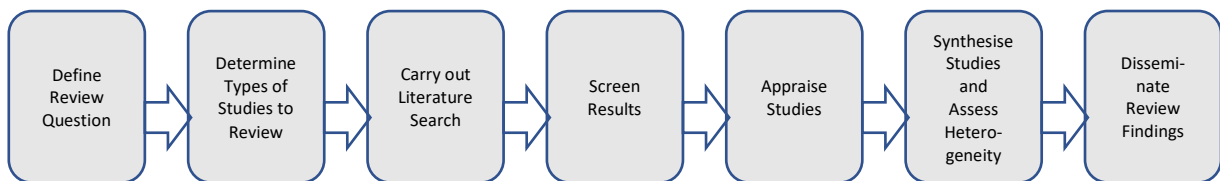


Figure 2.1 Steps for carrying out a systematic literature review (adapted from Petticrew & Roberts, 2006)

The steps outlined above compare to the guidelines suggested by Okoli and Schabram (2010) for conducting a systematic literature review, specifically in information systems research. Okolo and Schabram (2010) draw from six sources within different fields of study – namely, Fink (2005); Kitchenham (2007); Levy and Ellis (2006); Petticrew and Roberts (2006); Rousseau, Manning, and Denyer (2008); and Webster and Watson (2002) – to present the following eight-step guide:

1. Purpose of the literature review: this step entails identifying the purpose and goal of the review. It can be equated to the step from Petticrew and Roberts (2006) that defines the research question.
2. Protocol and training: this step entails clearly stipulating the procedure to be followed in carrying out the research, and training the researchers involved in the same project to make sure that the review was undertaken in a consistent

manner. It compares, though not fully, to Petticrew and Roberts' (2006) step for determining the type of literature to be included in the review.

3. Searching for the literature: this is the step wherein the researcher specifies the exact details of the literature search. This step also compares to Petticrew and Roberts' (2006) step of carrying out a comprehensive literature review.
4. Practical screen: this step involves screening the literature for inclusion. The researcher needs to be explicit in which studies were included, and which were excluded without further examination. Practical reasons need to be provided for the excluded studies. This step also compares to a step by Petticrew and Roberts (2006); they mention screening the results by sifting through them to determine the studies that meet the inclusion criteria.
5. Quality appraisal: this is a step for screening for inclusions. It also requires the review to be explicit about the criteria that are to be used to assess the quality of studies to be included in the review synthesis. Petticrew and Roberts (2006) have a similar step for critically appraising the included studies.
6. Data extraction: this step entails extracting relevant data from all the articles.
7. Synthesis of studies: in this step, all the facts from each study are combined using appropriate techniques (either qualitative, quantitative, or both). Petticrew and Roberts (2006) combine this and the previous step in which they synthesise and assess heterogeneity and homogeneity among the study findings.
8. Writing the review: this step entails writing the report, by including sufficient detail to enable it to be reproduced independently.

Figure 2.2 shows the step-by-step process for undertaking a systematic literature review as presented by Okoli and Schabram (2010):

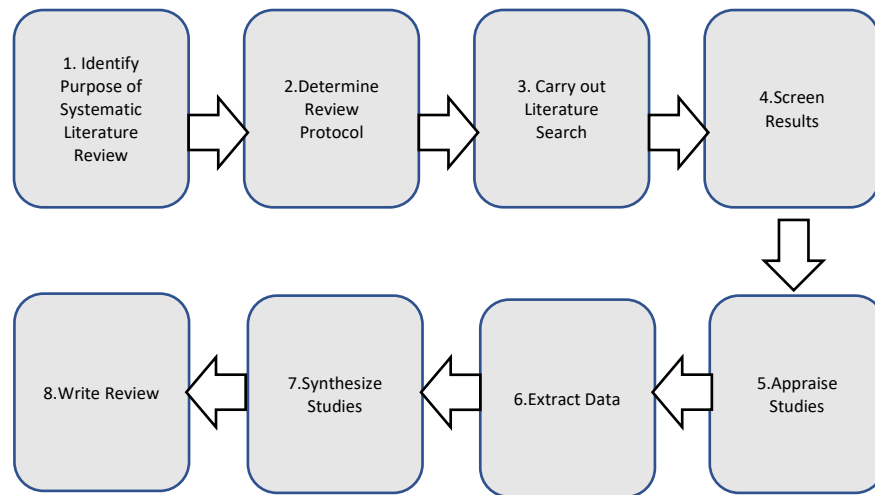


Figure 2.2 Steps for carrying out a systematic literature review (adapted from Okoli and Schabram, 2010)

Table 2.2 shows a comparison between Petticrew and Roberts (2006) and Okoli and Schabram (2010). Although the review steps from the two sets of authors are similar, this study adhered to the ones by Okoli and Schabram (2010). Whereas the data extraction step is implied in the steps offered by Petticrew and Roberts (2006), it is made explicit by Okoli and Schabram (2010). The current study employed this step in using a spreadsheet to extract information from each study. The current study also includes the writing and dissemination of the review; the latter comprises submission thereof to the department and faculty.

Okoli and Schabram (2010)	1. Identify purpose of systematic literature review	2. Determine review protocol	3. Carry out literature search	4. Screen results	5. Appraise studies	6. Extract data	7. Synthesise studies	8. Write review	
Petticrew and Roberts (2006)	1. Define review question	2. Determine types of studies to include in review	3. Search through literature	4. Screen results	5. Critically evaluate studies		6. Synthesise studies		7. Disseminate findings

Table 2.2 Systematic literature review steps: mapping of Okoli and Schabram (2010) to Petticrew and Roberts (2006)

2.4 Protocol for data collection

2.4.1 Search terms identification

Keywords related to this paper's topic had to be used (Table 2.3) to find the relevant articles for this study. Thus, "capability approach" and "information and communication technology" were used. This was done so that the retrieved papers would have both concepts included.

ICT4D Journals	Databases
<ul style="list-style-type: none">• "Capability approach"	<ul style="list-style-type: none">• "Capability approach" AND "ICT4D"• "Capability approach" AND "ICT"

Table 2.3 Study search terms

2.4.2 Inclusions

The most fundamental challenge in undertaking a literature review is identifying the relevant studies (Petticrew & Roberts, 2006). To this end, articles were found using the keywords from Table 2.3. Some keywords were joined by the logical operator AND, while other were single terms:

1. "Capability approach" AND "ICT4D";
2. "Capability approach" AND "ICT"; and
3. "Capability approach".

The search terms ("capability approach" AND "ICT4D", "capability approach" AND "ICT") were used when searching through the databases; this was done to narrow down the search results to include only those papers that used the capability approach in relation to ICT4D. The search terms ("capability approach" AND "ICT") also returned results that were relevant to development. The search terms ("capability approach") were used in the ICT4D journals; these journals already dealt with ICT4D, and it was thus unnecessary to include "ICT4D" in the search.

2.4.3 Excluded from this review are:

- Studies with incidental mentions of the capability approach. This entails papers that only mentioned the capability approach in passing, and was not focusing on, or engaging with, the approach at all;
- Studies with references to the dynamic capability approach;
- Studies that are too general; and
- Books.

2.4.4 Data sources

To find papers to include in this systematic literature review, journals and online databases were browsed (Table 2.4). Journals contain information on the current thinking and research in an area of interest (Oates, 2006). Online databases facilitate access to millions of academic books, articles, and papers that have been published or presented at conferences (Oates, 2006). The following journals were included in the literature search: Electronic Journal of Information Systems in Developing Countries, Information Technologies and International Development, Information Technology and People, Information Technology for Development, Journal of Community Informatics, and The African Journal of Information Systems. The following databases were consulted: ScienceDirect, Web of Science, Scopus, and Harzing’s Publish or Perish based on Google Scholar.

Journals	Databases
- Electronic Journal of Information Systems in Developing Countries	- Harzing’s Publish or Perish based on Google Scholar
- Information Technologies and International Development	- ScienceDirect
- Information Technology and People	- Scopus
- Information Technology for Development	- Web of Science
- Journal of Community Informatics	
- The African Journal of Information Systems	

Table 2.4 Data sources

2.4.5 Search Process

Figure 2.3 shows the search process, based on the keywords mentioned in Section 2.4.1. It summarises the process (Okoli and Schabram, 2010; Petticrew & Roberts, 2006) of how literature was found, screened, and quality appraised until the list of articles to be studied was arrived at.

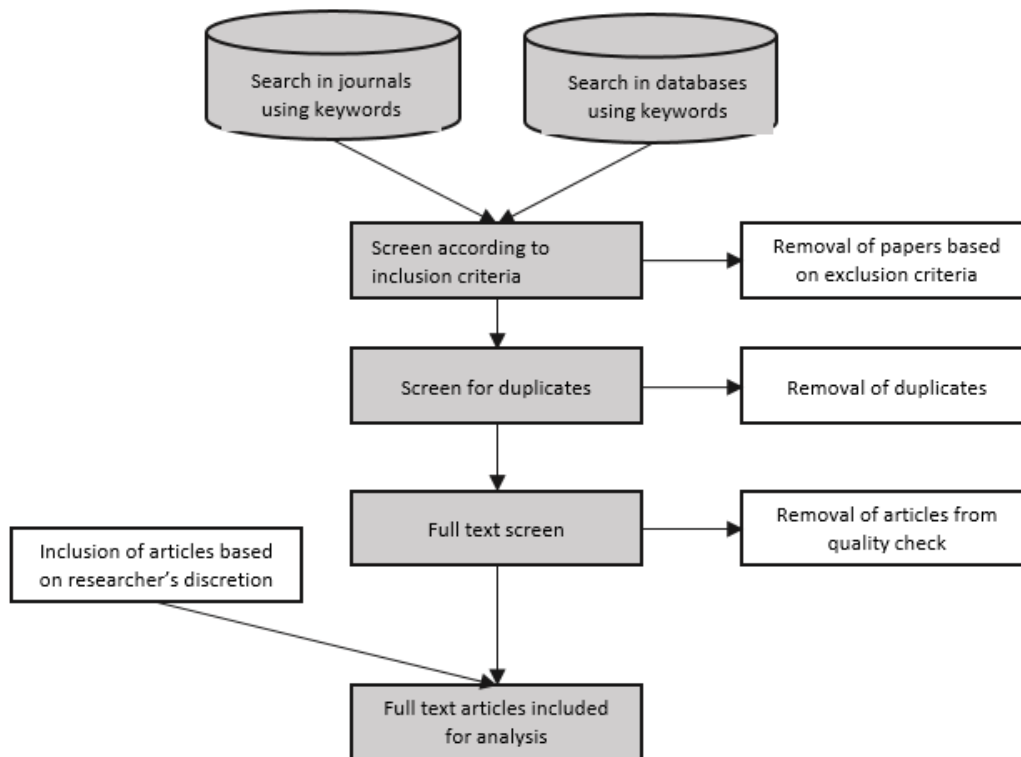


Figure 2.3 Search process

2.5 Data Analysis

The meaningfulness of this study is derived from the analysis done. Petticrew and Roberts (2006) suggest the following steps to synthesise the findings:

1. Organise the study descriptions into logical categories;
2. Analyse the findings in each category; and
3. Synthesise the findings across all included studies.

Organising the studies requires careful planning. Depending on the number of studies, it may for example entail that the studies along with their methods and conclusions are listed. Tables are suggested to aid presentation of the findings (Petticrew & Roberts, 2006). Within-study analysis entails describing each study's findings in a narrative manner (Petticrew & Roberts, 2006).

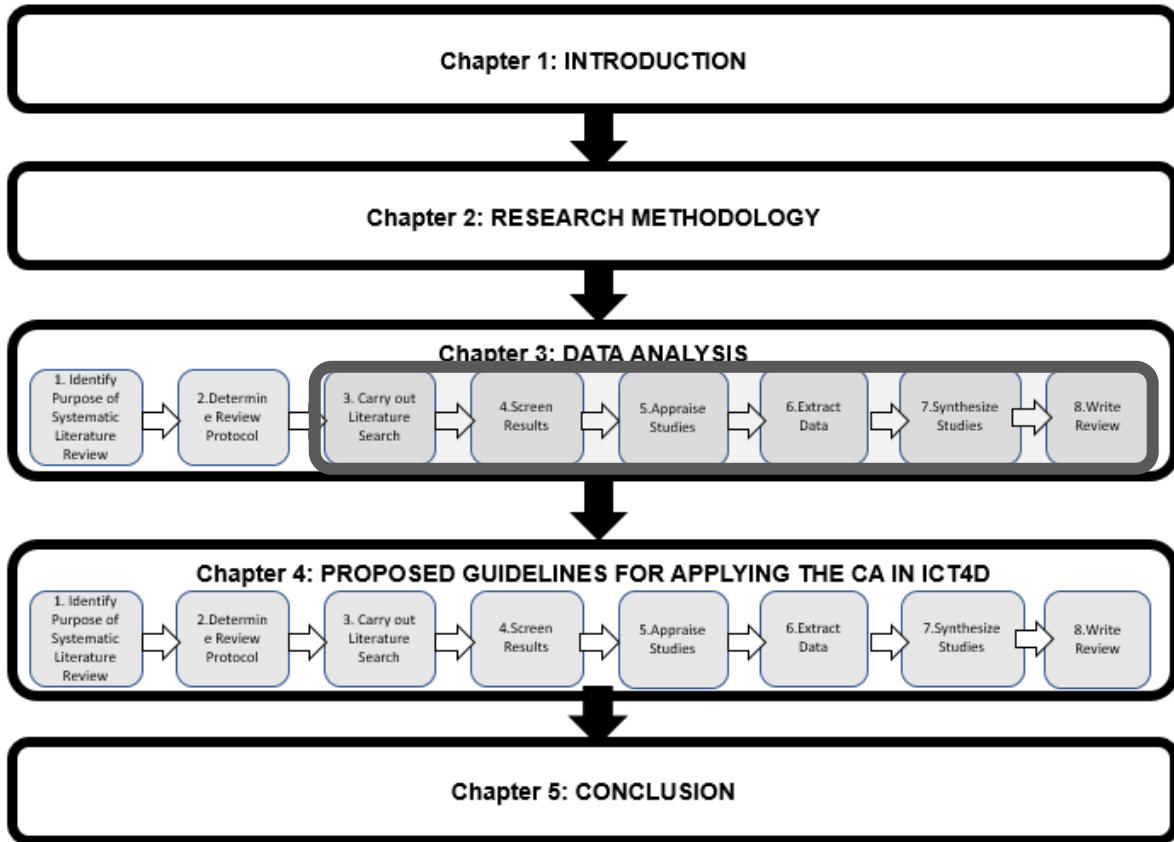
Cross-study synthesis begins with a description of the number of studies that matched the inclusion criteria (Petticrew & Roberts, 2006). This indicates the scale of the review. Then, a summary of mediating variables are presented. Thereafter, the results of each study are described. The intention is to provide a summary of findings that takes into account all the studies with their quality differences and other variations. This would also show the differences between the studies (Petticrew & Roberts, 2006). Okoli and Schabram (2010) offer examples and more information on how the analysis can be undertaken.

The current study employed these steps suggested by Petticrew and Roberts (2006). It used a spreadsheet to logically organise the identified studies into categories, after which it analysed the findings within each category and synthesised the findings. For this study, the synthesis of the findings ultimately produced guidelines that can be used in the field of ICT4D.

2.6 Conclusion

This chapter provided a description of how the research was carried out. First, justification was provided for the research paradigm through which the research would best be viewed. Thereafter, a discussion on what a systematic literature review is and how it would be employed as a research tool for this studied followed. The chapter ended with a description of how data would be analysed. The next chapter provides the search results along with the analysis thereof.

3. DATA ANALYSIS



3.1 Introduction

This chapter presents the results from the search process outlined in the previous chapter. It also shows the steps taken to arrive at the final list of articles that are included for analysis in this study.

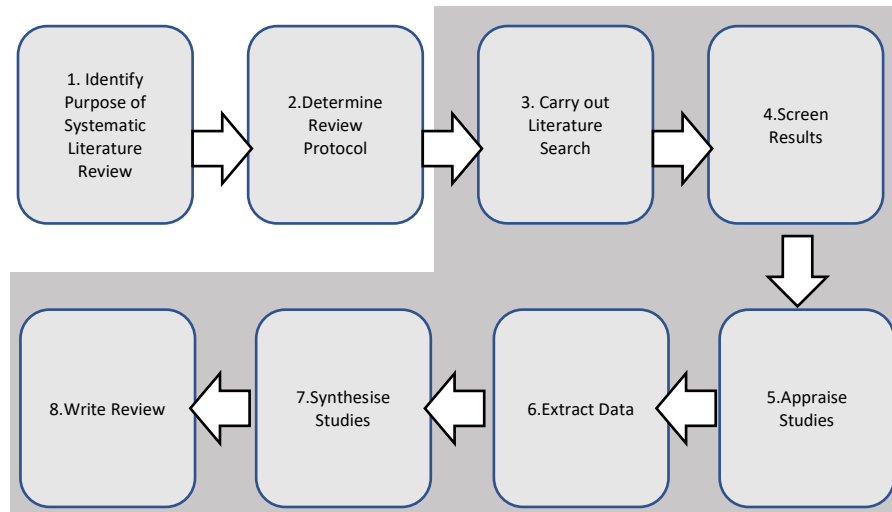
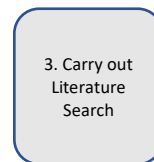


Figure 3. 1 Steps for carrying out a systematic literature review (adapted from Okoli and Schabram, 2010)

Figure 3.1 puts the present chapter on the systematic literature review steps into perspective; the highlighted steps will be covered herein, and the reader will be guided by the icons.

3.2 Search results

Table 3.1 shows the results of the keyword search done using the databases mentioned in 2.4.4. It contains all articles before any screening was done, and thus includes duplicates and papers that do not meet the inclusion criteria.



Search Term	Sources Retrieved
Journals	
Information Technologies and International Development. Results = 11	
"capability approach"	Ale and Chib (2011), Andersson and Hatakka (2017), Avgerou (2010), Bailur <i>et al.</i> (2018), Bass <i>et al.</i> (2013), Faith (2017), Smith <i>et al.</i> (2011), Spence (2010), Spence and Smith (2010), Wang (2015), Zelezny-Green (2018).
Journal of Community Informatics. Results = 8	
"capability approach"	Alexander <i>et al.</i> (2015), Arden <i>et al.</i> (2011), Attwood <i>et al.</i> (2013), Grunfeld (2013), Halabi <i>et al.</i> (2015), Tacchi <i>et al.</i> (2013), van Biljon <i>et al.</i> (2015), Wills (2015).
Information Technology for Development. Results = 11	
"capability approach"	Alam and Wagner (2016), Andersson <i>et al.</i> (2012), Hatakka and Lagsten (2012), Jiménez and Zheng (2018), Johri and Pal (2012), Kivunike <i>et al.</i> (2011), Kleine <i>et al.</i> (2012), Nyemba-Mudenda and Chigona (2018), Poveda and Roberts (2018), Thapa <i>et al.</i> (2012), Wresch and Fraser (2012).
The African Journal of Information Systems. Results = 5	
"capability approach"	Baduza and Khene (2017), Bankole and Mimbi (2017), Dasuki <i>et al.</i> (2012), Krauss (2012), Macueve (2008).
Electronic Journal of Information Systems in Developing Countries. Results = 28	
"capability approach"	Abubakar <i>et al.</i> (2017), Adaba and Rusu (2017), Alampay (2017), Anwar and Johanson (2017), Aricat (2017), Blake and Garzon (2017), Coelho <i>et al.</i> (2017), Cohen <i>et al.</i> (2017), Dasuki <i>et al.</i> (2017), Dasuki and Abbott (2017), Furuholt and Sæbø (2017), Grobler and de Villiers (2017), Gwaka (2017), Hatakka <i>et al.</i> (2017), Heeks and Krishna (2017), Krauss and Turpin (2017), Lunat (2017), Mow (2017), Mukherjee (2017), Omar <i>et al.</i> (2017), Osah <i>et al.</i> (2017), Sein and Thapa (2018), Stillman <i>et al.</i> (2017), Takavarasha <i>et al.</i> (2017), Thapa and Sæbø (2017), Turpin and Alexander (2017), Walls <i>et al.</i> (2017), Yim and Gomez (2017).
Databases	
ScienceDirect. Results = 49 "Capability approach" AND "ICT"; Results = 8 "capability approach" AND "ICT4D"	
"Capability approach" AND	Albertoni <i>et al.</i> (2018), Avilés <i>et al.</i> (2016), Baldascino and Mosca

"ICT"	(2016), Castellacci and Tveito (2018), Claver-Cortés <i>et al.</i> (2006), Costantini and Liberati (2014), Day <i>et al.</i> (2016), de Araujo and Reinhard (2015), Delmas (2002), Dijst <i>et al.</i> (2018), Fagerberg <i>et al.</i> (2010), Fife and Pereira (2016), Frenken <i>et al.</i> (2010), Geels (2014), Guarini <i>et al.</i> (2018), Hanckel (2016), James (2014), Johannessen and Olsen (2010), Johannessen and Olsen (2011), Johansson <i>et al.</i> (2016), Kabanda and Brown (2017), Kapuire <i>et al.</i> (2015), Kesidou and Romijn (2008), Kleine (2009), Kodama (2007), Kruss <i>et al.</i> (2015), Künneke <i>et al.</i> (2015), Kusumaningtyas and Suwanto (2015), Lema <i>et al.</i> (2015), Łobacz and Głodek (2015), Mahroum and Al-Saleh (2013), Mikusz <i>et al.</i> (2016), Niehaves <i>et al.</i> (2013), Ojo (2016), Ojo <i>et al.</i> (2013), Otte (2014), Palvia <i>et al.</i> (2018), Ponelis and Britz (2008), Prahara <i>et al.</i> (2017), Rubagiza <i>et al.</i> (2011), Seele (2017), Stahl <i>et al.</i> (2014), Taipale (2013), Thomas et a (2017), Tikly (2011), Tikly <i>et al.</i> (2011), Wakunuma and Masika (2017), Wismadi <i>et al.</i> (2012), Yeboah-Boateng <i>et al.</i> (2017).
"capability approach" and "ICT4d"	Avilés <i>et al.</i> (2016), Fife and Pereira (2016), Kleine (2009), Ojo (2016), Palvia <i>et al.</i> (2018) Thomas <i>et al.</i> (2017), Wakunuma and Masika (2017), Yeboah-Boateng <i>et al.</i> (2017).
<p>Web of Science</p> <p>Results = 38 "capability approach" and "ICT"; Results = 27 "capability approach" and "ICT4D"</p>	
"capability approach" and "ICT"	Alam and Wagner (2016), Andersson <i>et al.</i> (2015), Andrade and Doolin (2016), Anwar and Johanson (2012), Araujo and Reinhard (2016), Bass (2014), Bentley (2013), Birdsall (2011), Bisht and Mishra (2016), Chigona and Dagada (2013), Dahiru <i>et al.</i> (2014), Dasuki <i>et al.</i> (2014), De Araujo and Reinhard (2014), Dolnicar and Fortunati (2014), Grunfeld (2011), Hanckel (2016), Hatakka <i>et al.</i> (2013), Heffernan <i>et al.</i> (2016), Johri and Pal (2012), Kivunike <i>et al.</i> (2011), Martinez (2016), Milne (2016), Mizohata and Jadoul (2013), Omar <i>et al.</i> (2015), Omland and Thapa (2017), Oosterlaken and van den Hoven (2011), Poveda (2016), Poveda and Roberts (2018), Rislana <i>et al.</i> (2015), Rislana <i>et al.</i> (2016), Rubagiza <i>et al.</i> (2011), Sahay and Walsham (2016), Takavarasha and Masunungure (2014), Thapa <i>et al.</i> (2012), Vaughan (2011), Villalba (2016), Zheng (2009).Zheng <i>et al.</i> (2018).
"capability approach" and	Alam and Wagner (2016), Andersson (2012), Bisht (2016), Chaudhuri

"ICT4D"	<p><i>et al.</i> (2017), Chew <i>et al.</i> (2015), Dasuki (2014), Dobson and Nicholson (2018), Grunfeld <i>et al.</i> (2011), Heffernan <i>et al.</i> (2016), Johri and Pal (2012), Kivunike <i>et al.</i> (2011), Kleine (2010), Kleine (2011), Manalo (2014), Nemer (2016), Nguyen <i>et al.</i> (2016), Omland and Thapa (2017), Poveda (2016), Poveda (2018), Poveda and Roberts (2018), Rislana (2016), Rislana <i>et al.</i> (2015), Stillman and Denison (2014), Thapa (2012), Vaughan (2011), Wakunuma and Masika (2017), Zheng <i>et al.</i> (2018).</p>
<p>SCOPUS Results = 73 "Capability approach" AND "ICT" Results = 41 "Capability approach" AND "ICT4D"</p>	
"capability approach" AND "ICT"	<p>Adaba and Rusu (2014), Ahmed (2011), Alam and Wagner (2016), Andersson <i>et al.</i> (2016), Andrade and Doolin (2016), Anwar and Johanson (2012), Aricat (2015), Ashraf <i>et al.</i> (2015), Bass and Thapa (2014), Birdsall (2011), Blake and Garzon (2012), Chan Mow (2014), Chigona and Chigona (2010), Chigona and Dagada (2012), Chipidza and Leidner (2017), Coeckelbergh (2016), Coelho <i>et al.</i> (2015), Crowley (2010), Dahiru <i>et al.</i> (2015), Dasuki (2017), Dasuki and Abbott (2011), Dasuki and Abbott (2015), Dasuki <i>et al.</i> (2014), de Araujo (2018), De Araujo and Reinhard (2013), De Araujo and Reinhard (2014), Didi-Quvane and Twinomurinzi (2013), Dolničar and Fortunati (2014), Egessa <i>et al.</i> (2018), Foster and Handy (2009), Gigler (2005), Grobler and de Villiers (2017), Grunfeld <i>et al.</i> (2011), Hanckel (2016), Hatakka <i>et al.</i> (2013), Hatakka <i>et al.</i> (2014), Heger and Boman (2015), Hellsten (2006), Kassongo <i>et al.</i> (2018), Kivunike <i>et al.</i> (2011), Kleine (2010), Loh (2015), Lorini (2014), Malinauskiene (2014), Mancilla (2018), Mariscal Avilés <i>et al.</i> (2016), Martínez Mancilla (2016), Mizohata and Jadoul (2013), Musa <i>et al.</i> (2006), Ndung'u <i>et al.</i> (2012), Omar <i>et al.</i> (2015), Omar <i>et al.</i> (2016), Oosterlaken (2015), Oosterlaken and van den Hoven (2011), Palvia <i>et al.</i> (2018), Poveda (2016), Poveda and Roberts (2018), Rislana <i>et al.</i> (2015), Rislana <i>et al.</i> (2016), Roberts (2016), Rubagiza <i>et al.</i> (2011), Sahay and Walsham (2017), Sein <i>et al.</i> (2018), Takavarasha and Masunungure (2013), Takavarasha and Masunungure (2014), Thapa and Sæbø (2014), Thapa et a (2012), Thomas and Parayil (2008), Twinomurinzi (2012), Vaughan (2011), Wainwright <i>et al.</i> (2005), Zamani (2017),</p>

	Zheng (2009).
“capability approach” and “ICT4D”	Alam and Wagner (2016), Andersson <i>et al.</i> (2012), Blake and Garzon (2012), Chaudhuri <i>et al.</i> (2017), Chipidza and Leidner(2017), Cibangu (2016), Coelho <i>et al.</i> (2015), Dasuki and Abbott (2011), Dasuki and Abbott (2015), Dasuki <i>et al.</i> (2014), Egessa <i>et al.</i> (2018), Grobler and de Villiers (2017), Grunfeld (2011), Hatakka <i>et al.</i> (2014), Hoan <i>et al.</i> (2016), Kassongo et a (2018), Kivunike <i>et al.</i> (2011), Kleine (2010), Kleine (2011), Kleine <i>et al.</i> (2012), Loh (2015), Lorini (2014), Mancilla (2018), Mukherjee (2015), Namatovu and Saebo (2015), Oosterlaken (2015), Poveda (2016), Poveda (2018), Poveda and Roberts (2018), Rislana <i>et al.</i> (2015), Rislana <i>et al.</i> (2016), Roberts (2016), Sein <i>et al.</i> (2018), Stillman and Denison (2014), Stratton and Grace (2016), Takavarasha <i>et al.</i> (2017), Thapa and Sæbø (2014), Thapa <i>et al.</i> (2012), Vaughan (2011), Wakunuma and Masika (2017), Yim and Gomez (2018).
Publish or Perish = 97	
“capability approach” AND “ICT”	Aderinoye and Ojokheta (2004), Alampay (2006), Barro (2001), Brown and Grant (2010), Crabtree (2007), Delmas (2002), Deneulin (2002), Deneulin and Shahani (2009), Diniz <i>et al.</i> (2012), Duysters <i>et al.</i> (2012), Fagerberg <i>et al.</i> (2010), Figueiredo (2011), Fook (2016), Foster and Handy (2008), Garai and Shadrach (2006), Gigler (2004), Gigler (2011), Giri (2000), Hamel (2010), Hase (2009), Hedlund (1986), Heeks (2010), Heeks and Molla (2009), Hennemann and Liefner (2010), Johnstone (2007), Kleine (2010), Kleine (2011), Kodama (2007), Lall (2003), Lall (2004), Lambert (2011), Lawson (2010), Lawson and Lorenz (1999), Lewis and Humbert (2010), Liao <i>et al.</i> (2009), Madon (2004), Madon <i>et al.</i> (2007), Musa (2006), Nordbakke and Schwanen (2014), Noruzi and Vargas-Hernández (2010), Norwich (2013), Nussbaum (2000), Oosterlaken (2009), Oosterlaken (2012), Paus (2012), Rubagiza <i>et al.</i> (2011), Sammarra and Biggiero (2008), Smith <i>et al.</i> (2011), Stähle and Bounfour (2008), Stirna <i>et al.</i> (2012), Strambach (2008), Tikly (2011), Tikly and Barrett (2011), Wainwright <i>et al.</i> (2005), Westera (2001), Woldesenbet <i>et al.</i> (2012), Yorke (1999), Zheng (2007), Zheng (2009), Zheng and Stahl (2011), Zheng and Walsham (2008).

<p>“capability approach” AND “ICT4D”</p>	<p>Alampay (2006), Andersson, <i>et al.</i> (2012), Brown and Grant (2010), Carmody (2012), Carmody (2013), Cleaver (1999), Donovan (2012), Duncombe (2011), Geldof <i>et al.</i> (2011), Gudmundsdóttir (2010), Hamel (2010), Harris (2016), Hatakka and De (2011), Hatakka and Lagsten (2012), Hatakka <i>et al.</i> (2013), Heeks (2010), Heeks and Molla (2009), Johri and Pal (2012), Karanasios (2014), Kivunike <i>et al.</i> (2011), Kleine (2010), Kleine (2011), Olatokun (2009), Oosterlaken (2009), Oosterlaken (2011), Oosterlaken (2012), Pade-Khene <i>et al.</i> (2011), Qureshi (2015), Selwyn (2013), Smith <i>et al.</i> (2011), Spence and Smith (2010), Thapa and Sæbø (2014), Thapa <i>et al.</i> (2012), Toyama (2010), Vaughan (2011), Walsham (2017).</p>
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Table 3.1 Search results before screening

3.2.1 Search results after screening

Section 2.4.5 presented a diagrammatic representation of the search process. Figure 3.2 is the same figure, but with the search results included.

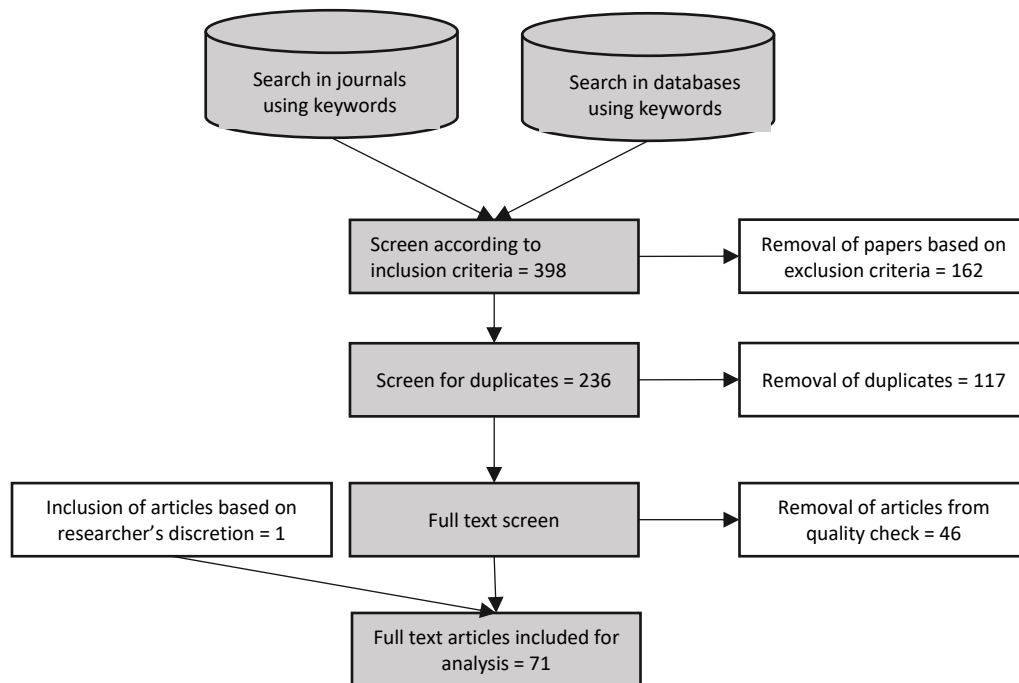
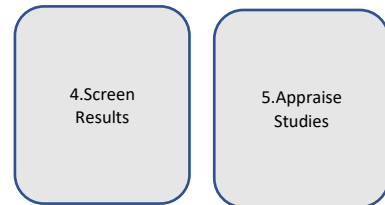


Figure 3.2 Research process results

3.3 Descriptive review

The step in which studies are synthesised entails making “sense out of a large number of studies” (Okoli & Schabram, 2010). This section presents the high-level overview of results: the sources where the articles were retrieved, the proliferation of articles over the years, the types of articles, the geographic location of where the empirical studies were conducted, and the distribution of articles across the different fields.

7. Synthesize
Studies

3.3.1 Sources of articles

Figure 3.3 shows that most of the papers that met the inclusion criteria for this study are from the Electronic Journal of Information Systems in Developing Countries. The next source with the most articles is the Journal of Information Technology for Development. This is followed by papers in conference proceedings. The Journal of Community Informatics follows with the next highest number of articles. It is not surprising that most of the papers retrieved for this study are from journals dealing with ICT4D. Of interest are all the other journals that include ICT4D and the capability approach. These are mostly from ICT-related journals, but Ethics, Education, and Policy journals also include ICT4D and the capability approach.

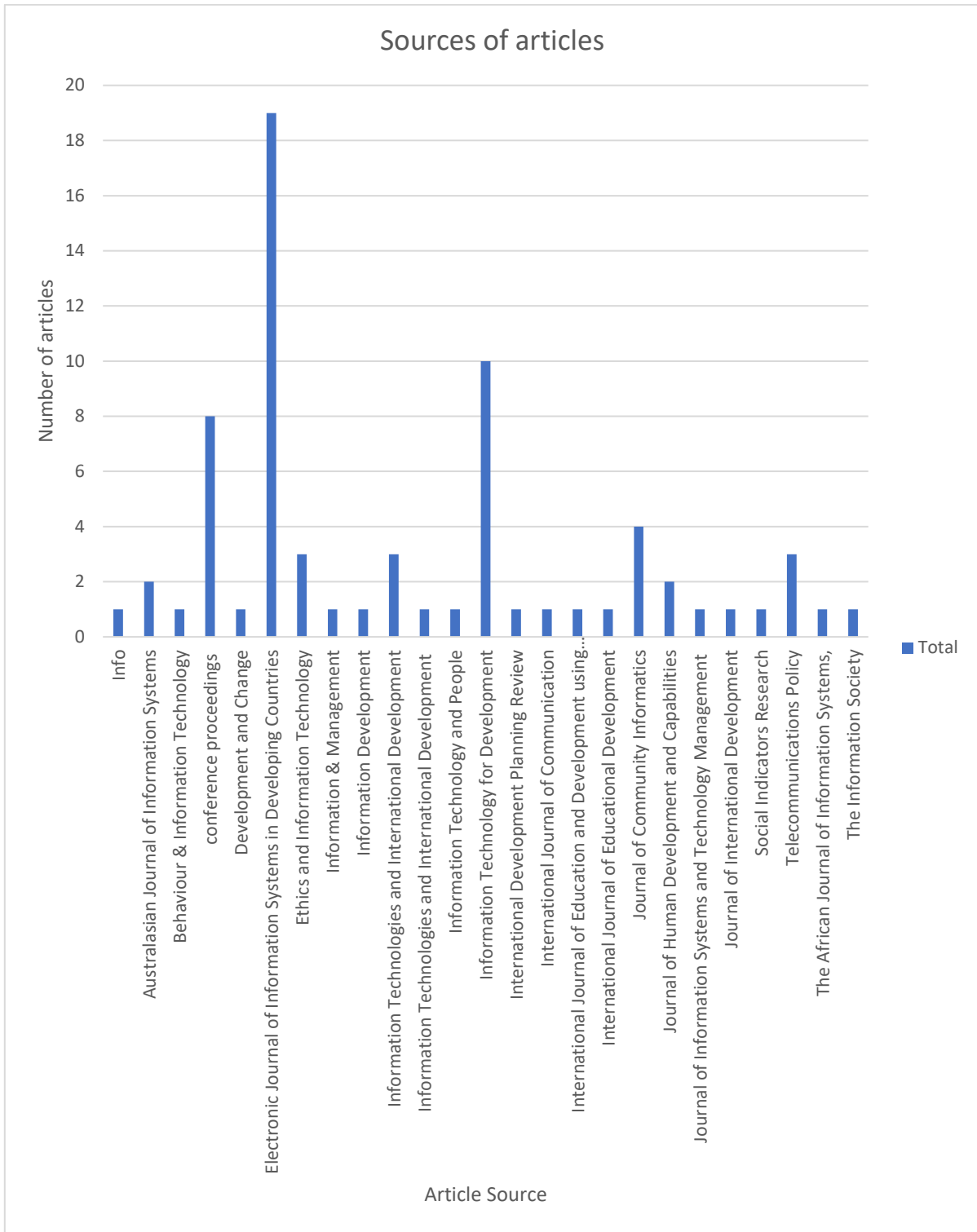


Figure 3.3 Distribution of ICT4D and capability approach articles over different sources

3.3.2 Distribution of articles over time

Figure 3.4 shows that there has been an increasing proliferation of articles over recent years. This is an indication of the growing interest in the capability approach in the field of ICT4D.

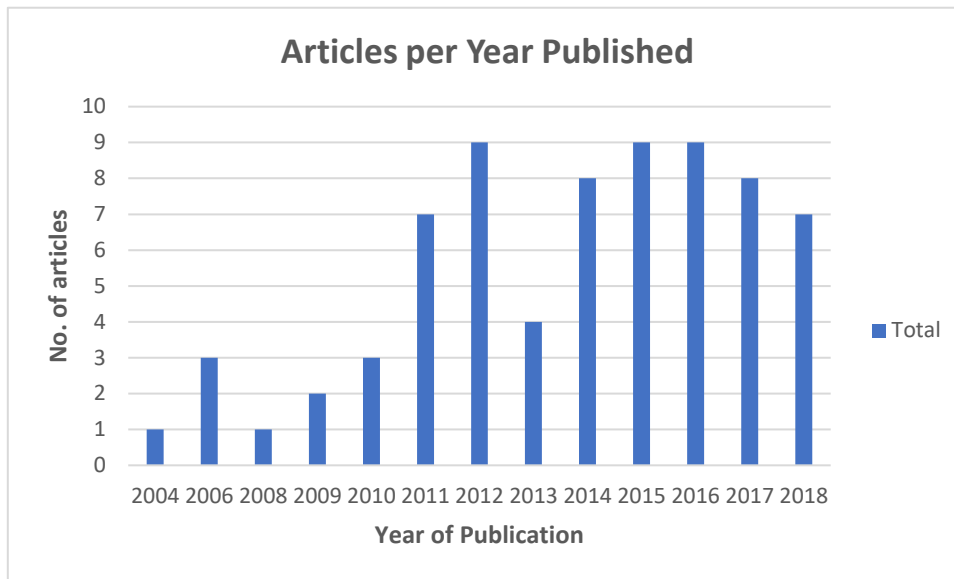


Figure 3.4 Distribution of articles over years

3.3.3 Article groupings

For this study, three main groupings (Figure 3.5) were used to organise the articles that met the inclusion criteria. The first is a grouping of articles that includes the capability approach within the context of ICT4D in a literature review or a conceptual undertaking. The second is a grouping of articles that includes the capability approach in a new framework to operationalise it. This was mostly done in conjunction with other frameworks or theories. The last grouping contains articles that are empirical in nature. This group either used an existing framework that operationalises the capability approach, or created one for the study, or used the capability approach as a theoretical framework to frame the concept of development. Figure 3.5 indicates that most of the papers used the capability approach in an empirical manner within ICT4D.

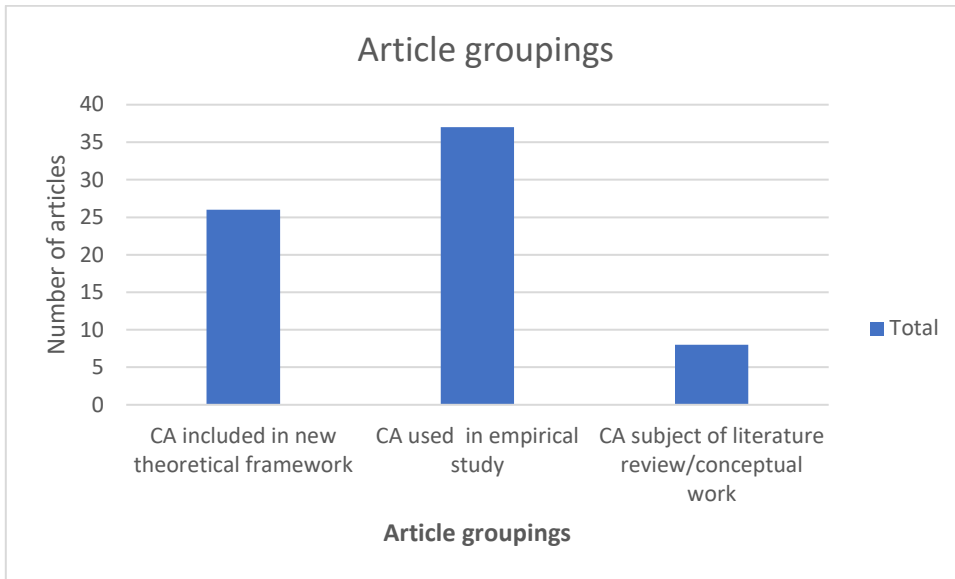


Figure 3. 5 Grouping of articles

3.3.4 Articles over geography

Figure 3.6 shows that most of the articles used for this study are from Africa and Asia. These articles are empirical in nature.

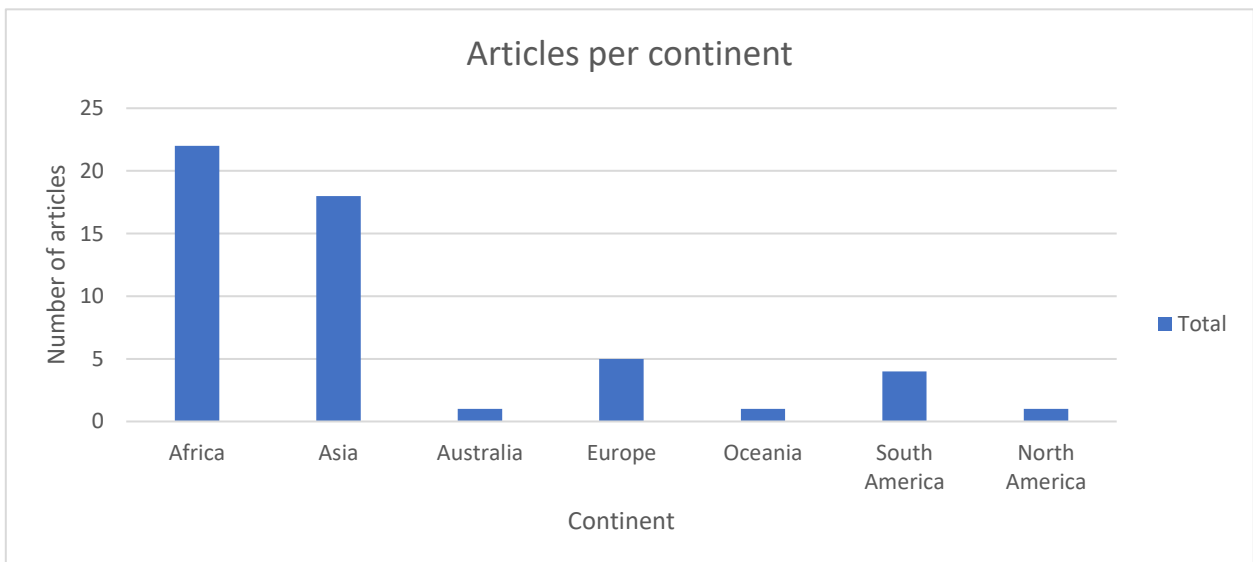


Figure 3. 6 Geography of CA application in ICT4D articles

3.3.5 Articles per country

Figure 3.7 further breaks down the previous representation (Figure 3.6), to show the exact countries where empirical studies were conducted. From the Asian continent, India is the country where most practical studies have taken place. This is followed by Bangladesh. From the African continent, Nigeria, followed by Kenya, are the countries where most practical studies have taken place.

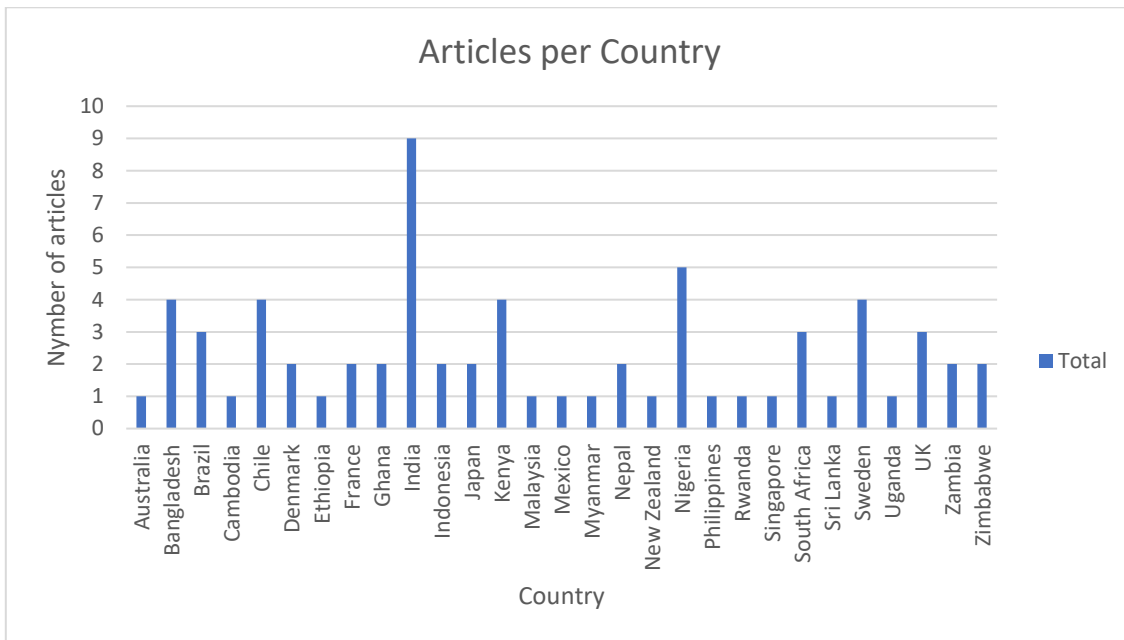


Figure 3. 7 Number of articles per country

3.3.6 Research fields

Figure 3.8 shows that most of the studies used for this study focused on community studies; this is followed by studies that did not focus on any specific field, but rather focused on ICT4D in general. Education is another field that showed high interest in the capability approach in ICT4D.

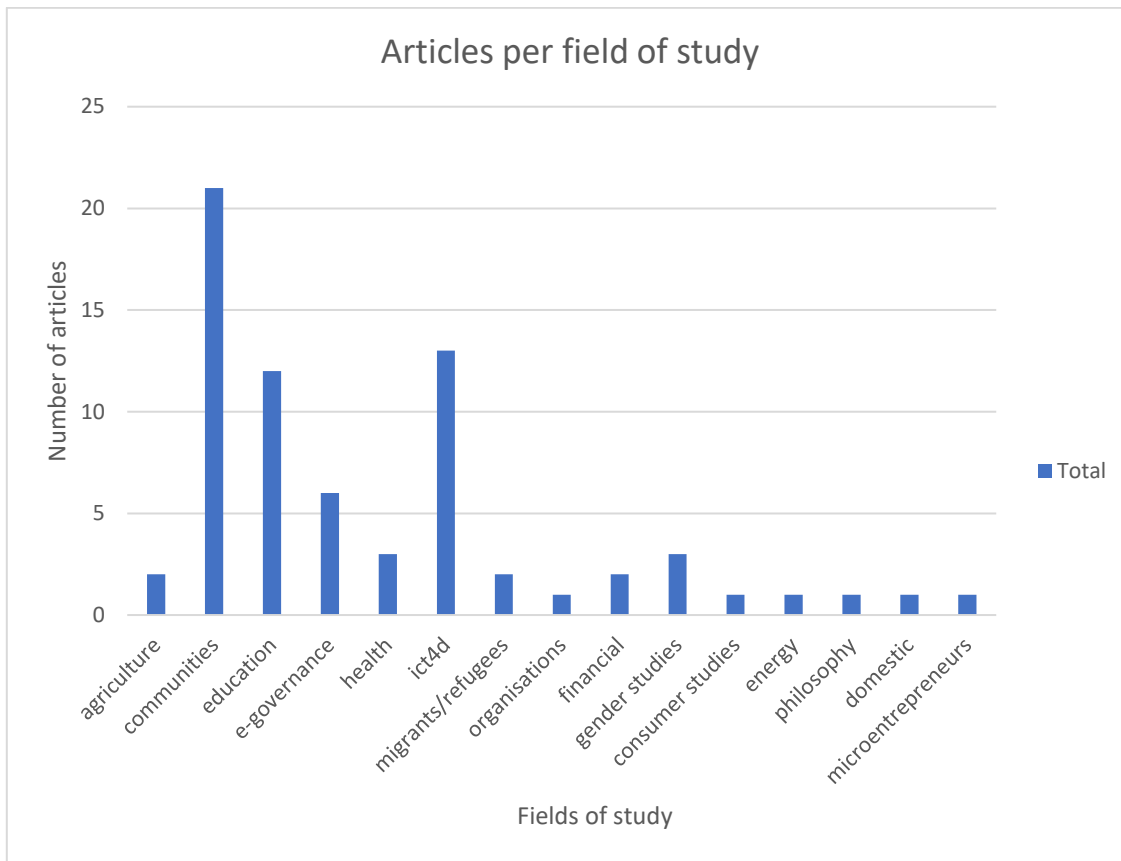


Figure 3. 8 Fields of study in which the capability approach was used in ICT4D

3.3.7 Field of study to grouping mapping

Figure 3.9 shows the mapping of the field of study to the groupings mentioned in Figure 10. It shows that, within the empirical studies grouping, the prominent field of study is communities, followed by education. Within the grouping where new frameworks were developed, the general ICT4D field was prominent; this means that the frameworks created with the capability approach can be applied to any field for the purposes of ICT4D. The communities' field of study was also prominent in the new frameworks grouping, followed by education and e-governance. Further, within the new frameworks grouping, most of the articles applied their new frameworks. Where the capability approach was the subject of a literature review or a conceptual undertaking, the prominent field of study was general ICT4D. Others with equal presence are education, philosophy, and communities.

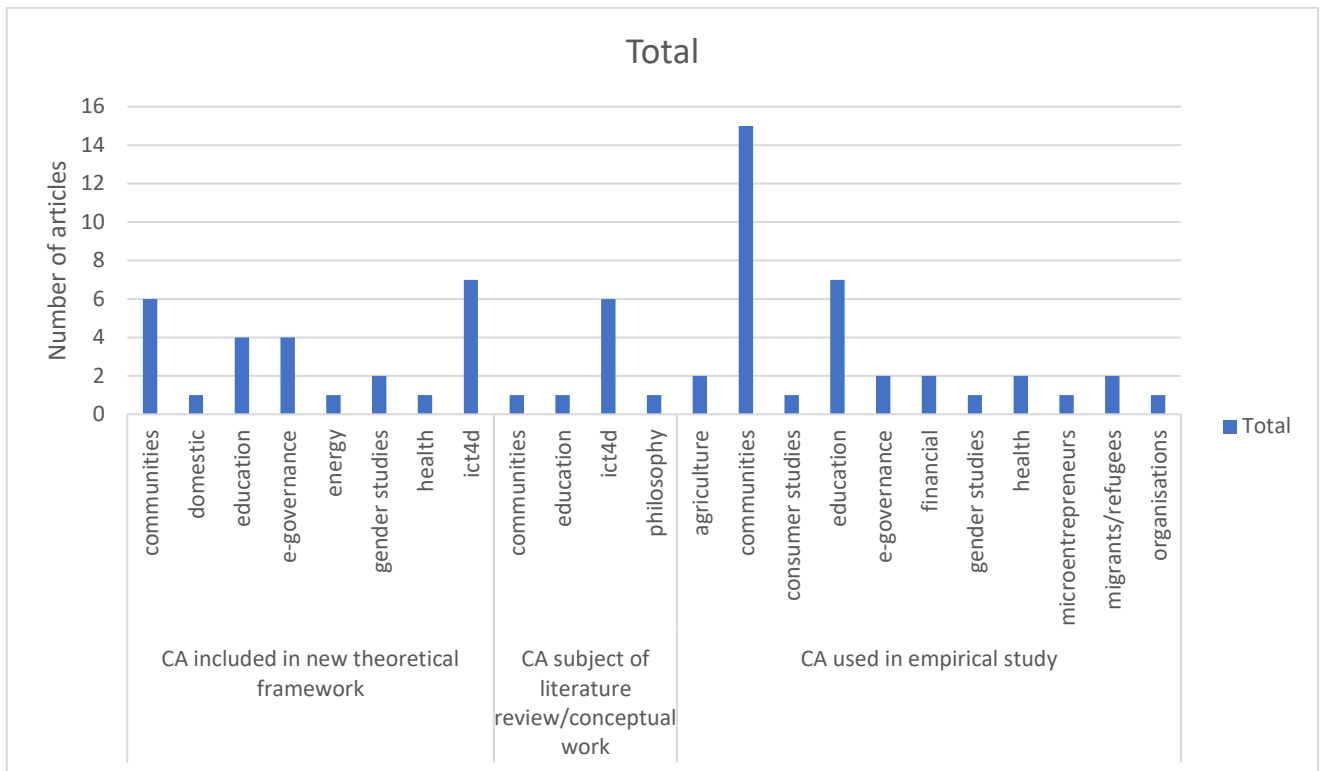


Figure 3. 9 Mapping of fields of study to article groupings

3.3.8 Frameworks used to operationalise CA

Of the empirical articles, a large majority did not use any approach to operationalise the capability approach – indicated by “N/A” on the graph (see Figure 3.10). These are articles that used the capability approach concepts in framing development, and articulated findings in terms of the capability approach. The Choice Framework is in second place, followed by Robyens’ (2005) “Stylised Non-Dynamic Representation of the Concepts of the Capability Approach Framework”.

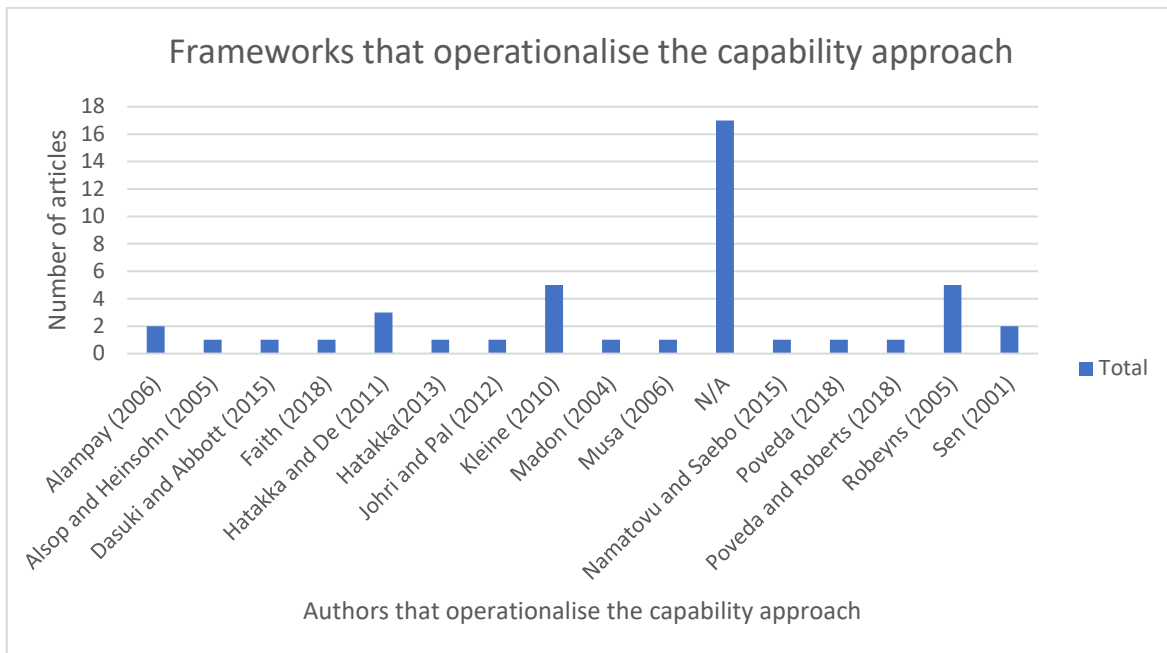


Figure 3.10 Capability approach frameworks used in empirical studies

Table 3.2 provides more detail on Figure 15; it expands the framework names.

Author(s)	Framework
Alampay (2006)	The capability approach applied to access to ICTs
Alsop and Heinsohn (2005)	Empowerment framework
Bass <i>et al.</i> (2013)	Institutional theory and the capability approach
Dasuki and Abbott (2015)	Socio-technical evaluative framework
Faith (2018)	Affordances and the capability approach
Hatakka (2013)	Main concepts in the capability approach
Hatakka and De (2011)	Capability approach concepts
Johri and Pal (2012)	Capable and convivial design
Kleine (2010)	Choice Framework
Madon (2004)	Framework for evaluating the impact of e-governance
Musa (2006)	Revised TAM for developing countries
Namatovu and Saebo (2015)	Diffusion of innovation and the capability approach
Poveda (2018)	Psychological analysis of development

Poveda and Roberts (2018)	Critical theory and agency
Robeyns (2005)	A Stylised Non-Dynamic Representation of the Concepts of the Capability Approach Framework
Sen (2001)	Sen's five freedoms

Table 3.2 Frameworks that operationalise the capability approach

3.4 Frameworks to operationalise the capability approach



This section considers the operationalisation of the capability approach.

It focuses on the empirical articles that were included in this study. The section assists in painting a picture of the landscape of frameworks that can be applied in different fields. Some authors highlight the shortcomings of the capability approach and devise their own means to meet their identified inadequacies.

3.4.1 The capability approach applied to access to ICTs (Alampay, 2006)

This framework (Figure 3.11) uses concepts of the capability approach to emphasise the difference between access and use of ICT. Alampay (2006) stresses that the availability of ICTs does not translate to their automatic use. The issue is broader than that. People's ability to meaningfully use ICTs is the determining factor in ICT use. Thus, when it comes to computer usage, a key question to ask is whether people can use the internet and email, for instance. Individual differences such as age, gender, education, location, and income affect whether an individual can access and use ICTs. Barriers to use are also important to uncover. This framework operationalises freedom in terms of how people view the worth ICTs. People will use ICTs if they perceive value in using them. Realised functionings are operationalised by asking about people's recent use of ICT. Unrealised functionings emanate from people who know how to use ICT and perceive it as valuable, but are unable to use it.

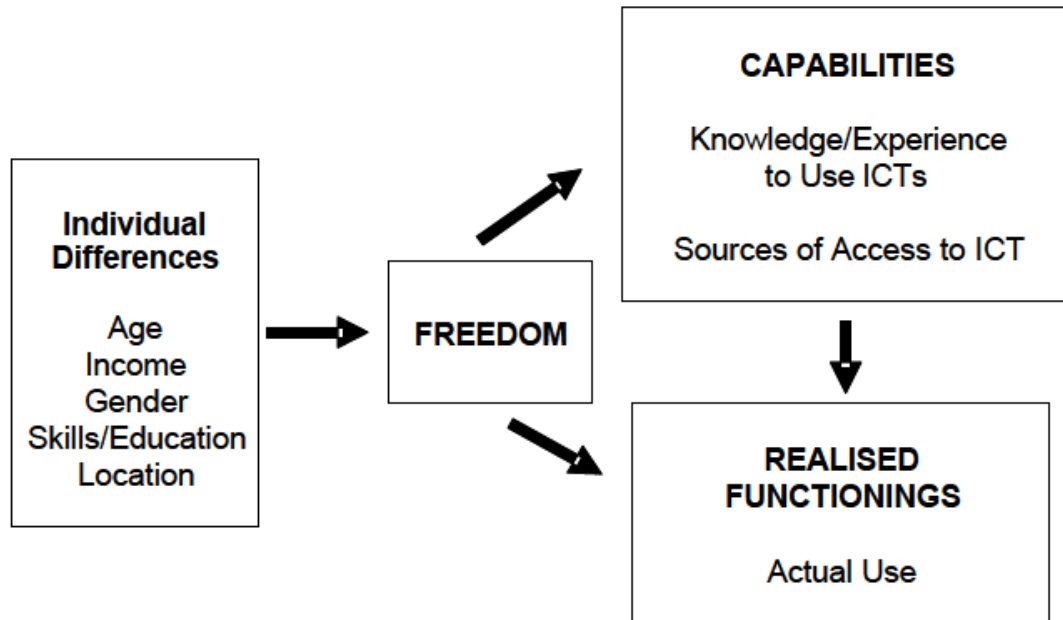


Figure 3. 11 The “capability approach applied to access to ICTs” (Alampay, 2006)

Alampay (2006) devised this framework and also applied it in the paper titled “Analysing socio-demographic differences in the access and use of ICTs in the Philippines using the capability approach”. This comparative study considered two locations in the Philippines. The main findings were that location and differences among people complicate the issue of ICT access. People who lived in isolated locations faced great challenges in terms of ICT access. However, those in more developed areas were faced with hurdles such as lack of motivation, skills, and knowledge, which hampered their perception of how ICTs can benefit their lives. The younger, well-educated, and more affluent people living in places with better infrastructure had better access and were better able to use ICTs.

Olatokun (2009) used Alampay’s (2006) framework to analyse the “socio-demographic differences in access and use of ICTs” in two locations in Nigeria – one in a rural area and the other in an urban area. The study found a gender digital divide between those who lived in urban and those who lived in rural areas. Although both genders had access to ICT facilities (at home, cyber café, working

places, friends' places, and others.), it was found that those living in the rural area used landlines more than cell phones. Females from both sides used landlines to a greater extent than the males did. This is attributed to the fact that males, from both the rural and urban areas, were more educated than females. Further, in terms of age, the study found that younger people were more capable of using ICT than the older folks. For the actual realised functionings from ICT use, the study found that "in person" was the preferred mode of communication with friends and relatives for most people living in the rural communities. They also preferred to communicate in person with banks, schools, hospitals, and organisations. People in the urban area preferred both in person and cell phones for communication with their friends and family, and for organisations such as banks, schools, and hospitals more people preferred cell phone and e-mail communication than in the rural area.

This framework is ideal to be used in studies that intend to investigate access and use of ICTs in communities. It also challenges policy makers to examine the socio-demographic factors that hinder people from accessing and using ICTs, and implores government to help solve infrastructure problems. It suggests establishment of libraries that also have well-equipped ICTs that can be used by people in rural areas. The gender digital divide is another area where government is urged to intervene and bridge. Education is also highlighted as important and in need of government intervention. This will contribute to creating awareness of the importance of ICTs (i.e., providing access to useful information) and to providing skills (Olatokun, 2009).

3.4.2 Empowerment framework (Alsop & Heinsohn, 2005)

The Empowerment Framework is also partly inspired by the capability approach. It consists of the following main components (Alsop & Heinsohn, 2005):

- Agency: the ability of an actor to make choices that are meaningful;
- Opportunity structure: the context in which actors operate, these are formal and informal;

- Degrees of empowerment: is made up of whether choice exists, whether it is used, and whether the choice made meets the desired outcome; and
- Domains: where empowerment take place. This can be at different domains (state, market, society) and levels (local, intermediary and local).

Figure 3.12 shows a summary of the framework. It shows that empowerment can take place at different domains and levels of a person’s life. Each domain can then be sub-divided into further domains that will indicate the area in which a person has been empowered.

DOMAIN		CONTRIBUTORY FACTOR	LEVEL		
	Sub-domain		Macro	Intermediary	Local
State	Justice	Agency (A) ¹	Degree of Empowerment (DOE) ³		
		Opportunity Structure (OS) ²			
	Politics	A			
		OS			
	Service Delivery	A			
		OS			
Market	Credit	A			
		OS			
	Labor	A			
		OS			
	Goods	A			
		OS			
OS					
Society	Family	A			
		OS			
	Community	A			
		OS			
¹ Agency: measured through endowment of psychological, informational, organizational, material, financial, and human assets. ² Opportunity Structure: measured through presence and operation of informal and formal rules. ³ Degree of Empowerment: measured through presence of choice, use of choice, effectiveness of choice.					

Figure 3. 12 Summary of the Empowerment Framework (Alsop & Heinsohn, 2005)

In their study “ICT-driven financial inclusion initiatives for urban poor in a developing economy: implications for public policy”, Bisht and Mishra (2016) used the Empowerment Framework to operationalise the capability approach in capturing personal, social, economic, and political empowerments. In their positivist study that took place in poor areas of urban India, these empowerments considered aspects of

behaviour. The study endeavoured to examine ICT impact in the financial sector, with specific consideration of the distinguishing design features of three initiatives. The study found that the role of service design was significant as it empowered users, enhanced service-related well-being, and increased service-related learning. Further, the study posits that the real hurdle lies with providers of services such as government and their partners in striking a balance between structure and being flexible in designing services, without restricting the choices of those who will use the services.

3.4.3 Institutional theory and the capability approach (Bass *et al.*, 2013)

Bass *et al.* (2013) combined the capability approach with institutional theory (Scott, 2004) to understand the role that social drivers have in enabling or inhibiting individuals from fully utilising ICTs for advancing their lives. It could also be viewed from the perspective of how capabilities strengthen institutions. This framework arose from a noted gap in ICT4D literature that relates the social context within which people find themselves to them fully exploiting ICT4D resources to better their lives. Institutional theory is concerned with examining broad social and historic forces, which may be implicit or explicit, and may impact or are impacted by people's actions and organisations (Orlikowski & Barley, 2001). Figure 3.19 shows the framework, which links ICT, capabilities, and institutional theory. The bidirectional arrows indicate that each component has an influence on the other:

- Dimension A: indicates that capabilities may have a positive influence on institutions while, for example, education policies may also have an influence on capabilities. Influence can also be negative or restricting due to informal norms such as discrimination and sexism. These are inhibitors of capabilities.
- Dimension B: indicates that ICTs provide increased opportunities for people to live lives that they have reason to value. Practical skill, on the other hand, can also be used to enhance ICT implementation. Complex ICTs can also inhibit capabilities.

- Dimension C: indicates that ICTs has an influence on institutions, and institutions have an influence on ICTs. For example, ICTs can provide transparency to stakeholders about service provision.

Each dimension may have a positive or negative influence; the framework refers to these as excitors (positive) and inhibitors (negative).

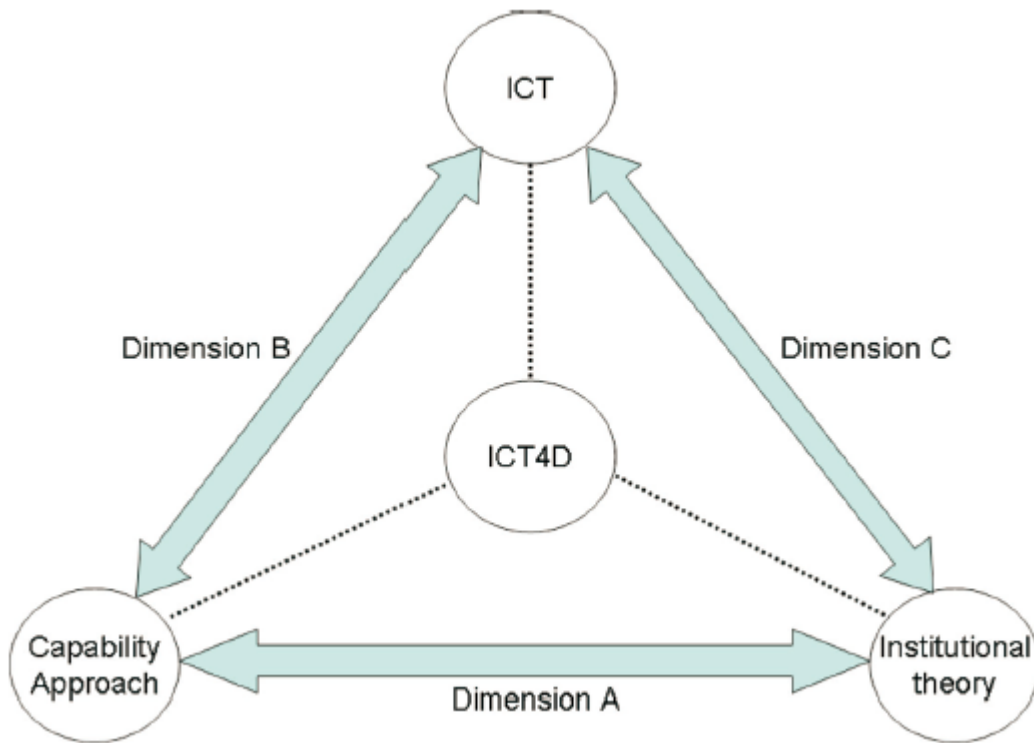


Figure 3. 13 Institutional theory, the capability approach, and ICT (from Bass et al., 2013)

Bass *et al.* (2013) applied this framework in Ethiopian higher education, and focused on the curriculum change process in ICT disciplines. The study showed the multifaceted and complex linkages between ICTs, institutions, and capabilities, and how they are inhibited and excited.

Omar *et al.*, (2016) also employed this framework to explore the influencing factors for the success of insourced government ICT projects in Malaysia. The findings revealed that there were positives when it came to insourcing; these included reduced costs, the provision of a platform for the enhancement of skills within the internal development team, and the enablement of access to new technologies. On

the other hand, insourcing came with challenges such as lack of expertise, inhibitive government policies and regulations, and a lack of resources for training.

3.4.4 A socio-technical evaluative framework (Dasuki & Abbott, 2015)

In Dasuki and Abbott's (2015) paper, socio-technical refers to how people interact with ICT resources. They created a framework that seeks to understand powers in society that allow or inhibit individuals from fully exploiting resources that can further their lives. Thus, they drew from the capability approach and Luke's (1974) conception of power, which distinguishes between three dimensions of power. The first dimension is when one person exercises power over another, and makes them do what they would not choose to do. The second dimension is when people are excluded from taking part in certain political processes and their decision-making scope is limited. The last dimension of power is that of influencing others' perceptions. Thus, in this framework, all these three dimensions of power are considered when analysing how power inhibits or enables people's capabilities.

Dasuki and Abbott (2015) applied their framework to evaluate a computerised electricity management system (CEMS) in Nigeria. The findings show that the deprivation of capabilities were caused by the high rate of corruption and poverty. The poor infrastructure in the country also led to capability deprivation. In addition, the users were excluded from the designing phase of the initiative, which means that their agency was not taken into account. To add to this, policies did not consider the local context, and priority was thus given to economic growth instead of bettering peoples' lives. Thus, power dynamics had a restrictive impact on the expansion of people's capabilities.

3.4.5 Affordances and the capability approach (Faith, 2018)

Faith (2018) combined the maintenance affordance theory with the capability approach. Maintenance affordance in this framework is seen as directly impacting individuals' capability to use resources in order to live lives they value. Best's (2009) definition of maintenance affordances posits that technology has its own set of needs, and that it is the user's duty to take care of these needs for energy and

repair. Further, technology is dependent on the systems and other associated technologies, which too may break and experience downtime. The capability approach on its own has the weakness of assuming that technology will automatically help to provide someone with a job. Adding the affordance maintenance theory to the capability approach helps with the understating that technology has to be maintained: if it is a cell phone, it has to be charged; funds are required to make calls and use the internet; when it breaks it needs to be fixed. Thus, maintenance affordances impact the ability of a technology to impact people to live the lives they value.

This framework was applied by Faith (2018) in a study that explored the impact of cell phones on women in low-income communities. The study found that some women were not able to access the internet because of the cost burden associated with data. This was a barrier to the effective use of the device. Other barriers included poor battery life and repair considerations. The study posited that the concept of affordances provides a productive way of theorising about the concept of inequality and materiality of mobile phones.

3.4.6 Alternative Evaluative Framework (Gigler, 2015)

An article by Tshivhase *et al.* (2016) that explores the use of the capability approach in ICT4D, considers the different ways in which scholars have sought to operationalise the capability approach. The article indicates that one of these is the Alternative Evaluative Framework (AEF) by Gigler (2015). The approach puts the human at the centre, while ICTs and information are placed on the outermost circle – indicating that they are not central to the aim of development, but are merely catalysts in development. ICTs alone are also not seen as a means to an end, but they need to be used under certain conditions to be able to enhance the conditions of the poor. The framework integrates the sustainable livelihoods framework and adds information as one of the assets; hence, the concept of “human capital” is introduced. Figure 3.14 shows the framework, which analyses context, livelihood resources, institutional processes, capabilities, and well-being or livelihood

outcomes. Context considers the “socio-economic condition”, “demographics”, cultural and political context, “ICT diffusion”, and the “ICT policy framework” that are in place (Gigler, 2015). Livelihood resources include the “economic financial capital”, “natural capital”, “social capital”, and “informational capital” (Gigler, 2015). Institutional processes examine the existing social structure and information system at the level of ICT intermediation. Capabilities include both individual and collective capabilities. Well-being or livelihood outcomes examine the information, human, and social capabilities that have been strengthened by the ICT intervention. The framework finally describes five stages of ICT projects. The first stage is concerned with assessing the information capital: understanding where it is strong and weak, and who the key stakeholders are. The next stage assesses the extent to which people use ICT and the extent to which the community has access to information from formal institutions. The third stage assesses the role that ICT and social intermediaries play in enhancing people’s information capabilities. Next is the assessment of how people have appropriated ICT, and whether ICTs were appropriate to the local context in catering to their information needs. The final stage is reached when the local communities gain ownership of the ICTs and the program secures the intended long-term financial and social sustainability.

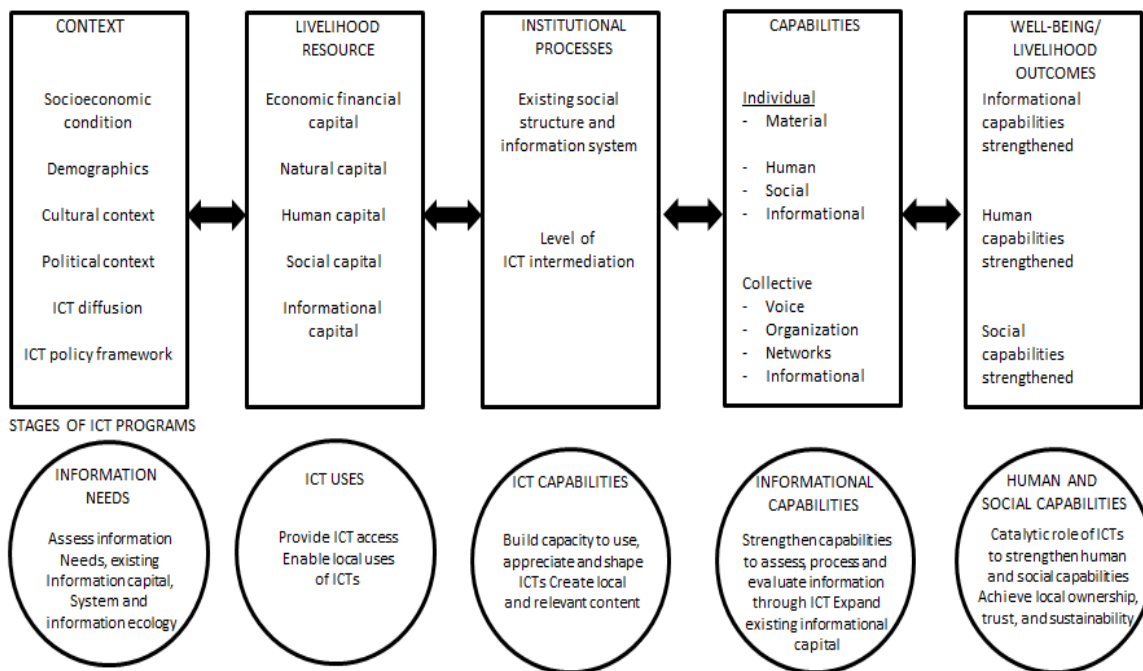


Figure 3. 14 Alternative evaluative framework for the impact of ICTs on well-being (Gigler, 2015)

Aviles *et al.* (2016) made use of Gigler’s (2012) framework to operationalise the capability approach. They identified the skills that were enabled for low-income communities by mobile broadband access and training through infomediaries. They made use of Gigler’s (2012) concept of “informational capabilities”; this is when a person can use ICTs to find, make sense of, examine, and use information. It includes communicating with family, friends, and colleagues. Furthermore, it includes the making and sharing of content with others. These are summarised as “ICT capability, information literacy, communication capability, and content capability” (Aviles *et al.*, 2016). The study considered three localities in Mexico with different levels of marginalisation and connectivity. The finding that Aviles *et al.* (2016) highlight is that of the role of infomediaries. Family members played a valuable role as infomediaries in learning about and using ICTs (i.e., the enhancement of ICT capabilities and increasing information literacy). Furthermore, they found that although sharing of ICT resources like internet connections gives users useful knowledge about broadband, it has a limited impact due to access-related rules imposed by community centres. The study also showed that the

communication capability of individuals had increased, as they were now able to communicate more efficiently with loved ones through channels like email.

The above study demonstrated another framework to operationalise the capability approach by Gigler (2012). This framework assesses the informational capabilities of individuals that are enhanced by an ICT intervention.

3.4.7 Hatakka and De (2011)

Hatakka and De (2011) developed a framework that also operationalises the capability approach. Figure 3.15 shows the diagrammatic representation of the components of the operationalisation. The framework focuses on three main components:

- Intervention: the technological artefact or resource with its features, including support functions;
- Functionings: the functionings that are enabled by the intervention; and
- Conversion factors: personal, social and environmental factors that allow or inhibit the use of the intervention.

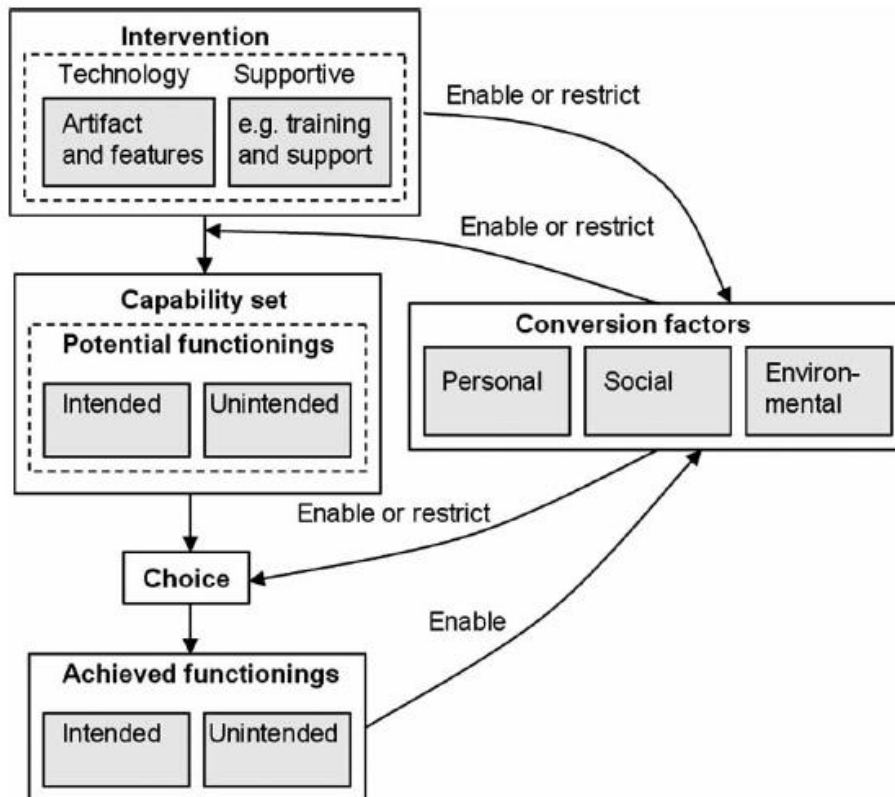


Figure 3. 15 Operationalisation of the capability approach (Hatakka & De, 2011)

Hatakka and Lagsten (2012) used Hatakka and De’s operationalisation of the capability approach in their study “The capability approach as a tool for development evaluation – analysing students’ use of internet resources”. They sought to answer what the benefits of using the capability approach are by analysing both means and ends associated with internet resources for students. The study took place at a university in Sweden, but focused on students who were from developing countries. Hatakka and Lagsten (2012) analysed how the use of internet resources impacted the students’ development by mapping the case to Hatakka and De’s (2011) framework. They did so as follows: the intervention consisted of internet resources; these were categorised into educational material, social and communication media, and career. Educational resources included online lectures, tutorials, manuals, scientific articles, eBooks, and audio files. Social and communication resources included email, chat, Facebook, YouTube, blogs, and

discussion forums. Career resources included publishing, educational institutions, and job opportunities. The study found that the functionings enabled by the internet resources were on three different levels: educational, personal, and professional. The educational functionings that were enabled were, firstly, pedagogical in nature. These included the students having the ability to engage in studying unassisted, resolve problems on their own, learn new things on their own without the teacher, question teachers, compare information, broaden their perspective, and improve their analytical skills. The second educational functioning was as source of information. Students were enabled to access global information, updated information, and practical knowledge. The third functioning was education management: the students were enabled to save time and be more efficient. The fourth educational functioning was performance related: students were enabled to get better grades and do better on assignments; however, it was also made easy to plagiarise. The personal functionings enabled were economical, in that it enabled students to save money; instead of buying books they could now download material. Self-development was also enabled; this entailed the ability to expand their knowledge, to improve themselves, to gain self-confidence, and to pursue their interests. Professional functionings enabled were in the form of job opportunities and educational opportunities. The mapping to conversion factors shows that, for personal factors, the students' economic standing determined their ability to use technology. Those who could not afford it, could not access internet resources outside the university. The types of subjects and educational background of students determined their IT and information literacy. Those who had a more technical background had better IT literacy than those who did not. Social factors included how education was structured, and the culture in which the students were brought up. Many students did not feel that they had any incentive to use the internet. Environmental factors included technological access, cost, and infrastructure.

Nyemba-Mudenda and Chigona (2018) also used the capability approach, and analysed how mobile technology for healthcare service delivery contributes to social change and human development. They used Hatakka and De's (2011) framework to guide their investigation into pregnant women in Malawi. The intervention was the "Mobile System for Safe Motherhood (MSSM)" (Nyemba-Mudenda & Chigona, 2018), which consisted of messages sent by text and an interactive voice response for pregnant women to advance their ability to get information related to their pregnancy, and other services. The study found that the capabilities enabled by the intervention concerned the economy, health, information, and self-development. The informational capabilities that were enabled included IT literacy; women gained mobile phone knowledge. They also included access to health information (the women could contact the hotline for advice), and access health information messages. They were also empowered with health information in that they could understand and be cooperative patients, and they felt secure about their pregnancy. The intervention also enabled health capabilities; patients were able to get healthcare services in good time, there were fewer complaints, they could go for postnatal check-ups, and they had healthy pregnancies and babies. Economic capabilities were also enabled; the women saved both time and money as they were able to get assistance while at home. Lastly, self-development capabilities were also enabled; the women became more self-confident, more expressive, and were enabled to be more modern. The conversion factors that played a part in either enabling or restricting the realisation of capabilities included availability of phones – villages had community phones and the women did not always have access to the phones. The MSSM encountered system outages, network coverage that was poor, electricity supply was lacking, and data showed that 10 percent of all calls were not complete. Attitudes towards the system were also a restricting conversion factor: there were beliefs held by some in the communities that the system was black magic, associated with evil spirits, and was a satanic gimmick. They could not fathom how a stranger was able to tell them about the developments in their bodies. Others did develop trust over some time. The economic factor was both enabling

and restricting. Because the service was free, it enabled the women to use it at no cost to them. On the other hand, the operational costs of the MSSM were too expensive to sustain due to the high cost of telecommunications in Malawi. The health facilities in the areas where the project piloted also posed a restriction to achieving capabilities. There were shortages of prenatal drugs, equipment and instruments were inadequate, the referral system was poor, the waiting areas were not in good condition, there were not enough beds for admission, and the lack of staff affected service quality.

In their paper, Hatakka *et al.* (2014) analysed the use of ICT in formal education in Kenya. They used a version of Hatakka and De's (2011) framework (Figure 3.16), as presented in Hatakka (2013), to analyse an initiative that promoted adult education, aimed to make basic education available, introduced ICT as a tool for use in a practical way for everyday life, and promoted alternative income-generating projects.

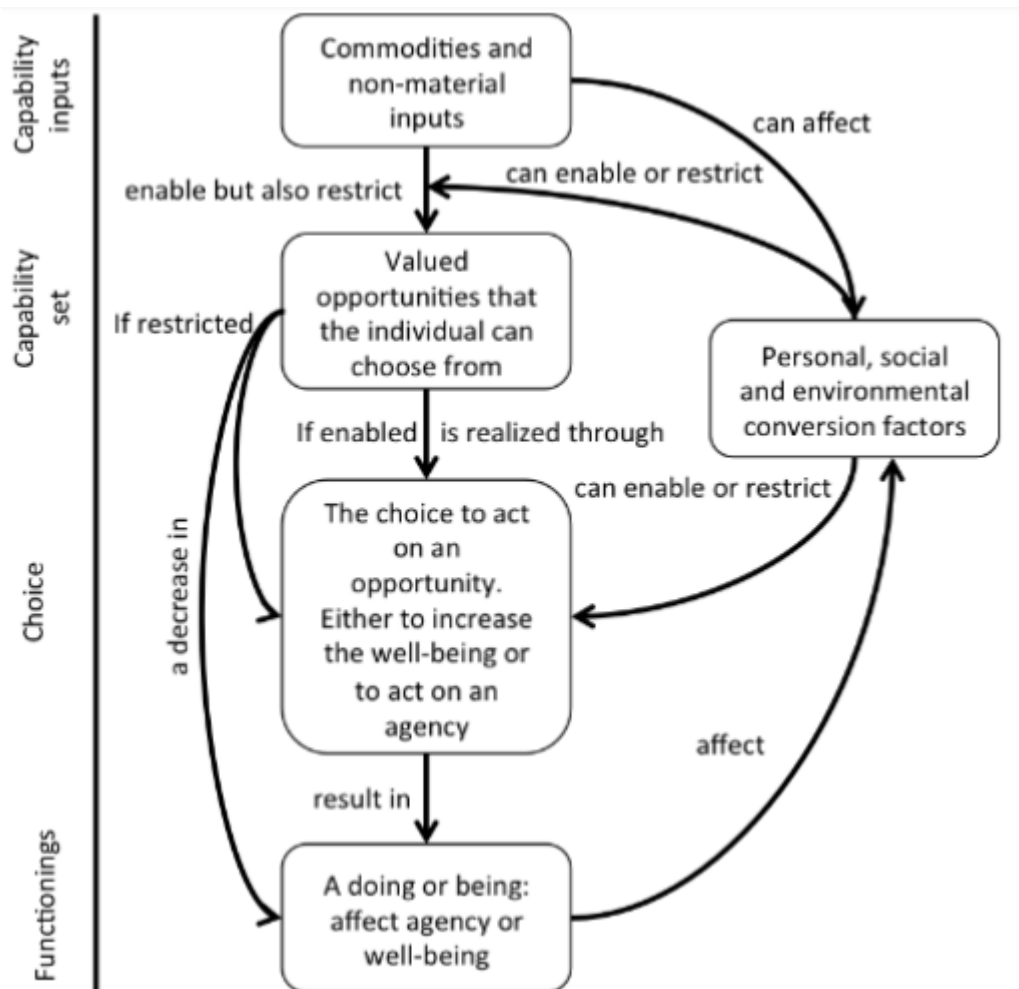


Figure 3. 16 Main concepts in the capability approach (Hatakka, 2013)

Mapping to the framework, the study found that the capabilities enabled by the project were direct income-generating capabilities. These capabilities were provision of services such as photocopying and internet access, and the capability to be employed. Indirect income-generating capabilities were also enabled; these were capabilities to promote and market products and services (advertising), to manage activities and economy (e.g., budgeting and accounting, storing project and business documents), to learn professional skills (e.g., accessing project information), and to apply for funds (e.g., finding funding opportunities, writing proposals, and contacting organisations). Learning capabilities included getting access to information and using technology for learning. Community capabilities

included the ability for the community to use technology and share technology-related knowledge. Lastly, the basic human capabilities were to be literate, to communicate, to use electronic services, to be self-confident and empowered, and to be modern. The conversion factors that prevented many people from achieving the capabilities were poor access to the internet (environmental factor) and poor ICT literacy (personal factor).

Grobler and De Villiers (2017) added thoroughness to their research and revealed greater information about their research participants by using the capability approach. They used the framework by Hatakka and De (2011), which they extended in a previous study to include the agency role under intervention (Grobler & De Villiers, 2014). They argued that placing agency at the start of an intervention can offer a signal of whether the intervention will be impactful. In their design science research, they considered how women working in the domestic cleaning sector used cell phones, WhatsApp chat messages, and SMSs. They did a mapping of the study to their extended framework as part of a larger study that created an artefact called the Community Shaping Solution Framework (CSSF), which seeks to address the information needs of women working as domestic workers. It addresses how their information needs can be interpreted by ICT use to improve their lives according to the capability approach.

3.4.8 Capable and convivial design (Johri & Pal, 2012)

After noticing the lack of guiding frameworks that have a focus on user-focused design, Johri and Pal (2012) proposed a framework that leverages design-based approaches. They argue that most current research focuses on the practice and theory of development and empowerment, and that design theory – which is the foundation of ICT4D – is an important omitted aspect. In creating a framework that covers this omission – Capable and Convivial Design (CCD) – they drew on concepts from the capability approach to create ways for people to freely exercise opportunities, and to empower them to draw from their existing capabilities to realise their aspirations. They combined these concepts with those from Illich's (1973)

conviviality concepts, which are about empowering users to have a say about the design of infrastructure and tools of which they are the intended beneficiaries. This merging of the conviviality approach with the capability approach thus allows users to have control over the developments that pertain to them. The framework consists of the following components:

1. Access to artefacts: refers to ease of access;
2. Ability to self-express: entails expressing one's creativity:
 - a. To be able to use personal energy in a creative way; and
 - b. To be able to personalise one's environment;
3. The ability to form relationships and interact with other people; and
4. Opportunity to enrich the environment: entails ecological reciprocity.

Johri and Pal (2012) applied their framework to a previous case study, which encompassed a process that created computers and software that allowed a single computer to be used by multiple children in India (Pal, et al., 2006). Applying CCD principles to the case study, they found:

1. That it was possible for multiple users to use the same computer simultaneously, thus enabling sharing;
2. Learners were able to produce and use their personal energy creatively to solve problems and learn;
3. Learners were able to learn and interact with each other, thus forming relationships; and
4. Learners were able to teach others, thereby enriching the learning environment.

This framework can be helpful in creating ICT artefacts used in ICT4D. It allows the users to be part of the design process, which also allows them to take ownership of their own development.

3.4.9 Choice Framework (Kleine, 2010)

During the literature search, a number of articles were found that have used the Choice Framework as an analysis tool for development. This framework was created by Kleine (2010), and also seeks to make the capability approach more practical for use in a systemic and an all-encompassing manner. The framework is based on Alsop and Heinsohn (2005) (discussed in section 3.4.2) and on the Sustainable Livelihoods Framework (DFID, 1999). Figure 3.17 shows the diagrammatic representation of the framework, including all its components. The framework is used backwards (i.e., from development outcomes to structure and agency) to assess how the development outcomes were arrived at. The development outcome is choice itself, and it is what Sen (1999) considers as the chief aim and “principal means of development”. Secondary development depends on the individual’s primary choice, and may include choices such as the saving of time, earning more income, or increasing one’s knowledge. Degrees of empowerment indicate whether choice exists, and are concerned with the different possibilities one can achieve, depending on one’s resources and structural conditions. Sense of choice indicates whether individuals are aware of some of the possibilities offered by new technology. Use of choice denotes whether or not a choice is made by an individual. Lastly, achievement of choice indicates whether the realised outcome was the desired outcome for the individual. The agency of an individual depends on their resource portfolio; these represent capability inputs based on agency that, together with inputs based on structure, can be converted to capabilities. The resource portfolio consists of the following:

- Material resources: material things that an individual owns;
- Financial resources: include all forms of financial resources;
- Natural resources: geomorphological and climatic conditions;
- Geographical resources: practical implications of location and distance;
- Human resources: include skills, education, and health;
- Psychological resources: include, optimism, creativity self-confidence, and resilience;

- Information: includes access to information, which leads to knowledge acquisition;
- Cultural resources: exist in three states: embodied state, objectified state, and institutionalised state; and
- Social resources: entail membership of a group, including next of kin, friends, class and ethnicity that is shared, informal community ties.

Structure is what aids or constrains agency. In the Choice Framework, structure include: “institutions and organisations”, “discourses”, “policies and programmes”, “formal and informal laws”, and “technologies and innovations” (Kleine, 2010). Kleine (2011) suggests three ways in which the Choice Framework can be employed:

1. Deconstructing ideas that are embedded, and examining goals;
2. Systemic mapping; and
3. Planning for choice.

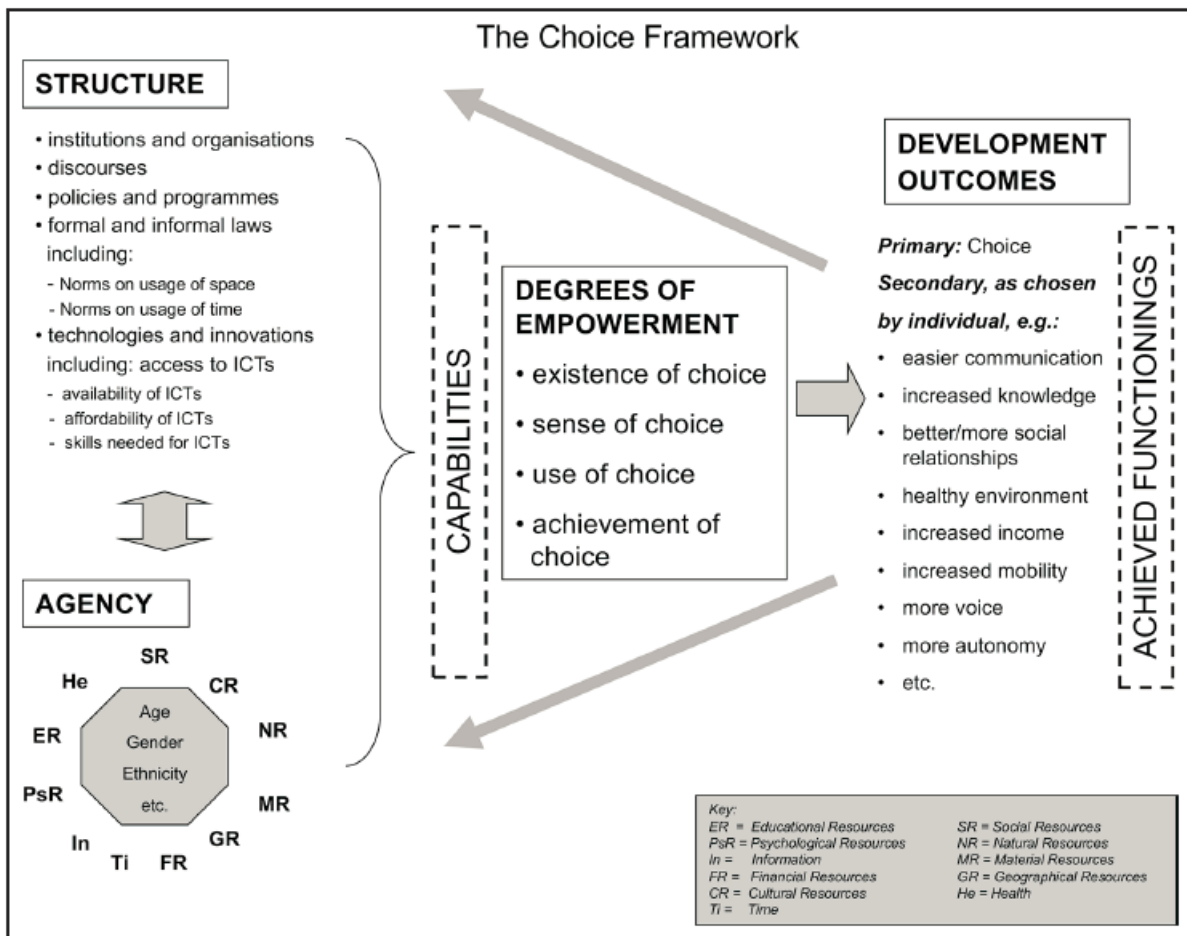


Figure 3. 17 The Choice Framework (Kleine, 2013)

In the same paper that Kleine (2010) presents the Choice Framework, she also demonstrates how this framework can be used by assessing the impact of telecentres in rural Chile. By assessing the interview of one user, the study found that the primary outcome that was brought about by the telecentre was improved choice, which was between virtually visiting Kaiserslautern and not visiting Kaiserslautern. The secondary choice was seeing more of the world, which meant a virtual tour of Kaiserslautern. The study found that, although her material resources did not include a computer nor internet at home, and her financial standing could not afford her the use of a computer at the local cyber cafes, her social resources – which are her contacts with friends – alerted her to free internet access at the telecentre in the local library. Her close proximity to the telecentre (geographical

resources) and state of health (human resource) enabled her to reach the telecentre by walking. Her cultural resources allowed her to enter the library and know how she was to behave, and also allowed her to not feel intimidated when entering the library. She quickly learnt how to use the computer; she did so by drawing on social resources (she knew the librarian who helped her), educational resources (literacy and basic English), and psychological resources (being extroverted, and her willingness to ask questions). She also had a curiosity (psychological resource) that allowed for understanding of the choices that she had, and ultimately to achieve her development outcome of virtually visiting Kaiserslautern. The structure in which agency operated was conducive: the national ICT policy secured the hardware that was installed in the telecentres in libraries; libraries were existing institutions; and there were free ICT literacy courses for adults. Within the telecentres there were formal and informal rules around time limits of computer usage. In terms of degrees of choice, the option existed to choose between physically traveling to Kaiserslautern and taking a virtual trip to Kaiserslautern. However, the only feasible choice was to take a virtual trip, because her financial resources did not allow for the physical trip. Thus, she had a sense of choice, and was able to make a choice and achieve what she was hoping for.

In their action research study “Signifiers of life we value? – considering human development, technologies and Fair Trade from the perspective of the capabilities approach” Kleine *et al.* (2012) used the Choice Framework to map the Fair Tracing project. This study considered the design of a system that would empower both those who produce and consume information to make ethical decisions. Desired outcomes for producers were mapped to information on the value chain in which they operate. This information would be a means to having greater knowledge regarding the market and a bargaining position that enabled greater market share and increased income to be gained. Consumers’ desired outcomes entailed more information, which would enable them to have a better understanding of the

products and their claims regarding ethics. The degree of empowerment was mapped as follows:

- Existence of choice: this was reliant on the reliable Fair Trade certification system;
- Sense of choice: this was the consumers knowledge of the system, their trust in the system's effectiveness, their knowledge of where to get products and determine cost, and the difficulty of making choices in favour of Fair Trade products;
- Use of choice: refers to whether they did indeed buy product; and
- Effectiveness of choice: refers to the extent to which the choice made meets the desired results for the consumers.

For the Fair Tracing project, it was necessary for consumers to have financial resources to be able make consumption choices. They also needed the educational resource of literacy in order to make use of computers and smart phones. Material resources were needed in order for consumers to access a phone or computer with internet access. Psychological resources were necessary for self-confidence and curiosity to find new things. Self-governed time was another resource that would allow consumers to engage with the system. The Fair Tracing project was made possible by the structure in which it existed. This includes institutions and organisations, and the entire supply chain, including supermarkets, their standards and monitoring processes, and certified producers. Access to ICTs was also widespread. Norms of space enabled access for most citizens. There were norms of speed of use; shopping was something to be done quickly and conveniently.

The Choice Framework was also used by Yim and Gomez (2018) to analyse mobile phone use in Ghana. They used the Community Wellness Outcomes (CWO) toolkit, which they have derived from the capability approach and the Choice Framework, for their data collection. The CWO toolkit extends the concept of secondary outcomes identified by the Choice Framework and identifies nine themes as

possible CWOs, namely: “formation of self-esteem”, “aspiration”, “autonomy”, “mobility”, “bridging social capital”, “bonding social capital”, “communication”, “social relationships”, and “civic engagement” (Yim & Gomez, 2018). Findings show three main themes. The first is that communication is made possible with ties that were weak and strong, which generated positive outcomes. Mobile phone users were able to communicate with their friends and family. The second is that mobile phone use enabled the retrieval of information for expanding knowledge for occupational purposes. Students were able to browse the internet for information related to their studies, thus expanding their knowledge. An example is cited of a news coordinator at the local radio station who uses his mobile phone to find news from primary sources in order to report on them on the community station. Thus, the mobile phone made his job easier. Lastly, mobile use allowed for flexibility leading to reduced opportunity costs. An example is made of an elderly woman who still manages to ask about sermons using her phone on the days that she is too weak to go to church. This means that she did not have to choose between her health and maintaining social relationships. The three themes highlighted in this study helped to show how mobile phones contribute to development.

Attwood *et al.* (2013), in their participatory action research, drew on the Choice Framework as they investigated the impact of free computer training and telecentre use in South Africa. They mapped the project called “Community-based Learning, ICTs, and Quality-of-life” (CLIQ) to the Choice Framework as follows: for structure, it was seen that there were a few impediments such as procedural guidelines that were not being followed for repairs of computer equipment. Another structural hindrance was the delay in the training program due to incorrect software selection. In terms of agency, participation in the CLIQ project was limited due to different resources such as poor health, insufficient financial resources, and lack of self-confidence. Further, the relationship between structure and agency showed that gender norms prevented some women from participating in the project when they became mothers, while the fathers continued. This shows that a person’s gender

(personal characteristic), together with gender norms (structure), disempowered women but not men. Furthermore, those who lived within a walking distance from the telecentre could access the facility better and were less affected by the lack of certainty that the telecentre would be operational during normal working hours. Thus, those who lived further away would need to spend more resources and were more negatively impacted when they would find the telecentre closed. In terms of dimensions of choice, participants who had never seen a computer did not have the choice of email as a means of communication. Two women were keen to participate in the CLIQ project, which indicates that they had a sense of choice; further, they did indeed participate, which indicates that they exercised their use of choice. However, when they gave birth to their children they had to stop going to the telecentre. This indicated that their use of choice was cut short, and that their sense of choice was removed. The secondary development outcomes that were achieved by the participants include the computer skills that they learned, which improved their self-esteem and thus empowered them in their approach to life. Others were able to boost their education, thus enhancing their personal resources. These resources then contributed to allow for use and achievement of choice, which in turn contributed to the further development outcome of acquiring a job. The study highlighted that there are endless combinations of structure and agency (which is enabled by the availability of different resources), and that all lead to different degrees of choice and ultimately different development outcomes.

Coelho *et al.* (2015) also used the Choice Framework and mapped it to an ICT project in Brazil. The ICT4D project (named Sudotec) aimed to foster digital inclusion by providing digital skills in computational techniques; promoting professionalism in programming and business management; promoting and organising mini courses and discussions in Computer Society Courses; stimulating the creation of companies in the technology sector; and providing environmental preservation and development that is sustainable. Except for the mini courses, all the programs were offered for free. Mapping the project to the Choice Framework

shows that, for development outcomes, the population was given the possibility to choose to connect and use ICT for their own advantage. They have the possibilities of choice of learning new technologies, communicating with others virtually, improving their income in local commerce, and making changes in culture (i.e., agribusiness to technology). In terms of agency, the study found that the project provided material resources in the form of infrastructure, software, and hardware. It also provided financial resources in the form of payment for the instructors who were working with the community to enhance their lives through access to information. Educational resources were brought about by this access to information as it expanded the knowledge of participants. The project's mapping to structure indicated that its context was conducive for digital inclusion. The government of Brazil had policies pertaining to broadband and to the creation of informatics labs in their national program for technology education. The project's policies were also favourable for digital inclusion, and were based on international standards of success. In terms of degrees of empowerment, the study notes that the options "ICT use" and "no ICT use" were both available, and that the project was structurally favourably placed to allow individuals the choice of resources that would benefit them.

The Choice Framework highlights the outcome of an individual's choice, given their structural context and their personal resources that enable agency. It systematically operationalises these factors and impacts when considering how an individual can use ICTs to improve his/her own life (Attwood *et al.*, 2013). Coelho *et al.* (2015) highlighted in their study that some may question whether those outcomes are valid development results; however, according to the capability approach, as expressed in the Choice Framework, they are results of development. The same can be concluded with regards to the other studies' outcomes.

Zelezny-Green (2017) adds to the Choice Framework to make it cater specifically for the girl child. This adaptation of the Choice Framework is the Child-Centred Choice Framework (CCCF), as is depicted in Figure 3.18. This adapted framework

comes about from the author’s view that the capability approach must be considered differently when dealing with children than when dealing with adults. The gap identified in the Choice Framework is that it does not take into account individuals’ personal characteristics such as age, gender, and ethnicity, and it does not directly account for intermediaries and the powerful role that they play in the lives of children. Thus, the addition that was made to the Choice Framework to bridge this gap relates to personal characteristics and intermediaries.

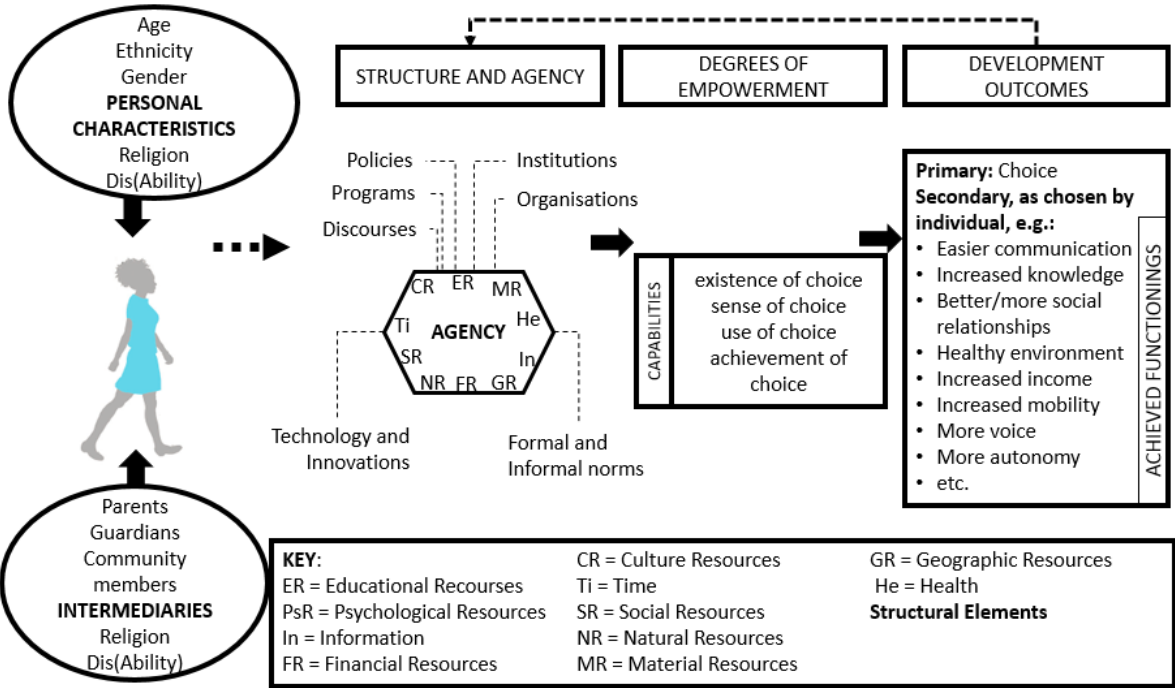


Figure 3. 18 Child-centred Choice Framework (Zelezny-Green, 2017)

Zelenzy-Green (2017) applied this framework in a study that sought to understand how girls use mobile phones during their after-school hours. The study found that personal characteristics such as age and gender shaped the girls’ agency. Further, adult intermediaries shaped (directly and indirectly) girls’ agency to use the mobile phones for any reason after school. It is understood that adult intermediaries can play a role that can help girls realise their desired outcomes through the use of

mobile technology. They can help girls to make decisions that have a positive impact on their lives.

3.4.10 Framework for evaluating the impact of e-governance (Madon, 2004)

Madon (2004) developed a framework, based on the capability approach, for evaluating e-governance projects. The focus of the framework is on considering capabilities as an active rather than static notion. The framework moves away from the past evaluation trend that focused on how much was spent, how ICTs were built, how they are accessed, and what skills and training they require. Instead, it adopts the capability approach and has the following components:

- The variety of applications generated by ICT;
- What functionings ICT enables;
- What is done with the opportunities; and
- What inhibits the achievement of the functionings.

Madon (2004) demonstrated how this framework can be used by applying it to e-governance initiatives (FRIENDS and AKSHAYA) in India. FRIENDS was an initiative that created IT-enabled centres that allowed citizens to make bill payments in their local vicinities, instead of going to the department's offices in different parts of the city. AKSHAYA was a project that established community centres that were intended to promote socio-economic growth. These provided high-speed internet connectivity, and were to foster IT literacy amongst villagers. Other services were computer training and training in spoken English. In addition, courses in important sectors such as education, agriculture, and health were developed for training purposes. Applying Madon's (2004) framework to these e-governance projects, the study found that the project provided a range of ICT-generated applications that included services such as bill payments, dissemination of information on key aspects of the health and education sector, and virtual services that were previously administered by the village council. The centres also provided a hub for bringing the society together, as well as economic activity. The functionings that were enabled were the real opportunities for the villagers to pay their bills without the middlemen,

self-confidence in the client-facing government employees who were now the faces of an efficient system, and empowered and confident citizens. The mapping of what people did with the opportunities highlights women as having, for the first time, the ability to participate in social clubs. Barriers to achieving functionings included the extent to which the projects were meeting citizens' expectations; citizens expected more e-governance activity, but government could not meet that expectation.

Adaba and Rusu (2014) also used Madon's (2004) framework in their evaluation of an e-government initiative in Ghana. The initiative was an innovative solution that would facilitate processing of cargo clearances in a rapid and effective manner. This solution replaced the cumbersome, time consuming, and largely paper-based system. It had two main components – a customs management system and an electronic data interchange (EDI). The project was mapped to the framework as follows: the range of ICT-generated applications included documents and information sharing within the community members that trade, the electronic declaration of imports and exports, and e-payments of duties and charges. The application can also maintain customs codes, issue permits and exemptions, audit trade transactions, generate customer reports, provide business intelligence services and data mining capabilities, and allows for declarations to be made electronically. The functionings that were enabled include individual and business capability improvement opportunities. Having this system meant that trade facilitations in Ghana could be done in a simple, transparent, and efficient manner. The system further enabled people to clear their consignments from customs faster than before, as they no longer had to travel from one department to the next at different locations in the city. This saved them time and costs. By mapping the case to how individuals utilised the opportunities, the study found that the system gave people the choice to avoid intermediaries and use the e-trade system instead. Further, people were able to pay taxes and duties through banks affiliated with the system. The time and cost savings that the system afforded allowed the trade community to potentially benefit economically. The customs offices itself

experienced organisational changes with the systems. It allowed for new modes of work and communications, reduced the level of falsification of documentation to avoid taxes and duties, improved fraud detection at post-clearance, made performance monitoring of officers easier, and contributed to professionalism amongst them. Barriers to functionings were technical and human in nature. These included access challenges for poor people living in remote areas in Ghana, low ICT learning levels, and low skills across the country and in the trading community, difficulty of the customs officers to transition from a paper-based to an electronic system, inadequate training from the project, and poor data quality as a result of human factors.

3.4.11 Revised TAM for developing countries (Musa, 2006)

Musa (2006) proposed a revision of the Technology Acceptance Model (TAM) that incorporates aspects of the capability approach. The revised TAM takes into account accessibility and exposure to technology, because it recognises that these are inadequate in poor communities. The original TAM was defined with a developed setting in mind. The revised TAM (Figure 3.19), which incorporates the capability approach, builds on an extension of TAM (Mathieson *et al.*, 2001) to include the accessibility of technology to the individual. Similar to Alampay's (2006) views, what is important regarding access is the actual use of the technology to realise its full potential in order to enable individuals to have enhanced capabilities.

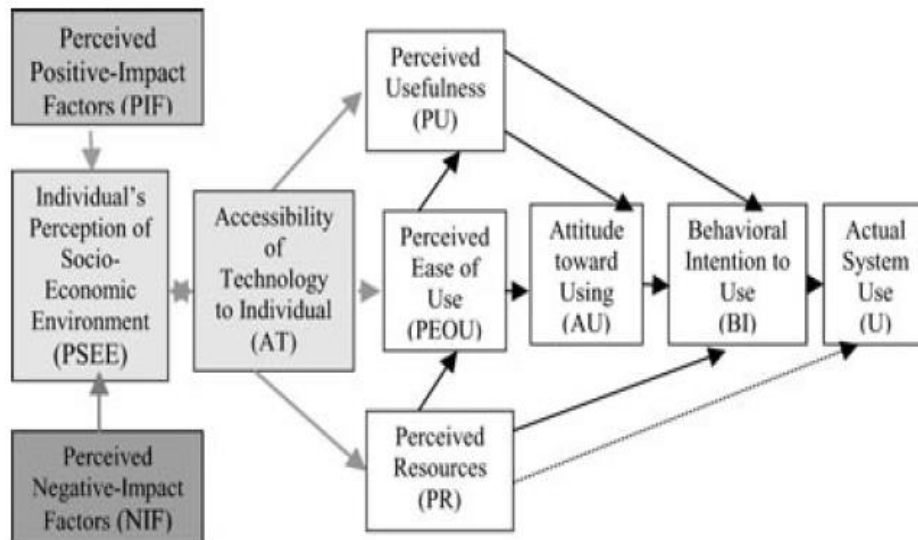


Figure 3.19 Revised TAM: accounting for accessibility of technology (Musa, 2006)

Musa (2006) used this framework to assess technology adoption in Sub-Saharan Africa, focusing on Kenya and Nigeria. It was found that introducing the best technologies to a developing country does not necessarily result in development that is sustainable, and does not necessarily lead to meaningful use. The revised TAM helps to understand the relationship between socioeconomic and human development needs.

3.4.12 Diffusion of innovation and the capability approach (Namatovu & Saebo, 2015)

Namatovu and Saebo (2015) created a framework that combines the capability approach with the diffusion of innovation theory. The diffusion of innovation theory (Everett, 1962) is concerned with characteristics of an innovation that influence whether an individual will accept or reject it. Thus, it also seeks to understand innovations like the internet and mobile phone to explain their use, that is, what about these innovations motivates people to adopt and use them. To analyse the motivation for use, Namatovu and Saebo (2015) made use of Rogers's (Everett, 1962) Perceived Characteristics of Innovation list, which includes: relative advantage, image, compatibility, complexity, visibility, result demonstrability,

trialability, and voluntariness. Although this theory can assist in explaining motivation for use, it does not assist in understanding the impact of use. The capability approach fills this gap. The capability approach was added to this framework to understand the impact of ICTs on social and economic development.

This framework was used to study the usage of mobile phones by the urban poor in Uganda to understand factors that motivate use, as well as the economic and social impact of such use (Namatovu and Saebo, 2015). Due to high levels of illiteracy and cost, the study found that there were low levels of use. These are conversion factors that restricted internet access and use. From those who were able to use these resources for business use, the study found that internet usage contributed to the efficient running of their businesses and therefore enabled them to realise the economic benefit that was brought about. The study also found that social development was a result of ICT, amongst others, as individuals were able to use the internet for educational purposes by searching for educational information. Furthermore, the internet was used by individuals to search for health information, thus enhancing their capabilities to improve their health practices.

3.4.13 Central human capabilities (Nussbaum, 2000)

Nussbaum is a prominent scholar on the subject of the capabilities approach. She proposed a list of “central human capabilities”, which she argues can be the object of overlapping consensus among people who may have different understandings of the good. Each item on the list, she argues, should be pursued for every person and should be seen as an end rather than a means to an end. The idea of a threshold level of each capability is also posited. Beneath the threshold, it is held that citizens cannot truly function as humans, thus the social goal is to get citizens above the threshold. The list is to be used to assess the quality of life and to plan political activities, and the selected capabilities are central, regardless of what an individual pursues. They can be used for political purposes in a diverse society. Nussbaum says that the list is open-ended and can always be contested and remade. The list is as follows:

1. Life: entails living a normal length of life and not dying before time;
2. Bodily health: entails being well;
3. Bodily integrity: entails freedom of movement from one place to another, and being safe from violence, domestic violence, and sexual assault;
4. Senses, imagination, and thought: entails using one's senses – to imagine, think, and reason. To have adequate education and literacy;
5. Emotions: entails having attachments to things and people outside ourselves;
6. Practical reason: entails the ability to think critically about one's life while planning for it;
7. Affiliation: entails living with others – being considerate and showing compassion for others, having friendships, and seeking justice. In addition, it entails being treated with respect and dignity, and being equal to others;
8. Other species: entails being considerate of nature, including plants and animals;
9. Play: entails laughing, playing, and enjoying recreational activities; and
10. Control over one's environment: entails participating in the political activities that affect one's life. It includes the attainment of property and competing with others on an equal basis when seeking employment.

3.4.14 Psychological analysis of development (Poveda, 2018)

Poveda (2018) created a framework that operationalises development by incorporating the capability approach, critical pedagogy, and psychology. The framework comes from a noted lack of psychological well-being considerations in development work. Thus, this framework draws from Freire's critical pedagogy; this work is about encouraging people to play an active role in their own development and social change. Poveda (2018) posits that seeking to understand individuals as social and psychological in ICT4D allows for an innovative perspective. In operationalising this framework, Poveda draws on the agency component from Kleine's (2010) Choice Framework to include psychological resources.

Poveda (2018) uses her framework on a case study in Myanmar, whereby she carries out a psychological analysis of development outcomes within digital literacy. An initiative was carried out to bring mobile information literacy courses to the teachers and students. The results show that participants did improve in their data literacy; however, internal constraints influenced teachers' and students' behaviour, which impacted how they related to information. These constraints include self-censorship and fear of authority. This psychological perspective allowed analysis to go beyond the technical skills; it examined peoples' behaviours and emotions, thus revealing the internalised constraints that were limiting their own development.

3.4.15 Critical theory and agency (Poveda & Roberts, 2018)

In their study, Poveda and Roberts (2018) created a framework that combines critical theory (critical feminism and critical pedagogy) and the capability approach. The capability approach is used as a normative framework and leans on the critical theory to fill the gap of structural issues of power. The authors lament that, although the capability approach is conceptually deep, it lacks in accounting for power and its role in constraining human development. They also point out that the capability approach lacks practical guidance on how individuals can overcome structural unfreedoms (Poveda & Roberts, 2018). To supplement this lack, they draw from critical theories: critical pedagogy and critical feminisms. Critical pedagogy by Freire (1970), which consists of critical consciousness and critical agency, is concerned with enhancing individuals' awareness of how structure has a negative or positive bearing on their own role to change it. Thus, it tackles constraining social structures that stand in the way of justice and equality. However, critical pedagogy is criticised for not being critical about gender inequalities; thus, critical feminism is brought into the framework to account for this lack. It provides a gender sensitivity to the framework. They argue that creating this framework by incorporating critical aspects into the capability approach helps with the understanding of the role that development has in improving the critical agency and well-being of individuals.

Poveda and Roberts (2018) demonstrated how this capability approach and critical feminist pedagogy framework adds value by applying it to two ICT4D case studies. One case study took place in Zambia, the other in Brazil. The Zambia case investigated the Asikana Network, a non-profit organisation by women engaged in different activities to mitigate gender discrimination and disadvantages faced by women. It aims to aid women empowerment in the ICT industry. The endeavour in this case was to investigate the factors that discriminate and are disadvantaging on the basis of gender in the male-dominated ICT industry in Zambia. The Brazil case study analysed how students' ICT use made them more aware of their agency and critical consciousness. The work of the CDI (Center for Diversity and Inclusion) is explicitly informed by Freire's critical pedagogy, and digital inclusion is used in improving the critical consciousness of citizens and their role in developing their society. Learning of ICT skills is fused with critical pedagogy, and an environment is fostered where participants can engage in critical dialogue, and propose and implement their own social community based projects. Findings from both studies show that the aim was to use ICT to meet their practical needs, which included vocational and communication skills and increased self-confidence. It also sought to meet their more strategic interest of identifying the causes of structural inequalities. Both cases reported that participants had increased their ICT skills. Participants experienced a positive impact on their development, which only pertained to the participants practical needs. The more strategic interests of challenging the root causes of disadvantage were not addressed. In the Asikana case, the positive outcomes did not challenge and made no change to the unequal gender relationships. Similarly, in the CDI case, the outcomes did not change the socio-economic inequalities that perpetuate social exclusion and poverty.

This framework is similar to that in Section 3.4.14; this is to be expected, since it has a common author. This work shows the author's commitment to the critical theory aspects that are being added to the capability approach, thereby enhancing it.

Similar to Dasuki and Abbott (2015) (discussed in Section 3.4.4), this framework provides an alternative for investigations into the role of power in enabling or restricting capabilities.

3.4.16 A Stylised Non-Dynamic Representation of the Concepts of the Capability Approach Framework (Adapted from Robeyns, 2005)

This study’s search found four articles that made use of Robeyns (2005) representation of the capability approach. Figure 3.20 shows the components of the capability approach as visualised by Robeyns (2005). Means to achieve include goods and services, as well as social institutions that serve as inputs in creating or expanding capabilities. Conversion factors (personal, environmental, and social) determine whether a commodity can be converted into a functioning. Functionings are what people are able to do and be, for example, resting, being healthy, or working. Capabilities are the effective possibilities or valuable options from which one can choose.

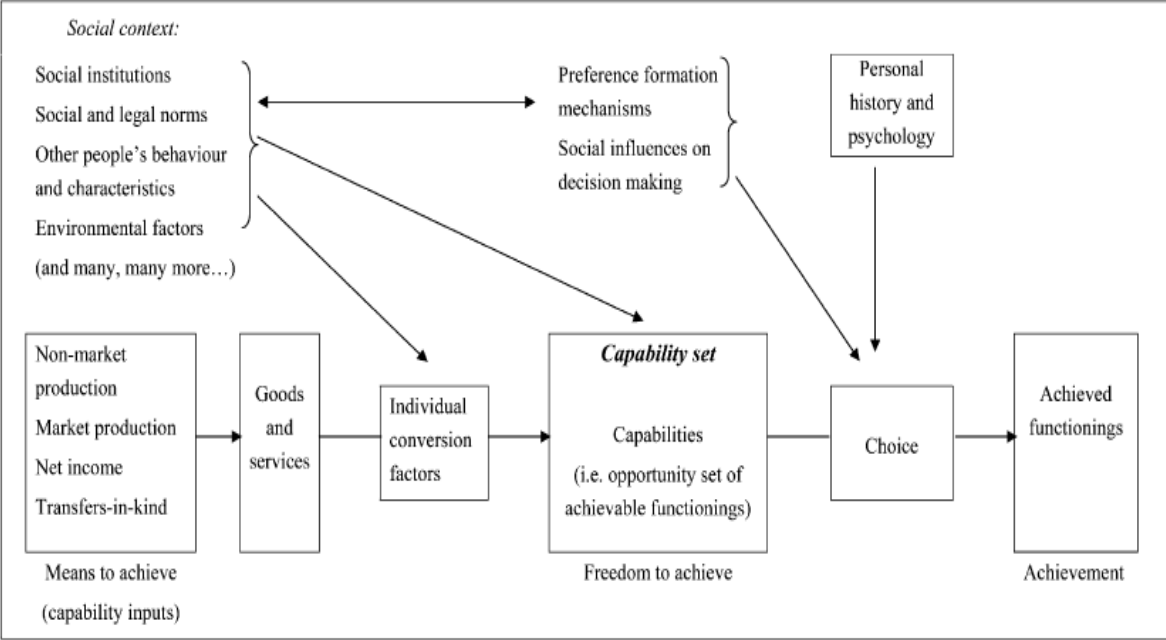


Figure 3. 20 “A stylised non-dynamic representation of a person’s capability set and her social and personal context” (Robeyns, 2005)

In the article “Factors influencing usage of new technologies in low-income households in Kenya: the case of Nairobi” by Ndung’u *et al.* (2012), the authors borrow from Robeyns’ (2005) representation to make the argument that access to technologies does not automatically entail that people will use those technologies. Instead, various factors determine whether technologies are used and how they are used. They found that income, age, education, skills, material status all influence how technology was used. The study showed that men used the new M-Pesa technology – a platform used to transfer money using mobile phones – more than females; the authors attributed this to the higher level of education of males.

Dasuki *et al.* (2014) also used Royens’s (2005) representation to interpret events in the case study. They found that the lack of involvement of the community during the design of the prepaid electricity system was a conversion factor that deprived them of participation in public affairs. On the other hand, those who participated in the provision of prepaid meters were found to have had improved agency through the training. In addition, the institutional support that they were afforded meant that they had a key conversion factor that enabled them to provide the project with support that led to continued use and installation of the prepaid meters. For those accessing the prepaid billing services, the study found that their wellbeing and freedom to save money were increased through the education provided by the project. Community representatives participated in shaping the project activities by attending meetings held by the project organisers. The study ultimately highlights that allowing people to participate in the various stages of a project empowers them; they are enabled to have some control over their wellbeing.

A study by Sahay and Walsham (2017) also considered the contribution of ICTs to human development. They focused their research on how an information system of a hospital is developed and used in the public sector in India, using Robeyns’ (2005) representation as an analysis guide. Three themes are highlighted in this study. The first is the inclusion of the disadvantaged. The system was mandated to primarily provide healthcare to the rural population; that population was thus provided with

access to healthcare at the district level, and had the capability of better care and of being healthier citizens. However, referral information that is not analysed remains a challenge. Second is the empowerment of the patient; this was achieved through the introduction of digital medical records, which did not exist before. This facilitated the capability of choice of treatment, which meant that patients could make informed choices about their health. Further, because their historical medical records were now stored centrally and electronically, they did not have to go to different places to get different pieces of information. However, the challenge was that the out-patient department doctors did not always use the system due to a lack of time – doctors could see between 50 to 75 patients in only a four-hour slot. Lastly, the system gave the patients a communal voice. Through aggregated patient medical records, it provided visibility of the medical conditions in the community. This enabled the capability of better community-focused care, and provided morbidity and mortality profiles of the communities. However, the challenge was that analysis reports were not sent to community functionaries like village political bodies, due to the centralised nature of the system.

Robeyns' (2005) representation of the capability approach was used again to assess the impact of an ICT4D project, this time in the field of education. Dasuki *et al.* (2017) in their study, "An evaluation of information systems student's internship programs in Nigeria: a capability perspective", assessed the extent to which internship programs are effective for Information Systems (IS) students, and what their contribution is to development. The internship programs provided the students with two commodities. The first was education resources which included eBooks, tutorials offered on video, and online academic journals, to enable them to attain greater knowledge regarding software and hardware. The second commodity was work resources, which included software for networking, web programming, databases, and modelling. Through these commodities, the students were afforded social and economic capabilities. The social capabilities included: opportunities to access knowledge that was practical, opportunities for the improvement of

academic performances, opportunities for expansion of knowledge and self-confidence, opportunities to go further in higher education, opportunities to assist others in class to learn, and opportunities to do things on their own. The following are the economic capabilities that were enabled: opportunities to earn an income, opportunities for sponsorships for projects, opportunities for bidding for government ICT contracts, opportunities for better career choices, opportunities for a career plan, and opportunities for a fulfilling job. Although the commodities already mentioned above were made available, the conversion of those into capabilities depended on social, personal, and environmental factors. Personal conversion factors included literacy, interest, and motivation. Social conversion factors included support from work and supervision. Lastly, environmental conversion factors included the presence of businesses that provided internship programs, availability of jobs, business infrastructure, and location.

Araujo and Reinhard (2015) used an adaptation of Robyens' (2005) representation of the capability approach (Figure 3.21). The basic objective of their adaptation was to show factors that influence individuals' decision to use electronic services. The three main constructs of the model by Araujo and Reinhard (2015) are:

1. "Conditions for acquisition" – this pertains to access;
2. "Freedom and ability to choose" – this pertains to capabilities; and
3. "Results" – this pertains to functionings.

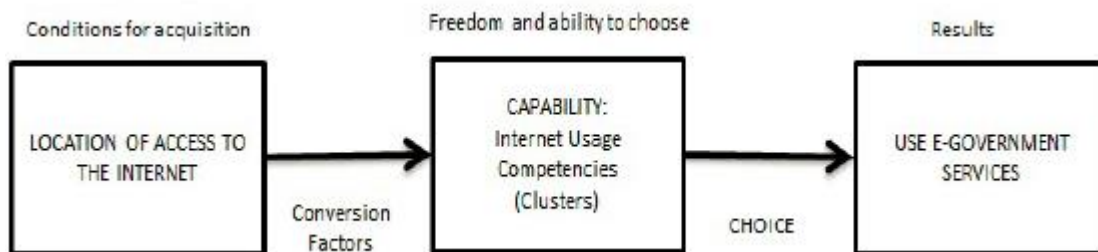


Figure 3. 21 Reference Model: Capability Approach (adapted from Araujo and Reinhard (2015), and Robeyns (2002))

In their study on the “Categorization of Brazilian Internet Users and Its Impacts on the Use of Electronic Government Services” Araujo and Reinhard (2015) operationalised this reference model (Figure 3.21). They used survey data from the ICT Household Survey, which is an annual survey that generates statistics on the use of ICTs in Brazil. All of the three constructs were operationalised in the survey itself. The study categorised internet users into three: advanced (the most competent in internet use), intermediate (they perform lesser activities, although they use collaborative and interactive activities extensively), and sporadic (limit themselves to a few activities on the internet). The advanced category was more likely to use e-government services, while the sporadic group was less likely to use e-government services. However, the study showed that the intermediate group presented a higher tendency to use the e-government services than the advanced group. This was attributed to their tendency to perform activities that enabled them to collaborate and interact for entertainment purposes.

3.4.17. Sen’s five freedoms (Sen, 2001)

Expansion of freedom is fundamental to the capability approach. The capability approach is concerned with expanding people’s capabilities so as to enable them to “live lives that they have reason to value” (Sen, 2001). Freedoms are said to be the building blocks of development, and have a mutual relationship with capabilities (Ashraf *et al.*, 2015). In order for one to exercise freedom they require capabilities, while freedom also facilitates the achievement of capabilities. These freedoms (Sen, 2001) are:

- Political freedoms: this is freedom to take part in government activities and governance structures. It includes freedom to scrutinise those in authority and freedom of expression.
- Economic freedoms: this is freedom to participate in markets and employment. It includes using economic resources for buying, selling, and producing.

- Social opportunities: these are opportunities that include provision for healthcare, basic services, and education. Political and economic freedoms are better attainable when social opportunities are in place.
- Transparency guarantees: this freedom plays a role in the prevention of corruption, the mishandling of finances, and other dishonest undertakings.
- Protective security: this freedom helps with reducing dire misery for people who are excluded from opportunities in the market. It provides social cushions that take the form of, for instance, old age benefits, unemployment benefits, and facilities for people living with disabilities.

From the articles included in this study, two use these five freedoms to operationalise the capability approach in their empirical studies. “The Impact of ICT Investments on Development Using the Capability Approach: The case of the Nigerian Pre-paid Electricity Billing System” by Dasuki *et al.* (2012) uses the concepts of freedom that are embedded in the capability approach to assess the developmental impact of a pre-paid billing system in Nigeria. From the economic freedom lens, the study found that the new system led the locals to benefit somewhat from temporary employment, and that there was a boost of economic activity. However, this did not make a significant developmental impact as it was overshadowed by nepotism and favouritism, which are said to be systematic and a cultural norm in Nigeria. In terms of transparency guarantees, the billing system was meant to afford the consumers some transparency in that they were able to monitor their consumption. However, corruption stemming from poverty meant that only those who were willing to pay a bribe could use the system. With regards to political participation, the project was found wanting in that it did not involve the locals; they were deprived of agency freedom. The project adopted a top-down approach, and policy makers failed to include and reflect the concerns of the locals. Through the social freedom analysis lens, the new billing system enhanced the knowledge of staff and that of consumers who were educated in new ways of saving electricity. However, the manner in which staff used that new

knowledge contravened protective security; staff would tamper with the meter readings so that consumers would pay less or not pay at all. This is also attributed to the high poverty levels in the country.

“Impact of ICT usage on indigenous peoples’ quality of life: Evidence from an Asian developing country” by Ashraf *et al.* (2015) also uses Sen’s five freedoms to analyse an initiative by government to digitise many of its services in Bangladesh through ICT centres. Through the political freedom lens, the study found that the ICT centre that was the subject of investigation did contribute to the political freedom of the indigenous community. It created awareness about legal issues and encouraged locals to participate in facilities planning and maintenance in the village. They were also enabled to take part in the agenda-setting process for development. The economic freedom of those using the centre was improved as they were skilled in ICT and entrepreneurship. Social freedoms were enabled through various health trainings at the centre, which allowed the community to take better care of their health. In addition, gender equality was fostered through the non-discriminatory policies of the initiative. Through training, transparency guarantees were facilitated that demonstrated to the community how information that made government actions transparent could be accessed. They were also given access to systems such as the land registration system, which further resulted in greater transparency. The study lastly found that the main contribution of the centre to protective securities was in enabling the community to access an early warning system for disaster, as well as facilitating the detection and prosecution of illegal loggers.

Table 3.3 provides a summary of the frameworks discussed in this section.

Framework	Purpose/for what purpose it was used	Used in	Fields applied
The capability approach applied to access to ICTs (Alampay, 2006)	To analyse ICT access and use	Olatokun (2009) Alampay (2006)	Communities
Empowerment Framework (Alsop and Heinsohn, 2005)	To understand and measure empowerment	Bisht and Mishra (2016)	Financial services
Capability approach reference model (Araujo and Reinhard, 2014)	To evaluate the impact of electronic government services	Araujo and Reinhard (2014)	E-governance
Institutional theory and the capability approach (Bass <i>et al.</i> , 2013)	To assess how capabilities strengthen institutions	Bass <i>et al.</i> (2013)	Education
Socio-technical analysis of ICT investments (Dasuki & Abbott, 2015)	To assess relations in ICT4D	Dasuki and Abbott (2015)	E-governance
Affordances and the capability approach (Faith, 2018)	To assess the impact of cell phones	Faith (2018)	Communities
Alternative Evaluative Framework (Gigler, 2015)	To evaluate ICT4D projects	Gigler (2015)	ICT projects
Operationalisation of the capability approach (Hatakka and De, 2011)	To evaluate students' use of internet resources	Hattakka and Lagsten (2012) Nyemba-Mudenda and Chigona (2018) Hatakka <i>et al.</i> (2014)	Education Health
Capable and convivial design (Johri & Pal, 2012)	To design ICTs for human development	Johri and Pal (2012)	Education
Choice Framework (Kleine, 2010)	To evaluate the impact of community-based ICT4D projects To co-design technologies with users/To apply CA to action research	Kleine (2010) Kleine <i>et al.</i> (2012) Yim and Gomez (2018) Attwood <i>et al.</i> (2013) Coelho <i>et al.</i> (2015)	Telecentres Consumer studies Mobile phones
E-government impact evaluation framework (Madon, 2004)	To evaluate ICT4D e-governance projects	Madon (2004) Adaba and Rusu (2014)	E-governance
Revised TAM for developing countries (Musa, 2006)	To assess technology adoption	Musa (2006)	Communities

Diffusion of Innovation and the capability approach (Namatovu & Saebo, 2015)	To assess people's motivation to use ICT and development outcomes	Namatovu and Saebo (2015)	Communities
Central Human Capabilities (Nussbaum, 2000)	To assess quality of life and assist in political planning	Nussbaum (2000)	Social Justice
Psychology and development (Poveda, 2018)	To evaluate the impact of ICT on social and psychological well-being	Poveda (2018)	Education
Critical theory and development (Poveda and Roberts, 2018)	To analyse ICT4D project and structural power	Poveda and Roberts (2018)	Education ICT sector (Film)
Stylised Non-Dynamic Representation of the Concepts of the Capability Approach Framework (adapted from Robeyns, 2005)	To evaluate participation To evaluate use of the public healthcare system To evaluate the impact of educational programs	Ndung'u <i>et al.</i> (2012) Dasuki <i>et al.</i> (2014) Sahay and Walsham (2017) Dasuki <i>et al.</i> (2017)	E-governance health education
Sen's five Freedoms (Sen, 2001)	To evaluate ICT4D e-governance projects	Dasuki <i>et al.</i> (2012) Ashraf <i>et al.</i> (2015)	E-governance

Table 3.3 Summary of frameworks that operationalise the capability approach and how they have been used

3.5 Empirical use of Sen's capability approach without operationalisation framework

7. Synthesize Studies

This study found that the majority of empirical studies did not use any of the frameworks outlined in Section 3.4 to operationalise the capability approach. Instead, they used the capability approach to guide the studies in terms of their perspective or understanding of development and to analyse findings. This finding echoes that of Tshivhase *et al.* (2016), who also found a mismatch between the availability of frameworks and the manner in which studies applied the capability approach in ICT4D. Studies utilise the capability approach through application of different methodologies and for different objectives.

How author(s) describe use of the CA	Author(s)	Field
Used to inform the analysis of ICT use	Andrade and Doolin (2016)	Refugees
Used to sensitise the emergent themes from fieldwork findings	Anwar and Johanson (2015)	Microentrepreneurship
Used to explicate concepts of freedom and development	Aricat (2015)	Migrants
Used as theory to guide the research	Grobler and de Villiers (2017)	Women
Used to define development	Grunfeld (2014)	Communities
Used as a conceptual framework	Gudmundsdotti (2010)	Education
Used as a theoretical framework and informed data collection and analysis	Hatakka <i>et al.</i> (2013)	Education
Used as a conceptual framework	Kassongo <i>et al.</i> (2018)	E-Governance
Used to develop the theoretical definition of quality of life and indicators for the study	Kivunike <i>et al.</i> (2011)	Communities
Used to assess as a conceptual framework	Ojo (2016)	ICT4D
Used as a theoretical framework	Palvia <i>et al.</i> (2018)	Citizens
Used to theorise issues of education policy and social justice in an ICT4D project	Rubagiza <i>et al.</i> (2011)	Education
Used to contextualise findings	Stratton and Grace (2016)	Education
Used as one of the underlying approaches concerning development	Tacchi <i>et al.</i> (2014)	Communities
Used to contextualise findings	Takavarasha <i>et al.</i> (2017)	Communities
Used as a theoretical framework	Thapa <i>et al.</i> (2012)	Communities
Used to interpret the results of empirical research	Thomas and Parayil (2008)	Communities
Used as a framework for considering the ethics of cloud computing	Wakunuma and Masika (2017)	Cloud Computing

Table 3.4 How the capability approach was applied in studies where no framework was used

Table 3.4 shows a summary of the ways in which the capability approach was appropriated by most of the scholars who used the approach in their empirical ICT4D studies. These studies did not operationalise the approach through the use

of any of the frameworks discussed in Section 3.4. Some (Aricat, 2015; Grunfeld, 2014; Tacchi *et al.*, 2014) used it in their study to define the concept of development. They viewed development as concerning the expansion of people's real freedoms, that is, what people are able to be and do (Sen, 1999). This moved away from the development paradigms targeted at economic growth, and the utilitarian paradigms. The appeal of the capability approach is that it attributes greater importance to freedom (Aricat, 2015). In addition, the human development focus of the capability approach is seen as crucial in the field of ICT4D, "otherwise development can result in social exclusion" (Zheng & Walsham, 2008).

The capability approach was also appropriated by using it to contextualise the study findings (Anwar & Johanson, 2015; Stratton & Grace, 2016; Takavarasha *et al.*, 2017; Thomas & Parayil, 2008). The authors connected findings from the studies to the language of the capability approach, that is, to terms such as capabilities, functionings, freedom, and conversion factors. For example, empirical evidence showed that mobile phones had expanded the capabilities of disabled micro-entrepreneurs, and enabled the following functionings: "being close to family", "raising children", "being independent", "fulfilling daily needs", and "helping others" (Anwar & Johanson, 2015), and helping others. The capability to use ICT and the capability to turn information into knowledge that was beneficial was higher among males than females, among the younger than the old, and among the richer and better educated (Thomas & Parayil, 2008). Further, it is conversion factors that determined whether resources such as the internet could be converted to capabilities that enabled individuals to participate in the market by selling their agricultural produce (Thomas & Parayil, 2008). The concepts of capabilities and capability inputs were of particular interest to Stratton and Grace (2016). In their study, online courses were seen as capability inputs; these are resources that become part of the capability set that an individual can select from to achieve a life they desire. However, they found that online courses were not universally available

capability inputs, because they were offered in a limited choice of languages, and disadvantaged students did not understand English.

Other scholars (Andrade & Doolin, 2016; Hatakka *et al.*, 2012) applied the capability approach as an analysis and data collection tool (Hatakka *et al.*, 2012). The questionnaire and interview guide in the study by Hatakka *et al.* (2013) was based on the capability approach. They broke down the questions for the interviews in terms that their research participants could understand, as opposed to terms such as capabilities and functionings. They used the following CA concepts for analysis: the choices the participants have, the result of their choices (functionings), and what enabled or restricted their choices (conversion factors). Andrade and Doolin (2016) used the capability approach to highlight five categories of achieved functionings by the participants, which are: “participating in the information society”, “communicating effectively”, “understanding a new society”, “being socially connected”, and “expressing their cultural identity”. These are the categories of ICT-enabled capabilities.

The other way of using the capability approach that authors (Grobler & de Villiers, 2017; Gudmundsdotti, 2010; Kassongo *et al.*, 2018; Kivunike *et al.*, 2011; Ojo, 2016; Palvia *et al.*, 2018; Rubagiza *et al.*, 2011; Thapa *et al.*, 2012; Wakunuma & Masika, 2017) found useful was as a conceptual framework. These authors used the approach to provide a “grounding theoretical understanding of human capabilities and development” (Ojo, 2016). Thus, their studies were embarked on with the understanding that ICT4D should not be about exposure or access to technologies or the abundance of information, but rather about how people make use of these commodities to enhance their capabilities in order to better their lives. The approach is also drawn on as a framework for investigating matters of social justice and education policy, and is helpful in discussing how engagement with ICT contributes to capabilities pertaining to the participatory culture (Rubagiza *et al.*, 2011). The capability approach as a conceptual framework is also appreciated in that it moves away from a Western market-oriented and economic focus to a human

development focus of ICT4D, where development is defined through freedom and the opportunities that people have (Gudmundsdotti, 2010; Wakunuma & Masika, 2017). Through the theoretical framework of the capability approach, access to a technology such as cloud computing is seen as a vehicle for expanding human capabilities that allow for the attainment of goals (Wakunuma & Masika, 2017). It also provides an evaluative space where the pros and cons of various actions are evaluated; the pros are capability enhancements and the cons are capability deprivations. Wakunuma and Masika (2017) offer further justification of why the use of the capability approach as a conceptual framework is important for their study; they offer six reasons: 1) a focus on human development places a focus on the needs of communities; 2) the concept of agency highlights whether people are able to “be and do”, free from ethical challenges; 3) well-being highlights the extent to which an intervention is instrumental in achieving freedom and other well-being indicators; 4) freedom considers whether the intervention restricts or advances the freedom of users; 5) security considers the kinds of security that the intervention presents to the users; and 6) responsibility assesses the extent to which safeguards are in place for data protection, as well as the stakeholders that are to take responsibility and accountability for ethical concerns stemming from the use of the intervention. Furthermore, the use of the capability approach as a theoretical framework provides a basis for analysis to be directed towards development constructs; the focus is on human capabilities that encourages a bottom-up instead of a top-down perspective (Kassongo *et al.*, 2018). The capability approach provides a framework to examine if ICT investments are consistent with the social goals of empowering the poor (Kassongo *et al.*, 2018). Further, the approach promotes freedom-oriented development, which stresses that participants need participate as agents in the process of development, instead of merely being recipients (Kivunike *et al.*, 2011). Furthermore, the capability approach as a theoretical framework can be extended. Thapa *et al.* (2012) extended the capability approach “by linking ICT to social capital, collective action, collective capabilities, and individual capabilities”. Their particular study proves that the capability

approach can be used in group contexts as well, and that it is not too individualistic – as is often the criticism thereof.

3.6 Capability approach used in literature reviews/conceptual work

7. Synthesize Studies

This current study has also highlighted that, among the proliferated works – including Sen’s capability approach – scholars have incorporated the approach to extend other theories and concepts instead of applying the approach practically. Table 3.5 shows a summary of the conceptual ideas that some scholars linked to the capability approach.

CA used in conceptual study	CA used in literature review
CA and boundary objectives	ICTs link to development
CA and community informatics	Cell phones expanding human capabilities
CA and critical theory	
CA and data literacy	
CA and hope	
CA and quality of life	
CA and resilience	
CA and technology	
CA and theory of change	
CA and vulnerabilities	

Table 3.5 Conceptual uses of the capability approach

Loh (2015) suggests that the capability approach can be used together with the vulnerabilities approach as valid theoretical foundations for ICT4D. She conducted a literature review that highlights the contention between the two theories. Ultimately, she proposed that both approaches are appropriate for the same ICT4D projects, depending on the enthymeme – a literary device where one premise is not explicitly stated in the argument (Devises, 2019).

“Different spaces for e-development: what can we learn from the capability approach?” by Zheng (2009) expounds on the contribution that the capability approach makes in development discourses within ICT4D. It highlights that the capability approach emphasizes embedding ICT in pursuit of human development, which is in contrast to the perspective of ICTs being justified for the purpose of economic growth. Furthermore, it highlights that it is functionings and capabilities that are what needs to be evaluated when examining issues of development, inequality and poverty. This helps to reject the shallow notion of the part that ICT plays in the development of humans, and allows for more complexity and multiplicity to be brought out. In addition, the article highlights the importance of conversion factors: although they need to be in place for the full use of ICTs, they also allow individuals to attain the wellbeing that they desire. Hence, a point is made that ICT4D maximises the free flow of information to enhance people’s agency and wellbeing, rather than access to technology.

Hope is another concept that is complementary to the capability approach. Heeks and Krishna (2016) bemoan that there is not much academic research that deals with hope and ICT4D, yet hope is integral to what makes one human. They closely examine the means of hope in existing literature, and ultimately propose a theoretical framework. Parallels are noted between hope and the capabilities approach. Hope can be seen as a capability – an end in itself – and is a channel through which other capabilities are made possible. While a functioning is an achievement and a capability is the ability to achieve, the enactment of hope is not what is realised, but what is hoped for. When relating hope to the capability approach, hope is better viewed as a means to an end (instrumental).

Oosterlaken (2011) conceptualised the inclusion of technology in the capability approach. She argues that technology as an artefact should be recognised as an important constituent of the capability approach. Thus, she extends work done by Smith and Seward (2009), who answer fundamental questions regarding the nature of human capabilities in the form of the critical realist ontology of human capabilities.

However, technology is not accounted for in their work. Oosterlaken (2011) then draws on the actor network theory to say that technologies cannot be understood in isolation; they are artefacts that extend human capabilities in a certain way, thus they need to be incorporated in both the technical and social networks of interdependencies (Lawson, 2010). Oosterlaken ultimately suggests that the relational ontology for the capability approach should ascribe causal efficacy to technical artefacts too, and not just to structures and people.

Cell phones have contributed to the enhancement of human capabilities. Smith *et al.* (2011) showed how, by using the capability approach. They argue that cell phones are the basis for the greatest of human expansions in recent history, and the expansion has taken place exponentially. This assertion is based on the perspective that views mobile phones as tools that provide access to more resources than were available before. Thus, mobile phones and their networks alter individuals' capability sets in at least two ways: by allowing individuals to access relevant information in a timely manner, and by expanding capabilities that allow people to be connected. They (Smith *et al.*, 2011) further posit that mobile phones have enabled functionings that were not possible before, or that had high transaction costs. These represent networking in three dimensions: enable or strengthen social networks, economic networks, and governance networks. Social networks are important for survival, well-being, and security, especially in rural areas. Economic networks enable individuals to connect to financial institutions, expands market boundaries, and improve supply chains. Governance networks increase citizens access to governments services, allow for political mobilisation and for election monitoring, and provide early warning systems.

Zheng and Stahl (2011) embarked on an exploration to find the contribution of critical theory to the capability approach. They posit that there are important commonalities between the two theories: both are in a quest of a "good life", they are theories of a normative nature which have their roots in ethics, and both are interested in democracy. Thus, they identified three ways in which critical theory can

contribute to the capability approach. The first is conceptually: it can provide a critical account of individual agency. The emphasis in critical theory is on how structures of society impact the agency of an individual. The second is methodologically: critical theory methodologies are sensitive to issues pertaining to politics and power; also, emphasis is on the researcher's reflexivity. Lastly, critical theory enriches the idea of technology further than the superficial idea of commodities. Whereas the capability approach views technology as commodities that are neutral, critical theory deems technology as having ideological qualities and hegemonic functions. In addition, critical theory is sensitive to the role that technology plays in the distribution of power. Poveda and Roberts (2018) used this very concept of employing critical theory alongside the capability approach. They used the concept in an empirical manner, as discussed earlier in this paper.

Thapa and Saebo (2014) also embarked on an exploration to find the link between ICTs and development, and they did so by means of a literature review. From the articles that they examined, they found that the capability approach was the most appropriate to explore that link, and they used it as a framework to guide such a task. Their finding revealed that the functionings that the reviewed papers had in common were the ability to access information, and the ability to communicate via the platforms provided. These contribute to generating social and human capital in communities in remote areas. This is in line with the exploration of Smith *et al.* (2011), who found that ICTs (mobile phones in particular) strengthen and enable social connections, and provide increased access to timely information. Another finding from Thapa and Saebo (2014) is that the social, cultural, religious, and economic context need to be taken into consideration when designing ICT4D projects. Further, six gaps were identified from their (Thapa & Saebo, 2014) study. The first is that the link between ICT and development is yet to be clearly understood; there is need for more knowledge in this regard. Although some scholars like Avgerou (2002) and Nair (2002) recognised the need to understand this link, little has been done in this regard. The second gap is the lack of clarity on

the concept of development in ICT4D. Two reasons are posited for the significance of this clarity: the first is to bring about an understanding of the similarities and differences from the various research studies and whether there are shared aims and objectives. The other important reason is to understand the different perspectives on development impact projects. The third gap is the lack of investigation into socio-cultural issues such as corruption, de-politicisation, and context-independent structures. Bridging this gap will help with the understanding of why projects fail or succeed. The fourth gap is the lack of focus on a wider variety of countries when it comes to ICT4D research; for example, there are some areas that have not received sufficient research attention. While research has concentrated on the Sub-Saharan countries, India, and Latin America, there are still many developing places yet to be studied. The current study shows that most of the investigations are indeed from the continents of Africa and Asia (Section 3.3.4). The fifth gap is the lack of more studies that seek to provide insights on the concept of the “digital divide”. More studies are needed to examine gender and urban versus rural divides. The work of Olatokun (2009), as identified earlier (Section 3.4.1), contributes to bridging this gap. The final gap is where researchers not only try to understand the problem, but also try to introduce change. Action-design research as a research method can be used to further study ICT4D projects.

Stillman and Denison (2014), in “The Capability Approach Community Informatics”, explore the potential of applying middle-range capability approach theories to community informatics. These “middle-range” theories are said to be theories that “provide a context for considering the capability approach as a robust form of sociological theory with considerable relevance to” (Stillman & Denison, 2014:200) community informatics. Community informatics is about effectively using ICTs to enhance communities and those who live in them. Ultimately, they assert that the strength of community informatics is enhanced by the use of a stronger theory chain; the capability approach can have emancipatory effects on community informatics.

Matthews (2016) considers different data conceptions mined from data. The capability approach is used to highlight aspects of the role that data can play in the community. The study found four conceptions of data: a “research focus”, a “classroom focus”, a “carpentry focus”, and an “inclusion focus”. The research focus is the most common, and emphasises further learning, those who look after information, and advocates of good data management practice. In this academic perspective, data is a result of a research undertaking, and also the foundation of new research undertakings. In the classroom focus, data is promoted to students as a way to be acquainted with the handling of data for learning that is based on problems. Decision making based on evidence, and by interacting with data based on actual everyday issues, are what data literacy in this perspective hopes to achieve. In the carpentry focus, data literacy emphasises tools and techniques, and how data is practically analysed by looking at datasets. The inclusion focus is more relevant to community informatics. The goal within this focus is on overcoming skills and knowledge inequalities, and to allow communities to access data that is useful for different aspects of their lives. Another goal is to involve marginalised people in data projects, instead of them being the intended beneficiaries. It is within the inclusion focus that data literacy is viewed as a form of a capability and, using Nussbaum’s Central Human Capabilities list (discussed in Section 3.4.11), Matthews sees data literacy as an element of “practical reason” and “political and material control over one’s environment”. Decisions based on data add value to practical reason. Data can also be used for political participation. Matthews (2016) posits that all the different data literacy parts can contribute towards capability, if they are constructed correctly.

In their paper, Heeks and Ospina (2014) analysed community informatics from a resilience perspective after noting the gap within the field. They filled this gap by developing a model that aims to bring about an understanding of the connection between community informatics and resilience. The principles from the capability approach (and the livelihoods approach) are used to derive this model. The model

views communities as systems that are made up of structure, which are components and relations; process which are functions; and properties. In the proposed model, resilience is a highlighted property that has sub-properties, namely: robustness, self-organisation, and learning. Heeks and Ospina (2014) posits that this framework can be used to analyse ICT4D projects. They also argue that the niche that this framework provides is the transcendent nature of resilience, unlike other lenses that analyse ICT4D with a focus on gender, civic participation, skills, and economic generation. The resilience lens is said to be both fundamental and overarching. It includes aspects of analysis that other approaches would miss, and focuses the attention on the long term rather than the short term. Furthermore, it adds depth and breadth to the planning, implementation, and assessment of ICT4D projects.

Blake and Garzon (2012) contemplated the components and concepts that make up the boarder limits for the field of ICT4D by reviewing recent literature. They used the capability approach as an organising principle for creating a comprehensive framework that combines other conceptual frameworks and participation processes found in ICT4D. This framework arises from a need to address certain concerns about how ICTs and poverty relate to each other. These include: low levels of academic rigor from some research; a lack of a link in the overall discourse concerning poverty alleviation; the seeming disconnect between academia and what academics need; and an inflated positive assumption of the impact of ICTs on development. The ontological, analytical, and societal complexities that are at play also give rise to the need for such a framework. The framework (Figure 3.22) shows an aerial view of the main aspects of what it takes to develop ICTs, and the steps needed for poverty reduction. It is a framework that is grounded in putting people at the centre, as is espoused by the capability approach.

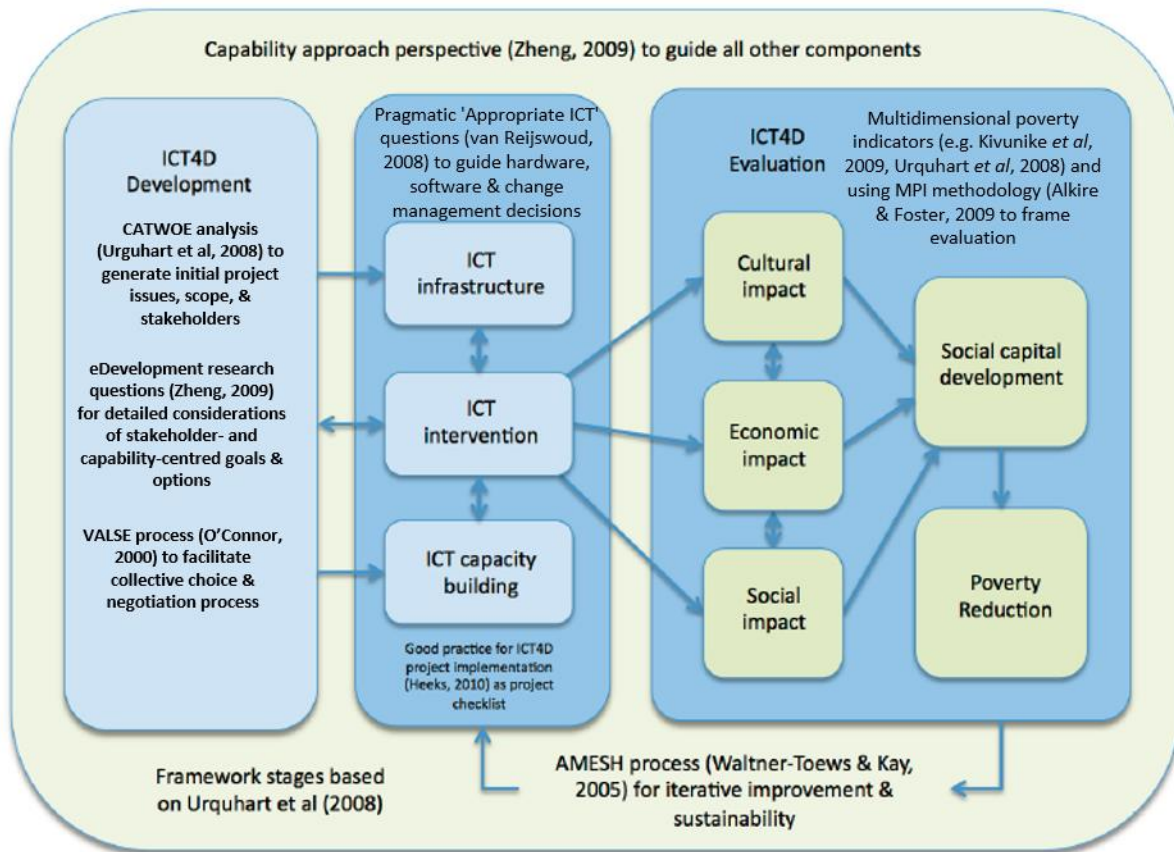


Figure 3.22 Comprehensive Framework for Sustainable Technology-Supported Participatory Development to Alleviate Poverty from (Blake & Garzon, 2012)

3.7 Themes

This study highlights several stark themes. These are prevalent through the body of work that has been identified and analysed. They include the concepts of human development, access and use of ICTs, conversion factors, and non-monetary development. These are discussed below.

7. Synthesize Studies

3.7.1 Human development

The capability approach is an approach of choice among studies looking at conceptualising human development (Adaba & Rusu, 2014). The human development approach is said to be gaining favour compared to other approaches, due to its consideration of multiple factors and its concern for the process of development and the people for whom it is intended (Kivunike *et al.*, 2011). It seems

that scholars are realising the importance of moving away from the narrow economic growth and modernisation perspectives to a more human-centred perspective of development (Donovan, 2012; Gudmundsdotti, 2010; Kivunike *et al.*, 2011; Ojo, 2016; Poveda, 2018). The human development approach, because of its multidimensional nature, enriches the assessment of an ICT4D intervention (Kivunike *et al.*, 2011). Kleine (2010) further suggests that the capability approach offers a systematic and holistic analysis for ICT4D projects, compared to the approaches that have an economic perspective of development. The analysed studies have an interest in human development and on the role that ICTs have in this development. The concepts of capabilities and functionings, inherent in the capability approach, are said to be substantial in understanding the process of human development (Aviles *et al.*, 2016). It is important that the design of ICT4D projects start from a clear human development definition (Poveda, 2018).

Not only do these studies find the human development perspective important, but the United Nations also adopted the capability approach and used it as inspiration for the Human Development Index (HDI) (Blake & Garzon, 2012; Poveda, 2018). Viewing development as “freedom” – freedom to choose the life one values – provides a way of conceptualising development in a holistic way. The capability approach puts an emphasis on people’s ability to function – the beings and doings of individuals. It is thus that many researchers have applied this human development approach in recent years (Adaba *et al.*, 2014). They are interested in what the capability approach offers: a holistic understanding of an e-government service (Andersson *et al.*, 2015), in education, communities, in health, and across the different ICT4D research fields.

3.7.2 Use of ICTs more important than access

Another theme that has stood out from this study is that of access versus use. The mere ability to access ICTs is deemed not enough, and the indicators of access are often misleading (Alampay, 2006). This applies to studies that had an interest in the use of ICTs. Just because ICTs are available and people have access to them does

not mean that people are capable of using them (Heeks, 2000; Olatokun, 2009; Sen, 1999).

Here, conversion factors become an important consideration. These are barriers or enablers of ICT use (Hatakka & De, 2011). The issue of lack of ICT use is connected to personal, social, and environmental factors that restrict individuals from using ICT resources. For those who are able to use ICTs, it is also because of personal, social, and environmental factors that are conducive to ICT use. These factors Alampay (2006) further breaks down into individual factors such as age, basic education, income, location, and gender; Kleine (2010) refers to them as “educational resources”, “psychological resources”, “information”, “financial resources”, “cultural resources”, “social resources”, “natural resources”, “material resources”, “geographical resources”, and “health”. In Gigler’s (2015) terms, these all constitute the contexts in which individuals find themselves – that is, their socio-economic condition, demographics, and cultural and political contexts. For those who consider using ICTs as important, but who are unable to use them because of these restricting factors, those are considered “unfreedoms”. Access to an ICT becomes important in as far as being the prerequisite for use; however, according to the capability approach, it is the person’s capabilities and choice that will determine the use of thereof, and whether it is valued. This makes it important to take individuals and their structural variations into account when doing developmental evaluations (Coelho. 2015) and when planning ICT4D projects. Further, it allows for a fair analysis of lack of ICT use.

3.7.4 What development looks like according to the capability approach

From the papers included in this study, it is evident that the capability approach broadens the understanding of development to go beyond indicators such as gross domestic product and providing ICT access. The capability approach allows for more nuanced interpretations of the impact of ICTs (Aricat, 2015). The beings and doings of individuals, and ICTs’ contribution to these, become the object of development. From the empirical studies discussed in this paper, it is clear that

development, as seen from the perspective of the capability approach, manifests itself in different ways.

Development looks like increased freedom in learning: to be efficient in doing school work, and to have access to more information (Hatakka *et al.*, 2012). It means increased choice: like taking a virtual trip to another country instead of not visiting at all (Kleine, 2010). It means being able to communicate with loved ones where one could not before (Yim & Gomez, 2018). It means the ability to have full information before making a purchasing decision (Kleine *et al.*, 2012). It means improved self-esteem from learning new skills, and boosting one's education, which leads to enhanced personal resources (Attwood *et al.*, 2013). It means that villages are able to pay their bills without a middleman, and that they can participate in social clubs (Madon, 2004). It means transparent and simplified e-trading for citizens (Adaba & Rusu, 2014). It means that students are able to study on their own and source their own information without the help of their teachers; it also means saving money where books can now be downloaded instead of bought (Hatakka & Lagsten, 2012). All these are but examples of functionings that were enabled by an ICT4D intervention. Further, they are real representations of development taking place at the individual and group levels.

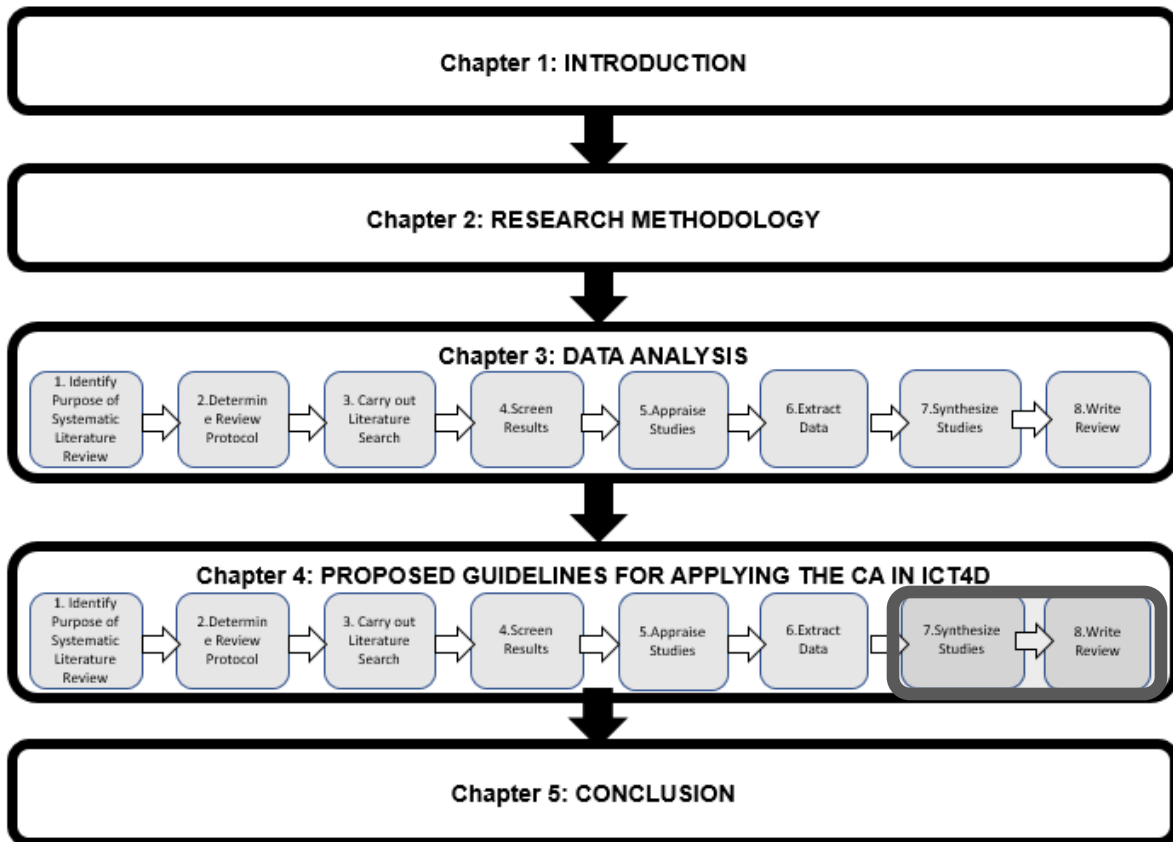
Ultimately, the end goal of development is the five types of freedom discussed earlier (Section 3.4.2). These are: economic freedom, social opportunities, political freedom, transparency guarantees, and protective security (Aricat, 2015). The examples of development provided here touch on some of these freedoms.

3.8 Conclusion

This chapter has shown how the capability approach has been used in ICT4D research. It provided a high level descriptive analysis of the findings, showing the proliferation of articles on this subject over the years. It showed the research field that dominate in using the capability approach in ICT4D; it also provided an overview of countries where empirical studies were conducted, based on the

application of the capability approach. This chapter highlighted different frameworks that have attempted to operationalise the capability approach, as well as their practical application in ICT4D projects. It furthermore showed how other scholars chose to appropriate the capability approach in their empirical studies without using a particular operational framework. Where no empirical study was conducted, this chapter highlighted how the capability approach was included in conceptual and literature review studies, where in some cases it was extended by other theories and concepts. Lastly, this chapter highlighted some themes that resonated throughout this systematic literature review. The next chapter presents the proposed guiding flowchart for using the capability approach in ICT4D studies.

4. PROPOSED GUIDELINES FOR APPLYING THE CAPABILITY APPROACH IN ICT4D



4.1 Introduction

The previous chapter provided a synthesis of the retrieved literature on how the capability approach has been used in the field of ICT4D. Using insights from the previous chapter, this chapter suggests guidelines for applying the capability approach in ICT4D research.

4.2 Application of the capability approach in ICT4D

Figure 4.1 shows four ways of applying the capability approach in ICT4D. The four ways are not mutually exclusive.

7. Synthesize
Studies

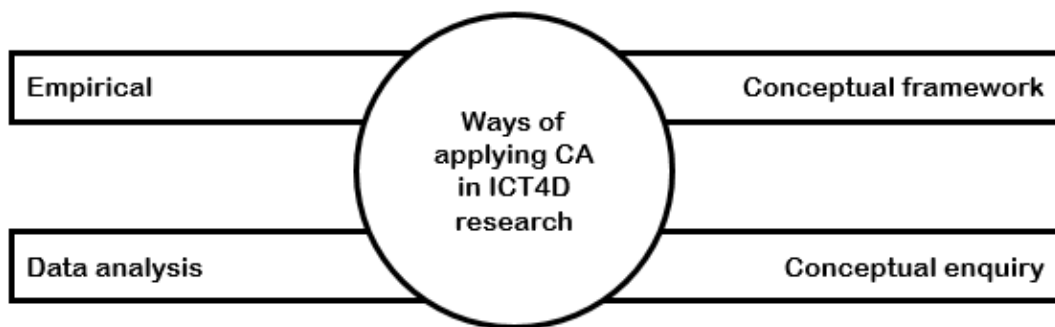


Figure 4.1 Ways of applying the capability approach in ICT4D research

1. *Empirical*

The first way of applying the capability approach in ICT4D is to use it in an empirical manner by employing one of the many available frameworks for operationalisation, some of which were identified in this study and discussed in Section 3.4. The available frameworks guide researchers in carrying out ICT4D research. They have embedded in them the concepts of the capability approach; they ask the right questions concerning individuals' contexts, their abilities, their available choices, and the functionings that they achieved by using the ICT intervention. Although most of the frameworks to operationalise the capability approach can be applied in any field, some are designed for application in specific fields. These are discussed later in this chapter (Section 4.3.1).

2. Conceptual framework

The second way of applying the capability approach in ICT4D is by using it as a conceptual or theoretical framework for a study. As seen in the previous chapter (Section 3.6), a number of scholars chose to use the capability approach only as a theoretical basis for their undertaking. This afforded them the human development perspective of development which places the human at the centre of development. Their enquiries moved away from technology and access, to how and to what extent people's capabilities had been enhanced and how their lives had been improved. Thus, using the capability approach as a conceptual framework provides scholars with a human-centred definition of development and sets the tone for a human-centred research undertaking. This moves the ICT4D study away from viewing development from an economic growth perspective, and instead to view ICTs as means to ends – lives that people value. People are not viewed as mere recipients of ICTs, but as those whose input is integral to any ICT4D endeavour.

3. Conceptual enquiry

The third way to use the capability approach is to make it the (or part of the) subject of further study. In the previous chapter (Section 3.6), a number of studies included the capability approach in their conceptual work and in literature reviews. A particular ICT (mobile phone) was studied (Smith *et al.*, 2011), and its contribution to the enhancement of human capabilities was sufficiently highlighted. Concepts were explored such as hope, data literacy, vulnerabilities, community informatics, and critical theory, all of which were explored in the context of the application of the capability approach in ICT4D. This way of applying the capability approach allows for the expansion of the approach and contributes to the field through new ideas that take the form of, for example, theories and frameworks that advance the field.

4. Data analysis

The fourth and last way of applying the capability approach is to use it as a data collection and analysis tool. It emerged from the previous chapter (Section 3.5) that

some scholars chose to use the capability approach to contextualise their findings. They used the concepts of the approach to analyse their data, using the terms capabilities, functioning, choice, and conversion factors to guide their analysis. These authors did not use any of the frameworks for operationalisation of the capability approach in their empirical search, but found it to be accessible as is. Another study (Hatakka *et al.*, 2013) used it not only to analyse data, but also to collect data. The capability approach concepts were interwoven into the questionnaire for their study in everyday language. These examples prove that the capability approach is accessible even without the frameworks to operationalise it; the researchers mentioned in Section 3.5 appropriated it for data analysis as well as data collection.

Table 4.1 maps the articles included in this study to the ways of applying the capability approach in ICT4D research, as presented in Figure 4.1. It also serves as an example guide for those intending to apply the capability approach in their research endeavours.

<i>Empirical</i>	<i>Conceptual framework</i>
- Adaba and Rusu (2014)	- Aricat (2015)
- Alampay (2006)	- Grunfeld (2014)
- Araujo and Reinhard (2014)	- Gudmundsdotti (2010)
- Ashraf <i>et al.</i> (2015)	- Kassongo <i>et al.</i> (2018)
- Attwood <i>et al.</i> (2013)	- Kivunike <i>et al.</i> (2011)
- Bass <i>et al.</i> (2013)	- Ojo (2016)
- Bisht and Mishra (2016)	- Palvia, <i>et al.</i> (2018)
- Coelho <i>et al.</i> (2015)	- Rubagiza <i>et al.</i> (2011)
- Dasuki and Abbot (2015)	- Tacchi <i>et al.</i> (2014)
- Dasuki <i>et al.</i> (2012)	- Thapa <i>et al.</i> (2012)
- Dasuki <i>et al.</i> (2014)	- Wakunuma and Masika (2017)
- Dasuki <i>et al.</i> (2017)	
- Faith (2018)	
- Grobler and de Villiers (2017)	
- Hatakka <i>et al.</i> (2014)	
- Hattakka and Lagsten (2012)	

<ul style="list-style-type: none"> - Johri and Pal (2012) - Kleine (2010) - Kleine <i>et al.</i> (2012) - Madon (2004) - Namatovu and Saebo (2015) - Ndung'u <i>et al.</i> (2012) - Nyemba-Mudenda and Chigona (2018) - Olatokun (2009) - Omar <i>et al.</i> (2016) - Poveda and Roberts (2018) - Sahay and Walsham (2017) - Yim and Gomez (2018) 	
Data analysis	Conceptual inquiry
<ul style="list-style-type: none"> - Andrade and Doolin (2016) - Anwar and Johanson (2015) - Hatakka <i>et al.</i> (2013) - Stratton and Grace (2016) - Takavarasha <i>et al.</i> (2017) - Thomas and Parayil (2008) 	<ul style="list-style-type: none"> - Blake and Garzon (2012) - Egessa <i>et al.</i> (2018) - Heeks and Krishna (2016) - Heeks and Ospina (2014) - Johri and Pal (2012) - Loh (2015) - Matthews (2016) - Mizohata and Jadoul (2013) - Oosterlaken (2011) - Smith <i>et al.</i> (2011) - Stillman and Denison (2014) - Thapa and Saebo (2014) - Zheng (2009) - Zheng and Stahl (2011)

Table 4.1 Mapping of studies to the ways in which the capability approach can be used

4.3 Guiding flowchart for using the capability approach in ICT4D research

7. Synthesize
Studies

Figure 4.2 presents a guide to assist in choosing the appropriate operationalisation frameworks for different enquiries in ICT4D, so as to enable researchers to use the approach. It is in line with Figure 4.1, which shows the ways of applying the capability approach in ICT4D. Whereas Figure 4.1 provides a view of where research found in this study fits in terms of its use of Sen's capability approach, Figure 4.2 provides more detail for arriving at the most appropriate way to apply the capability approach.

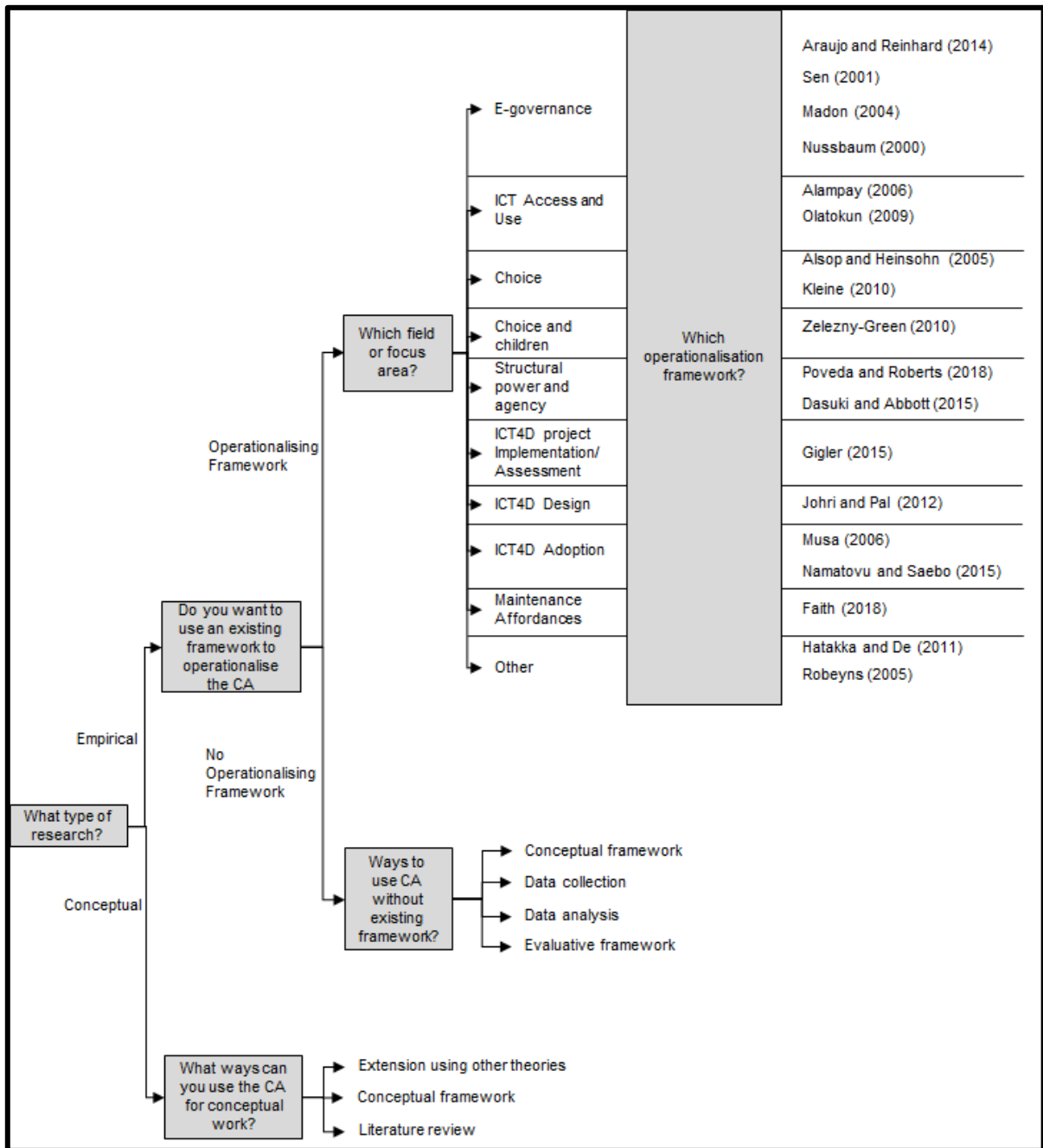


Figure 4.2 Guidelines for applying the capability approach in ICT4D

4.3.1 Empirical research using a framework that operationalises the capability approach

The starting point of this guide is to determine what type of research one seeks to undertake. It has been discovered from this research that the papers that use the

capability approach mainly fall into two groups, namely, empirical and conceptual. For empirical studies, this guiding flowchart suggests that there is a choice between using a framework that operationalised the capability approach and not using an approach. If one opts to use an existing framework, there are a number of frameworks available, each with their own focus, that are appropriate for certain applications:

E-governance

For projects related to e-governance, there are four suitable frameworks or means of application. The first is by Araujo and Reinhard (2014), who simplified Robeyns' (2005) framework and applied it in an e-governance project. It worked well in the e-governance context and for its intended purpose; it was able to uncover the uses of e-governance by citizens, given their conditions of acquisition and their freedom and ability to choose. One would use this framework to assess the root causes for use or lack of use of e-governance services, as well as to determine what citizens mostly used e-governance services for.

The second means of application is Sen's (2001) five freedoms. These are also appropriate for e-governance studies, as they are concerned with citizen's economic freedoms, the opportunities that they have in society, their political freedoms, their protective security, and their transparency guarantees. Studies (Dasuki *et al.*, 2012; Ashraf *et al.*, 2015) that applied this framework analysed how ICTs affected each one of these freedoms. This framework is ideal for studies that are interested in all these freedoms and how ICTs enable or restrict these for citizens.

The third means of applying the capability approach in e-governance is Madon's framework for evaluating the impact of e-governance. The framework asks questions related to the ICT intervention: what the ICT applications can do; what the functionings are that have been enabled; how people utilise the opportunities presented by the system; and what the barriers are to achieving functionings. Studies that applied this framework (Madon, 2004; Adaba & Rusu, 2014) were able

to do a comprehensive analysis of what was enabled for the citizens by the particular ICT applications, and whether or not they were able to utilise these in their contexts. This framework differentiates itself from the rest in that it asks for an analysis or a list of what ICT can actually do; from then onwards it seeks to uncover what citizens have done with those services.

The last recommended framework is Nussbaum's (2000) Central Human Capabilities list. Every human being has a right to dignity, and this list is premised on that notion. Nussbaum (2003) posits that for a society to be just, it must afford each one of its citizens all the capabilities on the Central Human Capabilities list, namely: life, bodily health, bodily integrity, senses, imagination and thought, emotions, practical reason, affiliation, engagement with other species, play, and control over one's environment. In ICT4D, this framework is ideal to be used in e-governance projects and any government-initiated project, as it provides a checklist for governments to ensure that these capabilities, as well as social justice, is sought for its citizens.

ICT access and use

If the focus of an ICT4D enquiry is on ICT access and use, the ideal framework to apply is by Alampay (2006). This framework specifically makes access and use of ICTs the subject of its analysis. It starts off by determining peoples' individual differences, and then examines whether they have a choice to access and use ICTs. Scholars who used this framework (Alampay, 2006; Olatokun, 2009) were able to discover the reasons behind the lack of use of ICTs by people, although they had access. This framework is ideal for enquiries interested in how ICTs are accessed and appropriated.

Choice

Choice is another area of interest for scholars. This study discovered two frameworks discovered that operationalise the capability approach that have choice as one of the main focus areas – the Empowerment Framework (Alsop and

Heinsohn, 2005) and the Choice Framework (Kleine, 2010). Along with structure and agency, the Empowerment Framework is concerned with individual's degrees of choice, which are: whether choice exists, whether a choice is made, and whether the choice made meets the individual's expectation. These degrees of choice provide a useful breakdown of choice, which allows choice to be examined more effectively. Domain (where empowerment takes place) is what makes this framework different from Kleine's (2010) Choice framework. Thus, if scholarly inquiry is on choice as well as domain, the Empowerment framework is ideal. Bisht and Mishra (2016) used the Empowerment Framework to operationalise the capability approach. They examined empowerment in the following domains: personal, social, economic, and political.

Further, the Choice Framework (Kleine, 2010) was drawn from the Empowerment Framework (Alsop and Heinsohn, 2005). Although it has similarities – in terms of components, which are structure and agency – its differentiating factor is its focus on outcomes (as opposed to domains). It considers the same degrees of choice (from the Empowerment Framework), but examines these in relation to their ability to achieve individuals' desired outcomes. Thus, if a study seeks to focus on choice and primary and secondary outcomes, the Choice Framework is ideal for use. In addition, the Choice Framework elaborates further on agency by providing a list of resources that affect people's agency. Scholars who used this framework (Attwood *et al.*, 2013; Coelho *et al.*, 2015; Kleine, 2010; Kleine *et al.*, 2012; Yim and Gomez, 2018) found it a useful framework for operationalisation of the capability approach.

Lastly, if an enquiry is concerned with choice and children, the Child-Centred Choice Framework (CCCF) by Zelenzy-Green (2010), which adds to the Choice Framework by incorporating children, is ideal.

Structural power and agency

A framework that augments the capability approach with critical theory and agency is also available to enquiries that are interested in how structural issues of power

and agency relate to the achievement of capabilities. This framework (by Poveda and Roberts, 2018) found a gap in the conceptually rich capability approach in that it omitted to account for power interests that pose constraints to humans' ability to develop, and it is inadequate on practical guidance for individuals to break through structural unfreedoms. Scholars using this framework (Poveda and Roberts, 2018) were able to determine the factors that were causing discrimination and disadvantage to a particular gender in the ICT sector of a certain country. Therefore, this is the ideal framework for researching issues of structural power and how individuals get themselves out of identified unfreedoms.

Dasuki's and Abbott's (2015) presents an alternative framework for dealing with power. The framework is concerned with powers in society that enable or restrict people from fully exploiting resources that can further their lives. Drawing from the capability approach and Luke's (1974) conception of power, which distinguishes between three dimensions of power, one can expose covert and overt power that is restricting or enabling.

ICTD4 project implementation and assessment

The Alternative Evaluation Framework (Gigler, 2015) has a differentiating factor, which is its incorporation of the Sustainable Livelihoods framework. This differentiating factor considers different resources such as human capital, informational capital, natural capital, and social capital. The Alternative Evaluation Framework also emphasises the need to contextualise ICTs and the information that they set to provide to communities. It is not enough to provide poor people with ICTs, but ICTs need to be fit-for-purpose for the realities that people face in order for communities to enjoy benefits that are sustained in the long term. The framework also describes five stages of ICT projects, which would be helpful in project implementation to make stakeholders aware of factors that would yield the best ICT4D project outcomes for recipients. Thus, this framework is ideal for going the distance with locals of a community in providing ICT4D solutions.

ICT4D design

A framework that can be used for the design of ICTs is also available. It attempts to fill the gap that Johri and Pal (2012) notices in literature of a lack of focus on design. This led to the development of Capable and Convivial Design (CCD). It draws concepts from the capability approach of creating ways for people to freely exercise opportunities, and of empowering them from their existing capabilities to their aspirations. It also draws from Illich's (1973) conviviality concepts, which are about empowering those who will use ICT to have a say regarding the design of infrastructure and tools of which they are the intended beneficiaries. This framework is ideal to help create ICT4D artefacts; it also ensures that the intended users are part of the design process.

ICT4D adoption

A framework exists that is suitable to the assessment of technology adoption in developing countries. This is a revision of TAM that was created by Musa (2006). This revised TAM incorporates aspects of the capability approach. The aspects that are added are that of accessibility and exposure, as it recognises that people in poorer areas have insufficient access to ICTs. Using the framework in an empirical study, Musa (2006) was able to determine that access to ICTs does lead to sustainable use.

An alternative framework in this area is one that combines the diffusion of innovation theory with the capability approach (by Namatovu & Saebo, 2015). This framework is ideal if one is interested in assessing what motivates people to adopt ICTs – it is interested in explaining ICT use. While the diffusion of innovation is concerned with reasons for use, the capability approach is added to understand the impact of that use. Namatovu and Saebo (2015) found the framework useful in their empirical study, as they were able to understand the things that motivated people to use mobile phones; these included better health, as people were able to use mobile phones to search for health information, which enhanced their health capabilities.

The study found that those in business could run their business affairs efficiently. There was also social development, as students were now able to search for educational material.

Maintenance affordances

A framework that understands that technology has to be maintained is one by Faith (2018), which combines the maintenance affordance theory with the capability approach. This framework is ideal for researchers or practitioners who intend to identify aspects about a technology that may hinder its use; this is keeping in mind that technology has its own sets of needs, and it is up to the user to ensure that these needs are taken care of. These needs include repairs and making sure that the technology is charged adequately. These maintenance affordances are seen as directly impacting an individual's capability to use resources in order to live the lives that they value. This framework helps to draw a researcher's attention to the fact that technology has to be maintained.

Other ICT4D uses

Robeyns' (2005) framework is a representation of the basic concepts that constitute the capability approach. It considers social context, means to achieve (goods and services), individual conversion factors, capability sets (which are opportunity sets of achievable functionings), choice, and achieved functionings. Because this framework stays true to the capability approach, it provides an approach that can be used in any research undertaking that seeks to evaluate the impact of ICT4D. This framework was found useful by some scholars (Dasuki *et al.*, 2014; Dasuki *et al.*, 2017; Ndung'u *et al.*, 2012; Sahay and Walsham, 2017) who sought to operationalise the capability approach in its pure form.

Another framework that operationalises the capability approach concepts, and that can be applied in any ICT4D impact evaluation endeavour, is one by Hatakka and De (2011). It differs from the one by Robeyns in that, whereas the one by Robeyns uses good and services, it has the intervention construct, which comprises the

actual technology artefact and its support (e.g., training). Thus, attention is also brought to the artefact for evaluation; it gives the complete picture of functionings enabled by the intervention, given individuals' enabling or restricting conversion factors. Scholars (Hatakka and Lagsten, 2012; Hatakka *et al.*, 2014; Nyemba-Mudenda and Chigona, 2018) were able to use this framework to operationalise the capability approach by applying it healthcare and education.

To further provide guidance on the frameworks that operationalise the capability approach, Table 4.2 shows the impact of the respective frameworks. It shows the number of citations of the articles in which the frameworks appear, based on Hartzing's Publish or Perish application. Where the paper was not available in Hartzing's Publish or Perish, databases were used (as of January 2019).

Framework	Number of citations	Source of citation
The capability approach applied to access to ICTs (Alampay, 2006)	66	Hartzing's Publish or Perish
Capability approach reference model (Araujo & Reinhard, 2014)	6	Hartzing's Publish or Perish
Empowerment Framework (Alsop and Heinsohn, 2005, 2005)	600	Hartzing's Publish or Perish
A Framework Using Institutional Analysis and the Capability Approach (Bass <i>et al.</i> , 2013)	34	Hartzing's Publish or Perish
Socio-technical evaluative framework (Dasuki & Abbott, 2015)	12	Hartzing's Publish or Perish
Capability approach and maintenance affordances (Faith, 2018)	1	Hartzing's Publish or Perish
Alternative Evaluative Framework (Gigler, 2015)	35	Hartzing's Publish or Perish

Operationalisation of the capability approach (Hatakka & De, 2011)	45	Hartzing's Publish or Perish
Convivial and Capable Design (Johri & Pal, 2012)	46	Hartzing's Publish or Perish
Choice Framework (Kleine, 2010)	296	Hartzing's Publish or Perish
E-government impact evaluation framework (Madon, 2004)	279	Hartzing's Publish or Perish
Revised TAM for developing countries (Musa, 2006)	79	Hartzing's Publish or Perish
Central Human Capabilities (Nussbaum, 2000)	9173	Hartzing's Publish or Perish
Critical theory and development (Poveda & Roberts, 2018)	13	Hartzing's Publish or Perish
Stylised Non-Dynamic Representation of the Concepts of the Capability Approach Framework (Robeyns, 2005)	66	EBSCOhost
Sen's five freedoms (Sen, 2001)	434	Hartzing's Publish or Perish

Table 4.2 Number of citations per article where framework appears

The graph in Figure 4.3 presents the citation results. It indicates that Nussbaum's (2000) article has been cited the most, followed by Alsop and Heinsohn's (2005), and then by Sen's (2001). It should be noted that the frameworks identified in these three articles are not exclusive to the ICT4D community, but have application across other fields, including social justice. For articles that discuss frameworks with a specific focus on ICT4D, the graph shows that Kleine's (2010) article, followed by Madon's (2004), have the most impact.

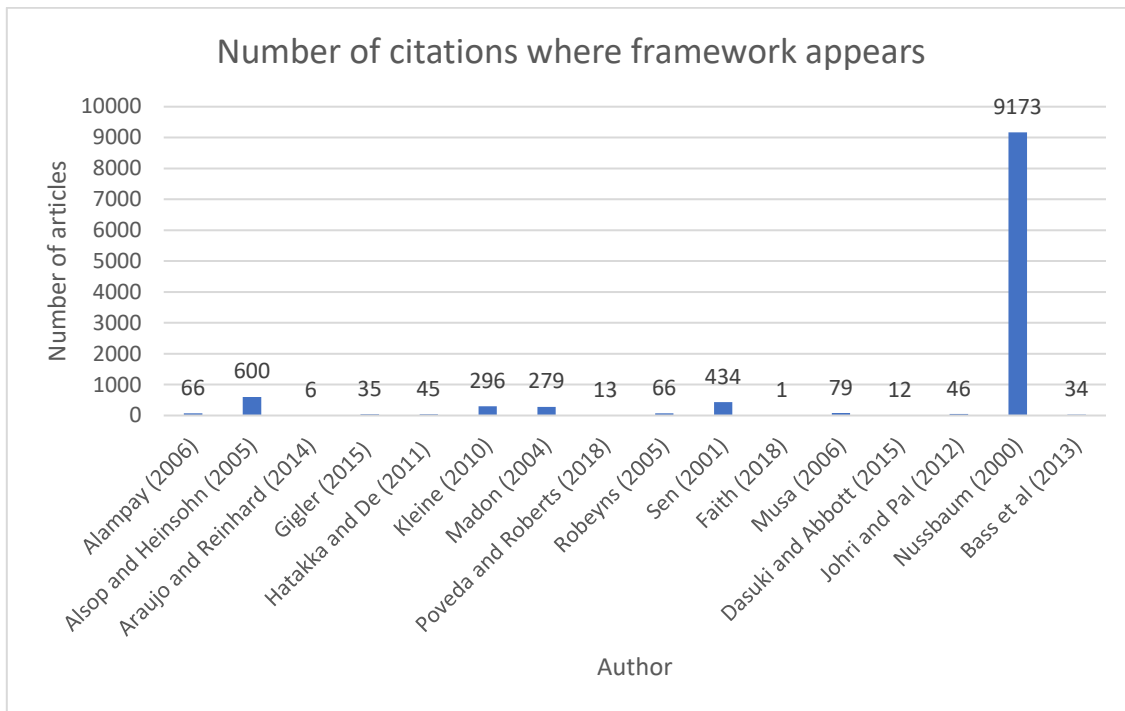


Figure 4.3 Number of citations per article where a framework that operationalises the capability approach appears

4.3.2 Empirical research using capability approach concepts

Several scholars applied the capability approach without using any of the identified operationalisation approaches. Instead, they appropriated the approach in three ways: as a conceptual approach, by incorporating the concepts in their data collection methods, and by using the capability approach to analyse their findings.

Conceptual framework

Scholars (Gudmundsdotti, 2010; Kivunike *et al.*, 2011; Kassongo *et al.*, 2018; Ojo, 2016; Rubagiza *et al.*, 2011; Wakunuma & Masika, 2017) found it useful to adopt the capability approach as the guiding foundation for their studies. They subscribed to the notions of development (of being human-centered) that are embodied in the capability approach. Thus, this way of appropriating the capability approach is one that a researcher can apply to frame their study regarding issues of development that are anticipated by ICT4D projects.

Data collection and analysis

Another way to use the capability approach without using any one of the existing frameworks is to incorporate it in data collection strategies and in the analysis of findings. Scholars (Hatakka *et al.*, 2013) found it useful to incorporate some capability approach concepts in their data collection strategy. Thus, researchers can use the approach in their questionnaires, interviews, surveys, and other instruments by framing the questions that use the capability approach concepts in language that is easily understood by research participants. Similarly, the concepts of the capability approach are also appropriate for use in data analysis.

4.3.2 Conceptual research using the capability approach

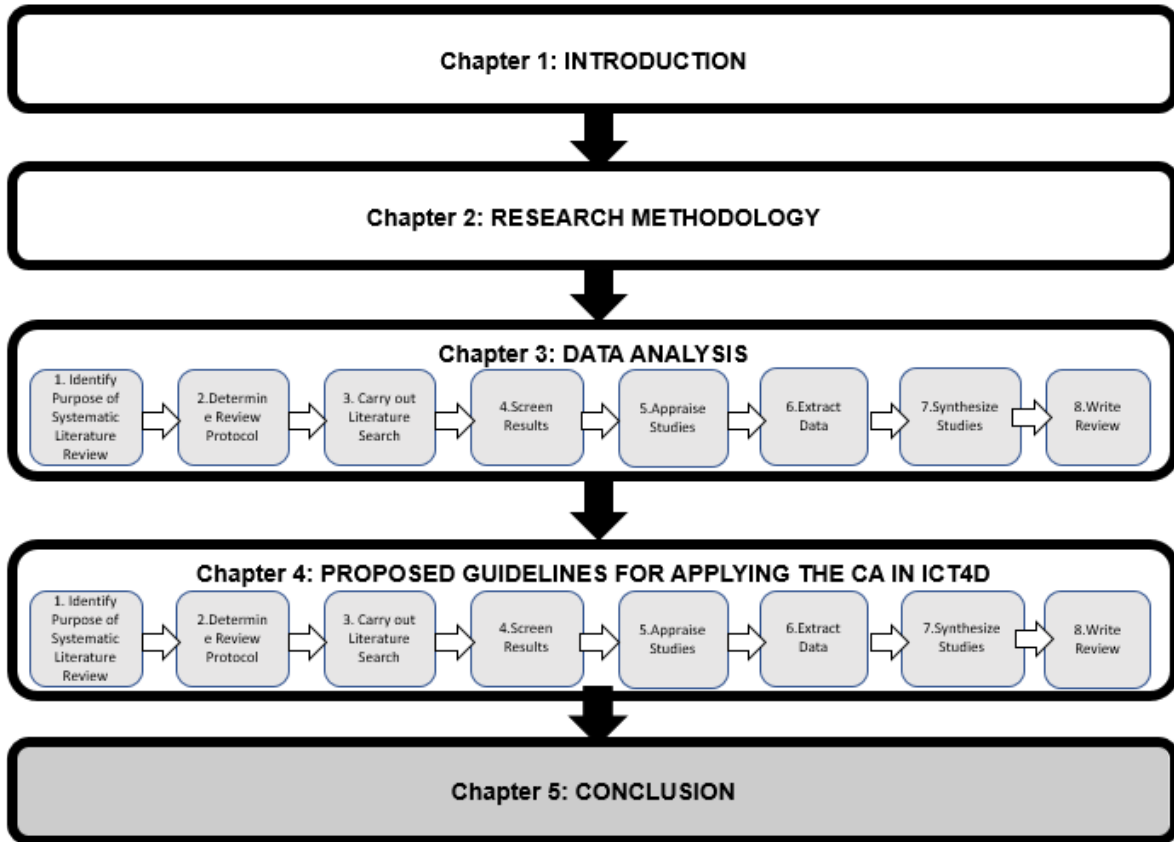
The guiding flowchart (Figure 4.2) shows that if researchers are interested in undertaking a conceptual study, they can do so by using the capability approach either as a conceptual framework, by extending it with other theories and frameworks, or as a subject of a literature review in ICT4D. Scholars (Heeks & Krishna, 2016; Loh, 2015; Matthews, 2016; Oosterlaken, 2011; Smith *et al.*, 2011; Thapa & Saebo, 2014; Zheng & Stahl, 2011) utilised the approach in these various ways. The capability approach can be seen as being extended by concepts such as hope and data literacy, and as being compared with concepts such as vulnerabilities (Heeks & Krishna; Loh, 2015; Matthews, 2016). Gaps identified in the capability approach are enhanced by other theories, for example, critical theory (Zheng &

Stahl, 2011). Further, literature reviews are undertaken where the capability approach is used in connection with ICTs such as mobile phones (Smith *et al.*, 2011). This type of research is a viable alternative to empirical research, and allows the capability approach to be explored and extended further.

4.4 Conclusion

This chapter described the landscape of use of the capability approach in ICT4D. It showed the four different ways in which the capability approach has been used by scholars in their research endeavours, which are: empirical use, use in conceptual enquiry, use in data collection and analysis, and use for the conceptual framework of a study. This chapter also presented the guiding flowchart for using the capability approach in ICT4D studies. The next chapter concludes the study.

5. CONCLUSION



5.1 Introduction

National governments and international agencies pour large investments into ICT4D initiatives with the hope and belief that ICTs will improve the lives of the poor (Andersson *et al.*, 2015; Aruajo & Reinhard, 2014; Wakunuma & Masika, 2017). Measuring the developmental impact of these initiatives is a difficult task (Heeks & Molla, 2009), but one that needs to be done in order to see the extent to which the investments meet their intended purpose. Mainstream development indicators have focused on economic growth (Dasuki *et al.*, 2012); however, there are increased calls for more human-centred and holistic development approaches. The capability approach is one such human-centred approach. While it has been gaining popularity in general, it has also gained much popularity in the field of ICT4D specifically (Thapa & Saebo, 2014). The capability approach, though powerful conceptually, was methodologically found wanting (Zheng & Walsham, 2008). Hence, there have been numerous attempts by scholars to operationalise it. However, there is no structured way of using the capability approach in ICT4D, which can be a deterrent for novices to the approach in the field of ICT4D. The objective of this study was to provide guidance for the use of the capability approach in ICT4D studies. The objective included showing the different ways in which the capability has been applied and appropriated by different scholars.

This research was undertaken using a systematic literature review approach. This was done so that the capability approach landscape within the ICT4D field could be better understood. Journals and databases were searched to find out how the capability approach has been used in ICT4D literature. High level insights from the literature search were presented by means of graphs that show the sources of articles, the distribution of the articles over time, the locations where empirical studies were conducted, the various research fields where the approach was applied, and the different frameworks that have sought to operationalise the capability approach. The operationalisation frameworks found through the literature search were each discussed and their empirical application was presented. For

those studies that did not use any operationalisation framework in their empirical undertaking, this paper showed how the authors appropriated the capability approach. This paper also presented how the capability approach has been used in studies that were not empirical. Themes were then highlighted to show what many of the articles have in common. Lastly, a flow chart that guides the use of the capability approach in ICT4D studies was presented.

5.2 Addressing research questions

This research sought to answer questions regarding the use of the capability approach in ICT4D, and did so in the following manner:

Sub-research questions:

- **How has the capability approach been used to date in ICT4D research?**

This paper showed that there are various ways to apply the capability approach. Through the means of a systematic literature review, this paper showed four main ways to apply the capability approach in ICT4D studies (Figure 5.1). The capability approach can be used in empirical studies using one of the frameworks available to operationalise it. It can also be used as a conceptual framework in a study where its concepts are used as the bases for empirical or conceptual research. Further, it can be used without a framework for operationalisation – instead, its concepts can be interwoven in data collection and analysis methods. Furthermore, it can be the subject of conceptual study, where it is combined with other concepts that enrich it, or it can be the subject of a literature review.

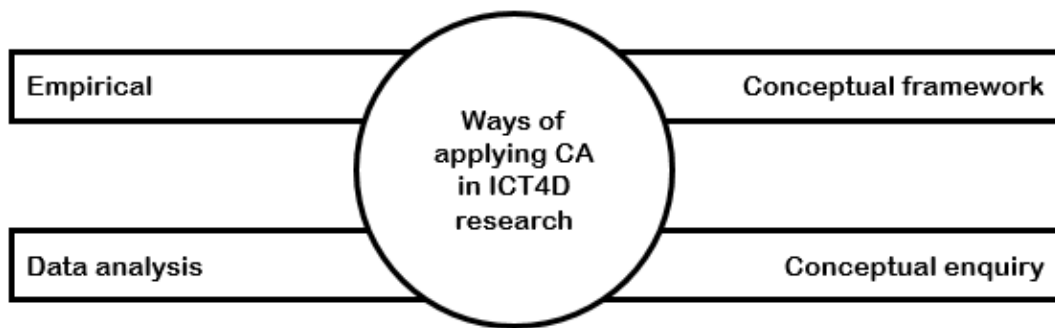


Figure 5.1 Ways of applying the capability approach in ICT4D research

- **Which operationalisation frameworks have been developed to apply the capability approach in ICT4D?**

A number of researchers have sought to operationalise the capability approach. Through a systematic literature review, this study showed the various frameworks and their applications (see Section 3.4). Although some were generic and can be applied in any ICT4D context, others were found to be specific to a field or subject area. For studies in e-governance, this study found four frameworks (Araujo & Reinhard, 2014; Madon, 2004; Nussbaum, 2000; Sen, 2001) that operationalise the capability approach. This study also found frameworks that specifically evaluated ICT access and use (Alampay, 2006; Musa, 2006). Frameworks were also found that deal with choice, and one was found that incorporates children (Alsop & Heinohn, 2005; Kleine, 2010; Zelenzy-Green, 2010). Frameworks that seek to evaluate structural power and agency (Dasuki & Abbott, 2015; Poveda & Roberts, 2018) were also found. A framework was found that seeks to evaluate ICT project implementation (Gigler, 2015). Another framework is concerned with ICT4D design (Johri & Pal, 2012), and another with ICT4D adoption (Musa, 2006). Furthermore, frameworks have also been developed that focus on ICT4D diffusion (Namatvu & Saebo, 2015) and maintenance affordances (Faith, 2018). Lastly, generic frameworks (Hatakka & De, 2011; Robeyns, 2005) were found that may be applied to any ICT4D impact assessment endeavour. Table 5.1 provides a list of the frameworks, the purpose for which they were applied, the studies in which they were used, and the fields in which they were applied.

Framework	Purpose/for what purpose it was used	Used in	Fields applied
The capability approach applied to access to ICTs (Alampay, 2006)	To analyse ICT access and use	Olatokun (2009) Alampay (2006)	Communities
Empowerment Framework (Alsop and Heinsohn, 2005)	To understand and measure empowerment	Bisht and Mishra (2016)	Financial services
Capability approach reference model (Araujo and Reinhard, 2014)	To evaluate the impact of electronic government services	Araujo and Reinhard (2014)	E-governance
Institutional theory and the capability approach (Bass <i>et al.</i> , 2013)	To assess how capabilities strengthen institutions	Bass <i>et al.</i> (2013)	Education
Socio-technical analysis of ICT investments (Dasuki & Abbott, 2015)	To assess relations in ICT4D	Dasuki and Abbott (2015)	E-governance
Affordances and the capability approach (Faith, 2018)	To assess the impact of cell phones	Faith (2018)	Communities
Alternative Evaluative Framework (Gigler, 2015)	To evaluate ICT4D projects	Gigler (2015)	ICT projects
Operationalisation of the capability approach (Hatakka and De, 2011)	To evaluate students' use of internet resources	Hattakka and Lagsten (2012) Nyemba-Mudenda and Chigona (2018) Hatakka <i>et al.</i> (2014)	Education Health
Capable and convivial design (Johri & Pal, 2012)	To design ICTs for human development	Johri and Pal (2012)	Education
Choice Framework (Kleine, 2010)	To evaluate the impact of community-based ICT4D projects To co-design technologies with users/To apply CA to action research	Kleine (2010) Kleine <i>et al.</i> (2012) Yim and Gomez (2018) Attwood <i>et al.</i> (2013) Coelho <i>et al.</i> (2015)	Telecentres Consumer studies Mobile phones
E-government impact evaluation framework (Madon, 2004)	To evaluate ICT4D e-governance projects	Madon (2004) Adaba and Rusu (2014)	E-governance
Revised TAM for developing countries (Musa, 2006)	To assess technology adoption	Musa (2006)	Communities

Diffusion of Innovation and the capability approach (Namatovu & Saebo, 2015)	To assess people's motivation to use ICT and development outcomes	Namatovu and Saebo (2015)	Communities
Central Human Capabilities (Nussbaum, 2000)	To assess quality of life and assist in political planning	Nussbaum (2000)	Social Justice
Psychology and development (Poveda, 2018)	To evaluate the impact of ICT on social and psychological well-being	Poveda (2018)	Education
Critical theory and development (Poveda and Roberts, 2018)	To analyse ICT4D project and structural power	Poveda and Roberts (2018)	Education ICT sector (Film)
Stylised Non-Dynamic Representation of the Concepts of the Capability Approach Framework (adapted from Robeyns, 2005)	To evaluate participation To evaluate use of the public healthcare system To evaluate the impact of educational programs	Ndung'u <i>et al.</i> (2012) Dasuki <i>et al.</i> (2014) Sahay and Walsham (2017) Dasuki <i>et al.</i> (2017)	E-governance health education
Sen's five Freedoms (Sen, 2001)	To evaluate ICT4D e-governance projects	Dasuki <i>et al.</i> (2012) Ashraf <i>et al.</i> (2015)	E-governance

Table 5.1 Frameworks that operationalise the capability approach and their uses in ICT4D

Main research question:

- **What guidelines for using the capability approach in ICT4D research can be learnt from existing research?**

Ultimately, this paper presented guidelines for applying the capability approach. It incorporated the four ways of applying the capability approach in ICT4D research, as well as the various fields and subject areas. By means of a flowchart (Figure 5.2), the guidelines stipulate which operationalisation framework can be applied under which condition for empirical studies; for non-empirical studies it stipulates the ways in which the capability approach can be applied. It guides the user through, and starts off by, enquiring what type of research is being embarked on – whether empirical or conceptual. If it is an empirical study, then there is an option to either use one of the existing frameworks that have been developed to operationalise the

capability approach, in which case one can choose the most appropriate framework given their area of study. If it is an empirical study, one can also choose not to use a framework, but instead to use the capability approach as a conceptual framework, or incorporate its concepts to collect and analyse data. If one is embarking on a conceptual study, the guide suggests that the capability approach can be extended by other concepts and frameworks. It can also be used as a conceptual framework for a conceptual study, or it can be included as subject of a literature review. These guidelines were derived from the sum of the papers used in this study.

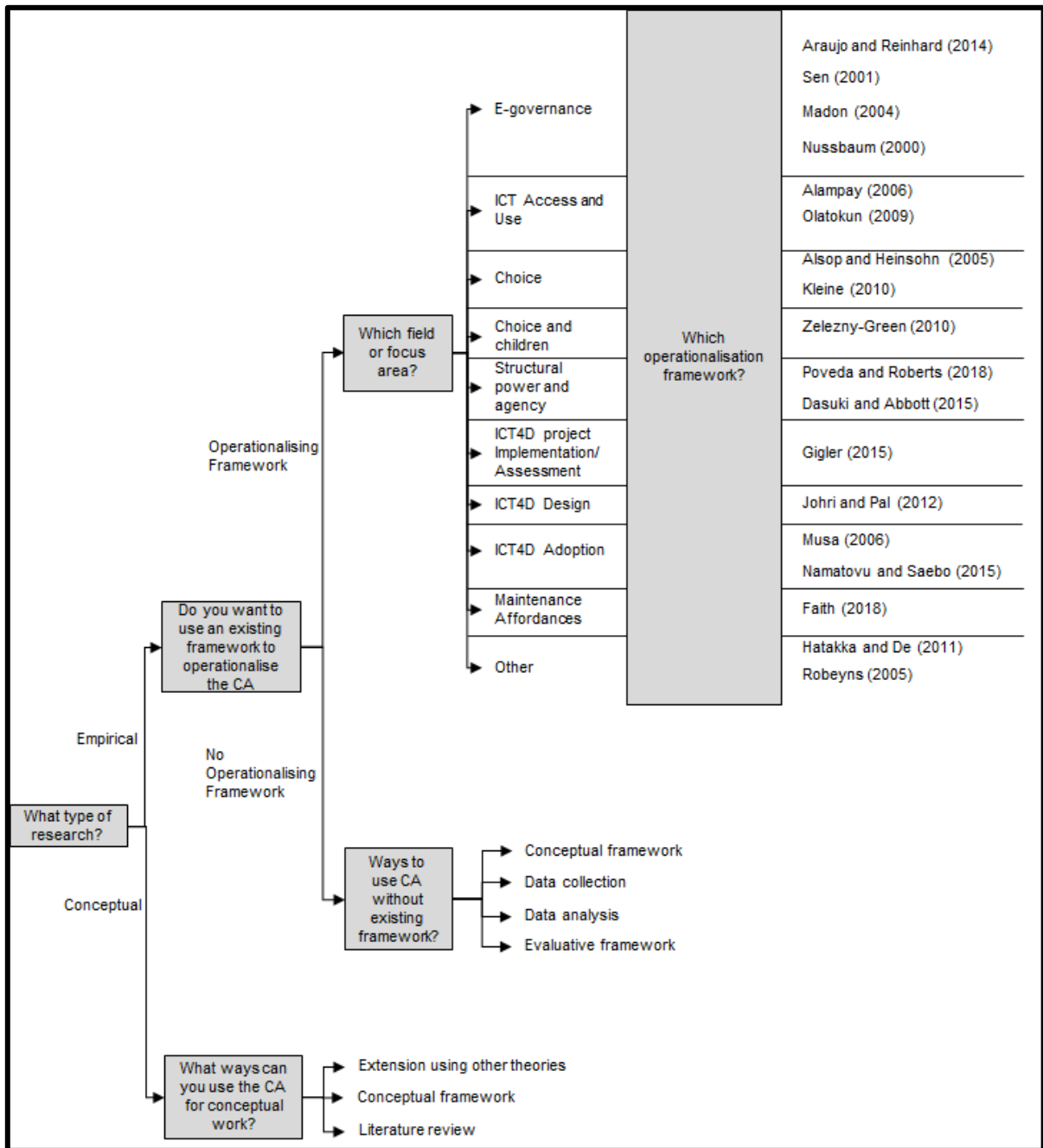


Figure 5.2 Guidelines for applying the capability approach in ICT4D

5.3 Contribution of the study

This paper contributes to the field of ICT4D by showing the landscape of use of the capability approach in ICT4D. It showed the four ways in which the capability approach can be and has been applied, namely: 1) empirically using one of the

frameworks by different authors; 2) empirically, without using any of the frameworks that operationalise it; 3) as a conceptual framework; and 4) as a subject of a research enquiry.

Another contribution is the themes associated with the use of the capability approach in ICT4D that are highlighted; one of these is the concern for human-centred development as opposed to economic growth when assessing the impact of ICTs. The other, where the research was about access to ICT for the recipients, is the importance of looking further than access to consider the factors that contribute to the use or lack of use. The last theme highlighted the face of development from the capability approach lens; this did not exclusively entail economic growth, but what people were actually able to do – that is, what capabilities and functionings were enabled by the ICT intervention.

Another contribution made by this study is the identification of the attempts by various authors to operationalise the capability approach. The fields in which these frameworks are applied are also highlighted (Table 5.1).

Another contribution is that of showing the non-empirical use of the capability approach in ICT4D. This study showed that the approach can be used in conceptual studies, where it gets enriched by being combined with other theories and concepts. This paper also showed that the capability approach can be used as a subject of literature reviews.

This study also contributed, by means of a flowchart, guidelines for using the capability approach in ICT4D research for novices and seasoned researchers. It asks questions and provides possible options for use of the capability approach, and ultimately provides a recommendation for the operationalisation framework, depending on the field or the subject area, or ways to use it without the operationalisation framework.

5.4 Limitations

The study has the following limitations:

- Only the journals and databases stipulated in this study were considered for this systematic literature review;
- Articles considered for the systematic literature review were from the commencement date of the journals and databases until August 2018;
- The findings and contributions made by this study are limited to the literature found in the literature search;
- Not all articles were discussed to the same extent; and
- The guiding flowchart was not tested as part of this research.

5.5 Reflection on researcher's learning

Through this study, the researcher has learned the value of applying the capability approach in ICT4D studies. There is great value in placing the human at the centre of an ICT4D enquiry. The researcher learned that by doing so, the use of the capability approach provides a holistic view of the factors that contribute to an individual's development; these factors are often overlooked when using other means of assessment. The researcher also learnt and appreciated the patience required to undertake such an academic journey, and the value that it brings in contributing to the body of knowledge. The researcher acquired the skill of undertaking a research project, and can apply its principles in many areas of her work and career. Lastly, the researcher has learned to be more sensitive and compassionate when assessing or viewing any intervention that is aimed at helping individuals at work or in society.

5.6 Opportunities for future research

Opportunity exists for future research to add to, and expand on, the guiding flowchart for using the capability approach in ICT4D proposed in this study. As more frameworks to operationalise the capability approach are developed in different

fields or subject areas, they can be added to the guiding flowchart. In addition, as new ways of applying the capability approach in ICT4D emerge, they too can be added to the guiding flowchart to expand the applicability to the capability approach.

The scope of this study did not include the testing of the guiding flowchart to see how well it works, and if there are any gaps. There is thus opportunity for future research to test the guiding flowchart to determine its helpfulness and to highlight any omissions.

5.7 Conclusion

This chapter concluded this study, which had the objective of investigating how the capability approach has been used to date in ICT4D in order to provide a guide for future use. It revisited the research problem, and showed how each research question was addressed by the study. It presented the contributions that this study has made in the field of ICT4D and highlighted, among the contributions, the development of a guide to apply the capability approach in ICT4D. Thereafter, this chapter listed the limitations of this study and presented the researcher's learnings from this research undertaking. Lastly, it presented opportunities for future research.

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