

# **A Systematic Literature Review of the Application of Capability Approach in the ICT4D Studies**

*Research full-length paper*

*General Track*

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## **Abstract**

*The applicability of the Capability approach (CA) continue to be a lingering problem in the Information and Communication Technology for Development (ICT4D) studies. The aim of this systematic literature review (SLR) is to review the use of the CA and its application in the ICT4D studies. The study synthesized literature from Three ICT4D journals: The Information Technologies & International Development (ITID), Electronic Journal of Information Systems in Developing Countries (EJISDC) and Information Technology for Development (ITD). We reviewed articles published between January 2004 to January 2019. The study reveals a mismatch and misalignment on the understanding of some of the concepts of the CA such as development; there seems to be lack of dearth knowledge on development and its applicability in the ICT4D domain. This calls for a further examination and contextualisation of the concepts of the CA.*

*Keywords: Information and Communication Technology for Development (ICT4d), Systematic Literature review (SLR), Capability Approach (CA).*

# 1 Introduction

The capability approach (CA) was first introduced by Amartya Sen in the 1980's. The CA depict a normative framework that is used for the assessment and evaluation of individual well-being, poverty, standard of living, quality of life or well-being and inequality (Robeyns, 2005; Kleine, 2010). As extended by other researchers (Nussbaum, 2000; Robeyns, 2001), it gives a well-being based approach to evaluation. Sen (1999) argued that to achieve a quality of life, individuals are required to consider the freedom to live the type of life they find valuable. He argued that development and well-being are evaluated from people's capabilities to function including the opportunities and freedom to be and to do what they value.

Over the last decade, the CA has proved to be one of the most prevalent framework for discussing and evaluating equality, justice, well-being and development (Oosterlaken, 2012). Recently, the CA has been frequently used in Information and Communication Technology for Development (ICT4D) studies; especially in providing insights into how ICTs contributes to human development (Dasuki et. al, 2017) but often without a clear operationalization, theorization and conceptualization (Robeyns, 2006; Kleine, 2010; Andersson, Grönlund, & Wicander, 2012; Gigler, 2015). In some instances, there seems to be a misalignment in the concept of development in the CA. Development as a concept consist of a wide range of meanings that are dynamic and interconnected.

A more detailed understanding is necessary to unpack development with regards to the CA. This paper reviews the existing state of ICT4D literature in the application of the CA in ICT4D. Our aim is to identify how the CA has been used, in what context and to review the relationships between the various concepts of the CA and its application to developmental impacts of ICT in different contexts. To achieve this, we conducted a Systematic Literature Review (SLR). The SLR is limited to a search of three ICT4D top journals from the year 2004 to 2019. The paper also seeks to identify some of the benefits and critique of the CA in the ICT4D studies.

## 2 Methodology

The methodology for this study was in accordance with Systematic Literature Review (SLR). The SLR is a *"means of evaluating and interpreting all available research relevant to a particular research question or topic area or phenomenon of interest"* (Brereton, Kitchenham, Budgen, Turner, & Khalil, 2007). The SLR identify the quality, compare and contrast and summaries the vigor of literature thereby providing enabling environment for future work. A SLR usually focuses on combining empirical evidence using various techniques and contexts (Webster & Watson, 2002). The techniques for conducting SLR include, selecting the suitable sources and keywords, aggregating the right keyword strings using logical operations, pinpoint search areas for articles, and performing the search process to recognize appropriate empirical studies via screening based on particular inclusion and exclusion criteria (Keele, 2007; Tranfield, Denyer, and Smart, 2003).

### 2.1 Searching for Initial List of Articles

Following the guidelines of conducting a SLR techniques such as Kitchenham, (2004), we included the following three steps: (a) search of initial list of articles, (b) relevance assessment, and (c) extracting the data. We reviewed literatures from Top Three ICT4D journals as ranked by Heeks (2010): The Information Technologies & International Development (ITID), Electronic Journal of Information Systems in Developing Countries (EJISDC) and Information Technology for Development (ITD). The

search keywords are ‘Capability approach and ICT4D’. The search occurred between April and May 2019. Additionally, a thematic analysis was conducted to highlight the focal contributions and outcomes of each article. Thematic analysis involves an in-depth analysis of information presented in words (Wong, 2008). We used the Zotero software to cluster and remove duplicates. The titles, keywords, abstract and full text were screened to find the initial list of articles. The search query returned 185 articles on Capability approach and ICT4D. (see Table 1).

Search Criteria			Keywords
Journal	Field and Access	Document Type	Capability Approach and ICT4D
ITID	ALL	Article	13
EJISDC	ALL	Article	87
ITD	ALL	Article	85
Total			185

TABLE 1: *Keyword Journal Searching Summary*

## 2.2 Relevancy Assessment/Extraction and Analysis of Data

The relevant articles were manually selected from the list of the initial articles. We included articles that adopted the CA and were published between 2004 to 2019 in three ICT4D journals. A number of articles were excluded following the exclusion criteria:

- The articles did not apply or operationalize the CA
- The articles were duplicates
- The articles were non-English articles
- The articles were published before 2004
- The full text was not available.

## 3 Results

We synthesized findings from 21 studies (see Figure 1) based on our inclusion criteria. Most of the selected articles are qualitative in nature. The concepts of the selected articles varied as such we started by analyzing the papers that operationalized the Sen’s CA. A total of 185 articles were acquired from 3 databases: 13 in ITID, 87 in EJISDC, 85 in ITD. All titles and abstracts were imported into Zotero and 95 duplicate and articles not related to ICT4D were excluded. The remaining 90 articles were further selected for screening. Of these 90 articles, 41 articles were excluded because they did not meet the inclusion criteria. In addition, 15 articles did not meet the time duration and 13 articles failed to use the CA. The remaining 21 articles met the suitable criteria for this SLR (see Figure 1)

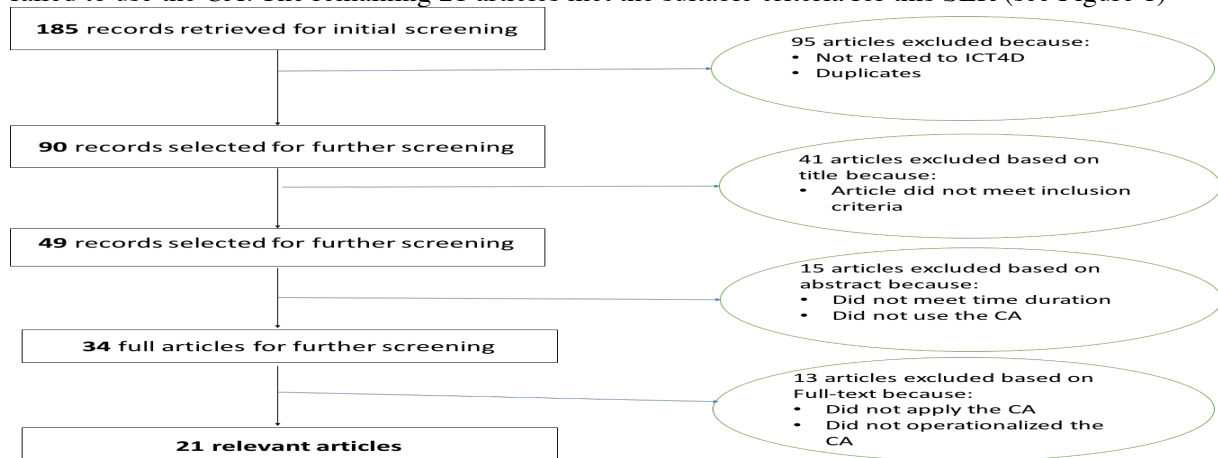


Figure 1. *Steps in the inclusion and exclusion criteria.*

### 3.1 Application of Sen's Capability Approach

This section summarizes some of the notable applications of the CA. Sen's CA calls for a participatory approach to both the process and ends of development (Andersson et al., 2012). The CA is gradually being applied in several areas (Oosterlaken, 2009). In 2006, Robeyns classified nine various types of application of the CA: "(1) general assessments of human development of countries, (2) assessing small-scale development projects, (3) identifying the poor in developing countries, (4) poverty and well-being assessment in advanced economies, (5) deprivation of disabled people, (6) assessing gender inequalities, (7) debating policies, (8) critiquing and assessing social norms, practices, and discourses, and (9) functionings and capabilities as concepts in non- normative research" which is in-line with the findings of our research.

Firstly, we begin by selecting papers that practically engage the CA and provide examples of its operationalization. The papers were chosen because they elaborate and reflect on the key concepts of the CA and offer analytical considerations of how the CA can be operationalized to clarify data collection and analysis. Three frameworks were found in the ICT4D literature. A summary of each framework is presented.

Gigler (2015) developed what he referred to as an Alternative Evaluation Framework in his work "Development as Freedom in a Digital Age". The framework stresses that the adoption of technologies and the information used for the creation of these ICTs should be context based. Gigler argues that the "livelihood resources dictate the individual's or society's capability to convert valued functionings into realized functionings". Gigler further argues that access to ICTs for the poor does not yield benefits, but in order to achieve the full potential of these ICTs, the ICTs should be based on the locals' realities and needs. The AEF comprises of components such as context, livelihood resources, institutional processes, capabilities and well-being/livelihood outcomes. (see Figure 2)

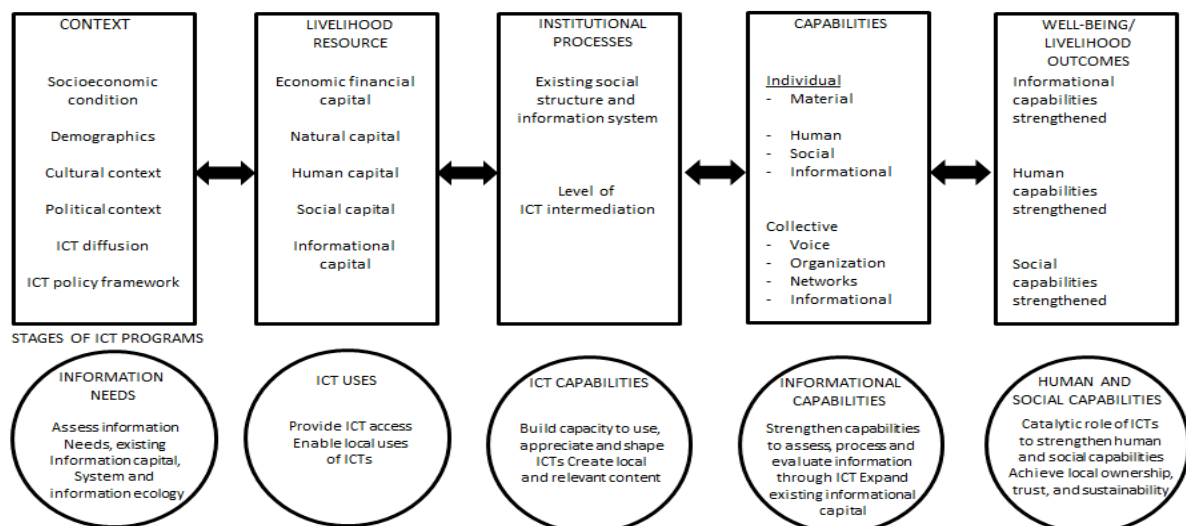


Figure 2: *Alternative evaluation framework (Gigler, 2015, p 32)*

Kleine, Light & Montero (2010) in their paper “Signifiers of life we value? – Considering Human Development, Technologies and Fair Trade from the Perspective of the Capabilities Approach” developed a Choice Framework to enable the operationalization of the CA. The framework provides a holistic view of development (Kleine, 2010) which can be deployed to assess development projects. It views development as the process that expand the real freedoms valuable to people (Sen, 1999). The choice framework is derived from the combination of the Empowerment framework, the Sustainable Livelihood framework and the CA. In its application, they present how the CA can be useful in ICT4D action research focusing on a case of Fair Tracing project. Findings from the research shows how their interactions and results from the field, regarding the desired capabilities of people influenced their design decisions of their system to support both consumers and producers with the relevant information. Similarly, the Fair Tracing project disclosed contesting capabilities such as capabilities of time and trust competing with the capability of making informed choices. The article also argues on the individual and collective issue of the CA, claiming that sometimes individuals are only able to achieve the things they value through collective action. (see Figure 3)

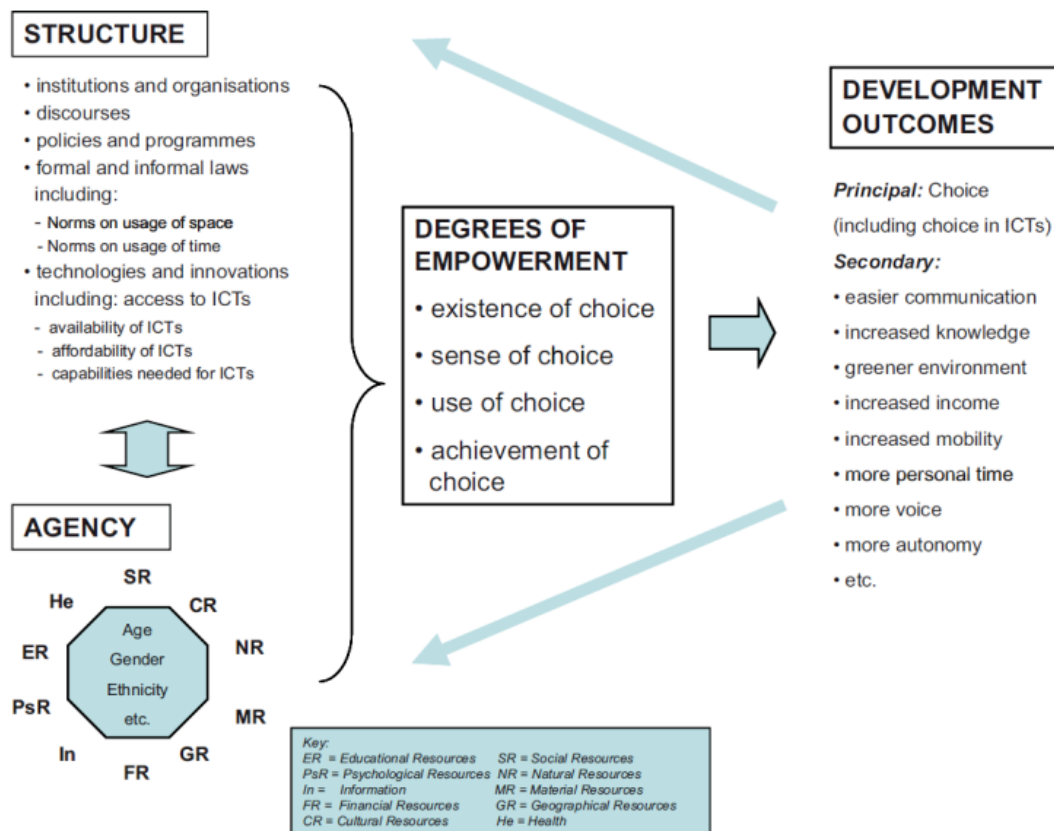


Figure 3: The choice Framework (Kleine, 2010, p 680)

In their paper, “Development, Capabilities and Technology – An evaluative framework”. Hatakka & De’ (2011) developed a framework based of Sen’s CA for evaluating ICT4D projects. The framework focuses on the differences between achieved and potential functionings as well as evaluating the role

of technology in the CA. The main components of the framework include conversion factors, capability set, choice, achieved functionings and intervention. The intervention consists of the technology together with support and training. They argue that the conversion factors which comprises of personal, social and environmental factors may enable or restrict the choice of an individual. The framework was validated in a case of distance education from Bangladesh as demonstrated in Figure 4.

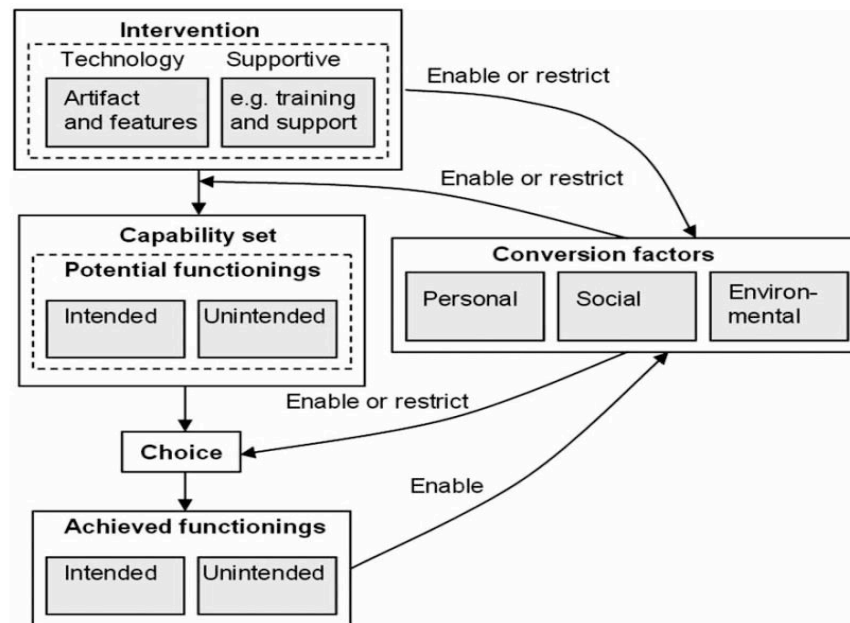


Figure 4: Hatakka & De' Operationalisation of Sen's CA

Hatakka & Lagsten (2012) in their paper "The capability Approach as a Tool for Development – Analyzing Students Use of Internet Resources", demonstrated how the CA can be deployed for better understanding of why and how development outcomes are achieved in student's use of internet resources. Though, they acknowledged the methodological problems of the CA, they however apply the CA and explain its effectiveness by applying the method to empirical data. They also argue on the whether capabilities should be pre-defined in the CA, claiming that in the case used in their paper, an 'open capabilities' without 'pre-define capabilities' was needed. They contributed to the method of data collection and analysis and also provide us with an understanding of the development outcomes cause by the student's use of the internet resources.

For Thapa, Sein & Sæbø (2012) who engage the CA in their paper "Building Collective Capabilities through ICT in a Mountain Region of Nepal: Where Social Capital leads to Collective Action". They argue that the CA is an over individualistic approach. They however demonstrated how the CA can be complemented with society or collective conceptual or theoretical approaches. In their findings, they illustrated through collective action how ICT can expand the social capital of a community which leads to achieving human development. The main contribution from this paper is how they complemented the collective level and CA which offers us a new theoretical lens on the notion of how ICT can contribute to human development. However, Andersson et. al, (2012) argue that whether capabilities can assume collective action remains an ongoing debate.

In a similar vein as Thapa, Sein & Sæbø (2012) i.e. complementing the CA with other analytical lens, Johri & Pal (2012) in their paper “Capable and Convivial Desing (CDD): A framework for Designing Information and Communication Technologies for Human Development”. They clarify development problems in the technology design process. They provide a novel and constructive approach of complementing the CA with the theory of conviviality in a “user empowering” technology design process. They offer guidelines beyond the usual concept of “interaction” and “usability” by suggesting “human self-expression” and “creativity”. This article has contributed not only to the ICT4D but to any IT realm interested in design aspects. The framework can also be applied in the ICT4D case study research.

Alsop & Heinsohn (2005) in their paper “Measuring Empowerment in Practice – Structuring Analysis and Framing indicators” provided one of the most interesting approach of operationalizing the CA. They define empowerment as “enhancing an individual’s or group’s capacity to make effective choices and translate these choices into desired actions and outcomes” (Alsop & Heinsohn, 2005 p.5). ICTs are seen as useful tools to achieve such empowerment (Kleine, 2010). For Alsop & Heinsohn, empowerment processes consist of individual agency, structural conditions which are derived from the material and non-material assets or resources. In an effort to use empowerment as a mid-range theoretical approach to transform the development concept of choice into a paradigm that is of use to practitioners, they developed a crude framework which links ‘individual agency’ with an ‘opportunity structure thereby tracking the ‘degree of empowerment’ an individual has to achieve development outcomes. “existence of choice, use of choice and achievement of choice” are various ‘degree of empowerment’ build by the framework. The individual agency is quantified by an individual’s assets ability, involving; material, organizational, psychological, informational, social human or financial assets (Alsop and Heinsohn, 2005 p.8). however, these assets are not defined. The framework is applied a number of World Bank projects.

	Author/Year	Paper	Journal	Use of CA	Context	Application (Practical or Theoretical)	Findings
1	Dasuki et., al (2015)	A Socio-Technical Analysis of ICT Investments in Developing country: A Capability Perspective	Electronic Journal of Information Systems in Developing Countries	ICT project assessment	Nigeria	Practical	In this study, the high rate of corruption and poverty gave rise to the capability deprivation of Nigeria citizens to acquire the prepaid billing meter in order to have access to consistent electricity supply
2	Dasuki et., al (2017)	An Evaluation of Information systems Students Internship Programs in Nigeria: A Capability Perspective	Electronic Journal of Information Systems in Developing Countries	Assessing Project effectiveness	Nigeria	Practical	Findings shows that the scheme has been designed to further the development of student, the lack of conversion factors makes the program contextually problematic.
3	Thapa et al (2012)	Building collective capabilities through ICT in a mountain region of Nepal: where social capital leads to collective action	Information Technology for Development	CA extended to include collective capabilities	Nepal	Practical	A strong relationship exists between individual capabilities and collective capabilities
4	Coelho et al (2015)	Analysing ICT and Development from the perspective of the capabilities approach: A study in South Brazil	Electronic Journal of Information Systems in Developing Countries	ICT for effective development	South Brazil	Practical	There are positive effects of the use of ICT in social, economic and cultural spheres, but not presenting political effect
5	Hatakka et al (2014)	Capability Outcomes from Educational and ICT Capability Inputs – An Analysis of ICT Use in Informal Education in Kenya	Electronic Journal of Information Systems in Developing Countries	Evaluating Capability Outcomes	Kenya	Practical	However, conversion factors such as a poorly developed infrastructure and poor IT literacy prevent many of the individuals from taking full advantage of the ICT and the opportunities it enables.
6	Mukherjee (2015)	Capacity Strengthening within a Development context: Developing and applying a conceptual model	Electronic Journal of Information Systems in Developing Countries	Development and Human Capability	India	Practical	The paper puts ICT's capacity strengthening within a broader development context, to emphasize the value of such projects to help improve the quality of development outcomes.
7	Osah et al (2014)	Critical Themes of process assessment in rural ICT4D Projects: An analysis of Assessment Approaches	Electronic Journal of Information Systems in Developing Countries	ICT Project assessment	NA	Theoretical	The paper describes a systematic approach employed to identify generic critical themes of process assessment in rural ICT4D projects, and how they can be appropriately assessed
8	Adaba & Rusu (2014)	E-trade facilitation in Ghana: A Capability Perspective	Electronic Journal of Information Systems in Developing Countries	Assessing ICT initiative	Ghana	Practical	The paper examines e-government initiatives particularly in developing countries focusing on what people can actually do with the opportunities provided by e-government, rather than using income-based measures.
9	Aricat (2015)	Mobile ecosystem among low-skilled migrants in Singapore: an investigation into mobile usage practices	Electronic Journal of Information Systems in Developing Countries	Capability Enhancement	Singapore/ India/ Bangladesh	Practical	The paper demonstrated how mobile phone enhances the functionalities of migrants, however constraints arise in the improvement of their capabilities
10	Hatakka et al (2012)	The capability approach as a tool for development evaluation - analysing students' use of internet resources	Information Technology for Development	Operationalization of CA	East Africa Sweden East Asia West Africa Middle East, East Europe	practical	The paper demonstrated how internet resources can be used as a means of development and utilising that choice is seen as freedom

Table 2: *Summary of the articles reviewed*



11	Alampay (2006)	Analysing socio-demographic difference in the access & use of ICTs in the Philippines using the capability approach	Electronic Journal of Information Systems in Developing Countries	Capability Enhancement	Philippines	practical	Findings revealed that mobile phone has a greater impact on personal and business activities which is an important aspect to development as it adds to capital.
12	Poveda & Roberts (2017)	Critical Agency and development: applying Freire and Sen to ICT4D in Zambia and Brazil	Information Technology for Development	Theoretical Framework	Zambia Brazil	practical	The paper argues that ICT4D must go beyond addressing people's immediate needs for access to ICT tools and skills, and also address their strategic identifying and tackling the root causes of disadvantage.
13	Zheng (2009)	Different spaces for e-development: what can we learn from capability approach	Information Technology for Development	Theoretical Framework	NA	NA	Evaluating development from ICTs should be done through some other approach
14	Andersson et al., (2012)	Development as freedom – how the Capability Approach can be used in ICT4D research and practice	Information Technology for Development	Operationalization of CA	NA	NA	They show the various operationalization and applications of the capability approach. They state that the CA is a suitable and useful lens in discussing development and
15	Nyemba-Mudenda & Chigona(2017)	mHealth outcomes for pregnant mothers in Malawi: a capability perspective	Information Technology for Development	Assessing Project effectiveness	Malawi	Practical	The findings show that the use of mobile phones to access health information and healthcare services can generate a number of opportunities for women in health, not only for health purposes but also for their informational, economic and psychological wellbeing.
16	Smith et al., (2011)	Mobile phones and expanding human capabilities	Information Technologies & International Development	Capability Enhancement	Developing countries	NA	Findings show that mobile phones are making strategic contribution to freedoms and capabilities to social, economic and governance activities
17	Kleine et al., (2012)	Signifiers of the life we value? – considering human development, technologies and Fair Trade from the perspective of the capabilities approach	Information Technology for Development	ICT project assessment	Chile	Practical	The findings show that Action research and participatory design create more challenging test settings for introducing the capabilities approach in ICT4D
18	Loh & Chib (2018)	Tackling social inequality in development: beyond access to appropriation of ICTs for employability	Information Technology for Development	Capability Enhancement	Singapore	Practical	The findings discuss the implications for development discourse in regions with limited access, advocating for policymakers to focus on ICT training. It further nuanced findings on vulnerability in developed economies as an enhancement to mainstream ICT4D scholarship, focused exclusively on poverty in developing countries.
19	Jiménez & Zheng (2017)	Tech hubs, Innovation and development	Information Technology for Development	Development and Human Capability	NA	Theoretical	From a human development perspective, institutional and collective social norms may be required to alleviate structural barriers that hinder the equitable expansion of capabilities among members of a tech hub.
20	Andrade & Urquhart (2012)	Unveiling the modernity bias: a critical examination of the politics of ICT4D	Information Technology for Development	ICT project assessment	NA	Theoretical	Findings from the study shows that researchers need to be more critical in the structure and intention of ICT4D projects
21	Madon (2004)	Evaluating the developmental impact of e-governance initiatives: an exploratory framework	Electronic Journal of Information Systems in Developing Countries	ICT Project assessment	India	Theoretical	The enablement of real opportunities in payment of bills without the middleman improved the attitudes and self-esteem of people towards its government

## 4 Discussion

All the Twenty-one papers analysed in this review practically or theoretically engaged the Sen's CA. The three frameworks presented that operationalised Sen's CA have also been adopted in some of the ICT4D studies. Majority of the papers applied the CA concepts while some use another framework to complement the CA. For example, Devendra Thapa, Maung K. Sein and Øystein Sæbø complement the CA with a collective approach. This is due to the individualistic approach of the Sen's CA.

Four papers focus on mobile phone use as an artefact for expanding and enhancing people's capabilities in developing countries. For example, Smith et., al, (2011) indicate that mobile phones are making strategic contribution to freedoms and capabilities to social, economic and governance activities. For Aricat (2015), he argues that mobile phone enhances the functionings of migrants, however the study showed that constraints arises in the improvement of their capabilities. Overall, from the findings of Smith et., al, (2011) and Aricat (2015), mobile phone has become an integral part of the day-to-day activities of individual's in developing countries. Nevertheless, it will be interesting to go beyond the positive effects of mobile phones and understand the underlying mechanisms that can enable or hinder mobile phone use in developing countries.

Six of the papers apply the CA in ICT projects assessment in order to measure the impact of ICTs on human development. However, a key finding from the review indicate a lingering problem on the definition and application of the term 'development'. There seems to be no solid evidence of development impact. Structural and human diversity are crucial to evaluation of development. It is imperative to identify what development is from the key stakeholders of the context been investigated, this will help researchers refine the process of development through ICT use. Similarly, the view on development is only implicitly stated.

The concept of agency is often neglected in Sen's CA. Most of the papers reviewed focus on individual well-being. Sen's idea of "substantive individual freedom" are agency freedom and well-being freedom. The former is neglected. Agency freedom refers to opportunities to pursuit multiple values while well-being freedom is linked achieving goals. Therefore, more emphasis should be given to agency freedom as well.

Also, there seems to be a mismatch on used of the concept of capabilities and how it is applied. Some view capabilities as 'Capacity' or 'ability'. This is contrary to the view of Sen, as he defined capabilities as freedom to exercise the type of life people want to live.

A common theme in most of the studies that have apply the CA in the ICT4D domain is the emphasis given to capabilities that individual's benefit from technology. Similarly, many of these studies focus on developing countries and concerned with project evaluation. Information systems and ICT4D researchers should rather focus more on project initiation, this will bring about context based ICT projects that will be fully utilised.

The fact that none of the Twenty-one papers apply the CA to the development or empowerment of People with disability (PWD) is noteworthy. PWD continue to be marginalised in their everyday activities, an empirically informed application of the CA in their eco-system will be interesting in the ICT4D studies.

## 5 Conclusion

We reviewed articles from three ICT4D journals from the period of 2004 to 2019. The articles reviewed have contributed to the application of the CA. It is evident that the CA is valuable and appropriate for discussing development and suitable for investigating ICT4D projects. The various methodological and operationalization guidelines presented by these authors have extended the applicability of the CA.

We argue at the outset that there seems to be a misalignment in the concept of development in the capability Approach. However, we uncover that concepts such as empowerment, well-being, functioning's and capabilities continue to be poorly defined and applied. Our paper has methodological implication. We suggest researchers' to be explicitly clear on the conceptualization of development. This will help in understanding the development goals, which Avgerou (2017) argues are vital for a researcher to be aware. Further, research in ICT4D focuses on how ICT can lead to development or empowerment, as such it is imperative for the researcher to be clear at the onset of what she/he is trying to achieve.

The process of development is not explicitly addressed in many of the ICT4D studies that apply the CA. It is therefore crucial to understand the effect of technology in empowering people in a particular context, else technology will cause further disempowerment of people. For example, Adaba & Rusu (2014) argues that e-government initiatives have brought about significant opportunities for people in developing country context, however, this is not the case in Nigeria, where e-government platform is used as a means for siphoning public funds. Such e-government initiative has no doubt brought about the disempowerment of citizens.

This paper has contributed to the ICT4D literature by stressing on how the CA has been applied in the three ICT4D journals searched. It also shows that the CA has been applied for various purposes ranging from ICT project assessment/initiative, capability enhancement, assessing project effectiveness and human development. A further study can go beyond the articles published in the three ICT4D journals searched and investigate the application of the CA in other areas of study.

Our study is limited to three ICT4D journals and as such we cannot generalised our findings to the overall ICT4D domain.

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