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The Impact of ICT Projects on Developing Economies: The Case of People with Physical Disabilities in Nigeria

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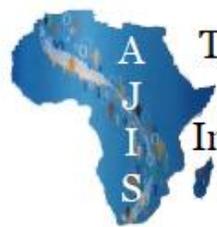
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The Impact of ICT Projects on Developing Economies: The Case of People with Physical Disabilities in Nigeria

Research Paper

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ABSTRACT

This study investigates the use of computers by People with Disabilities (PWDs) and whether it improves capability and human development in sub-Saharan Africa. Based on a case study's findings and interviews with PWDs, we build on the Technology-Augment Capability Approach to show how computers as technical objects and caregivers as non-technical objects facilitate four key capabilities for PWDs, namely (1) Capability to education, (2) Capability to socio-economic activities, (3) Capability to social relations, (4) Informational capabilities and capability to employment. However, PWDs' ability to convert the use of computers into capabilities is influenced by conversion factors, such as personal, social, environmental, technological, choice, and agency. Furthermore, our findings show also that there are enabling factors, such as accessibility, technological know-how, computer features, and Internet connectivity which facilitate PWDs' achieved functionings.

Keywords

ICT4D, computers, capability approach, people with disabilities, case study.

INTRODUCTION

The gradual adoption and use of Information and Communication Technology (ICT) projects and initiatives for economic and social development has witnessed an increasing trend in countries with developing economies (CDEs). However, the impacts of such initiatives on development are difficult to establish (Ibrahim-Dasuki, Abbott, & Kashefi, 2012) and the role of ICT in promoting the development of such countries is still debatable (Walsham, 2017). In fact, the question is, do ICTs lead to development? Or whether such development is "good" (Krauss, 2016)? Others question how it happens (De' & Ratan, 2009; Walsham, Robey, & Sahay, 2007; Heeks, 2010). This has been an issue of debate in the Information and Communication Technologies for Development (ICT4D) domain over the years

(Sein, Thapa, Hatakka, & Sæbø, 2018). Thus, the developmental process of ICT interventions is still lingering (Thapa & Sæbø, 2014; Zheng, Hatakka, Sahay, & Andersson, 2018).

The existing literature on ICT4D focuses on various areas, such as the digital divide (Venkatesh & Mendelson, 2011), empowering people with disabilities (Iliya & Ononiwu, 2020), inclusion of marginalized societies (Lin, Kuo, & Myers, 2015), evaluation of ICT interventions (Kumar & Best, 2006), the link between ICTs and development (Avgerou, 2003; Ngwenyama, Andoh-Baidoo, Bollou, & Morawczynski, 2006), and design, transfer, and implementation issues (Bhatnagar & Singh, 2010). Rather than focusing on policies in which ICTs can improve and serve strategic developmental goals (Kamel, Rateb, & El-tawil, 2009; Thompson & Walsham, 2010), these studies tend to focus on the benefits of ICTs in CDEs. Thus, there is a need to learn from these studies to guide ICT interventions for development (Sein et al., 2018) as well as to investigate the developmental aspect that underpins many ICT4D projects (Grimsley & Meehan, 2007; Thompson & Walsham, 2010).

Walsham (2017) emphasized that despite the extensive number of studies conducted within the purview of ICT4D in CDEs, research on disability has received no or minimal attention in the ICT4D literature. The World Health Organization (WHO) stated that PWDs were the world's largest and fastest-growing minority group (Eid, 2016); this is equivalent to 15% of the world's population living with a form of disability (WHO, 2011). In Nigeria, there are approximately 25 million people living with disabilities (Eleweke, 2013). PWDs in Nigeria are subjected to begging in the streets and, sometimes, in some parts of the country, they are seen as a curse. PWDs face widespread challenges, such as exclusion, marginalization, and discrimination in cultural, political, and socio-economic activities, which leads to poverty, inequality, and inability to access social amenities (Iliya, Ononiwu, Kah & Quaye, 2019).

In order to alleviate the plight of PWDs, the Nigerian government has provided support to PWDs through services offered by the skill acquisition centers established in every state of the country. The skill acquisition centers are charged with the responsibility of empowering PWDs, such as the hearing impaired, mobility impaired, and visually impaired. The skill training offered includes the making of shoes, bags, and soaps. Recently, a computer-based intervention was introduced where PWDs are trained and empowered, through the use of computers, in one of the 36 skill acquisition centers, the Adamawa Skill Acquisition Center for the Physically Challenged (ASACPC). However, a critical challenge to these ICT4D projects is how the impact of such ICT interventions, especially on PWDs, should be measured (Sein et al., 2018).

With this in mind, we propose to use the Technology-Augment Capability Approach of Haenssger and Ariana (2018) to understand the link between ICTs and development. The Technology-Augment Capability Approach is rooted in Sen's Capability Approach (CA). The CA is a normative framework that is used for the assessment and evaluation of individual well-being, poverty, standard of living, and quality of life or inequality (Kleine, 2010; Robeyns, 2005). The CA evaluates individual well-being in the form of capabilities. According to Sen (2014, p. 87), capabilities are "the substantive freedoms a person enjoys to lead the kind of life he or she has reason to value." In adopting the Technology-Augment Capability Approach, we specifically aim to derive achieved functionings, the nature of capabilities, the type of enabling conditions, the constraining factors, and the agential capacity on the individual lives of PWDs using the computer initiative in the ASACPC.

This paper, therefore, intends to find answers to this core research question: *What is the impact of the computer-based intervention on individual lives of PWDs in Nigeria?* The core research question will be answered through the sub-questions presented below:

- RQ1.** *What nature of achieved functionings do PWDs derive from the computer-based intervention?*
- RQ2.** *What nature of capabilities does the computer-based initiative provide for PWDs to achieve well-being?*
- RQ3.** *What types of conversion factors hinder the capabilities?*
- RQ4.** *What types of enabling conditions can facilitate the capabilities?*
- RQ5.** *What kind of agential capacity influences the conversion of the capabilities to the well-being of PWDs in Nigeria?*

Building on Haenssger and Ariana's (2018) Technology-Augment Capability Approach, we examine the link between ICTs and human development, using one-on-one interviews and focus groups with PWDs from the ASACPC in the city of Yola, Adamawa State, Nigeria. This study provides an insight into how computer-based intervention provides support and freedom to PWDs. Our focus in this study is on the physically challenged, such as the visually impaired, hearing impaired, and the mobility impaired. Being physically challenged is the most common form of disability in Nigeria and it affects more than 15 million Nigerians.

The next section presents the literature review regarding ICTs and development, specifically in CDEs.

ICT AND DEVELOPMENT IN COUNTRIES WITH DEVELOPING ECONOMIES

ICT4D is a growing field of study that is focused on how ICTs tackled community development goals (Unwin, 2009). These ICTs include, but are not limited to a range of technologies, such as computers, Internet connection, mobile phones, and software applications that have a significant impact in the day-to-day activities of our everyday lives (Lin, Yang, & Zhang, 2018). ICTs have been adopted and used in many CDEs to address numerous challenges, such as alleviating poverty (Greenberg, 2005); empowering PWDs (Iliya, Ononiwu, Kah, & Quaye, 2019); maternal and child health (Nyemba-Mudenda & Chigona, 2018); inequalities and youth empowerment (Sam, 2018); and for other challenges. The rapid adoption of ICTs in addressing these challenges could be due to its increasing access in CDEs. Several studies have shown the positive effects of ICT projects in CDEs in, for example, addressing community health care challenges and improving the quality of life (Cohen, Coleman, & Abrahams, 2015; Niemöller, Metzger, Berkemeier et al., 2016), in the effectiveness of mHealth interventions for maternal health care (Ilozumba, Abejirinde, Dieleman et al., 2018; Lee, Nurmatov, Nwaru et al., 2016) and in other areas. Additional studies have highlighted the challenges in the adoption and use of ICTs in CDEs (Avgerou & Walsham, 2000; Chipidza & Leidner, 2019). There are key issues in the adoption of ICTs in CDEs, such as finance, complexity, privacy, and culture. Other studies have been conducted to understand the impact and challenges of ICT adoption on marginalized persons in CDEs; however, there is a dearth of empirical evidence available on the impact of ICTs in the PWDs ecosystem. We argue that the literature is yet to assess PWDs' ICT projects effectively, based on an individual's capabilities and how it contributes towards human development. This makes developmental initiatives challenging, especially in the long run. Soeftestad and Sein (2003) argue that this is a result of poorly formulated intervention strategies.

For more than a decade, the ICT4D research domain has revealed how technology has failed to meet its intended purposes (Heeks, 2002; Soeftestad & Sein, 2003) and the evidence has shown that ICT investments do not lead to economic growth and improvement of basic amenities in CDEs (Avgerou, 2003; Akpan, 2003). This has led to more emphasis on what entails "development" (Walsham, 2007; Iliya, Ononiwu, Kah & Quaye, 2019b).

THEORETICAL PERSPECTIVE: SEN'S CAPABILITY APPROACH

The ICT4D domain has witnessed a growing application of various conceptual frameworks for different research purposes (Iliya, Ononiwu, Kah, & Quaye, 2019b). Such frameworks include the Actor Network Theory (ANT) (Chaudhuri, Dasgupta, Hoysala, Kendall, & Srinivasan, 2017), Unified Theory of Acceptance and Use of Technology (UTAUT) (Bawack & Kamdjoug, 2018) and Structuration Theory (Bernardi, 2017). Despite the contributions of these frameworks in understanding the social implications of ICTs in developing countries, they tend to disregard the developmental perspective at the individual level of study (Grunfeld, Hak, & Pin, 2011). As a result, we look at Sen's Capability Approach (CA) to development. The CA is a normative framework that is used for the assessment and evaluation of individual well-being. As developed by Sen (1999) and extended by other researchers (Nussbaum, 2000; Robeyns, 2005), it gives a well-being-based approach to evaluation. Sen (1999) explained 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.

In CA, the core ideas are *capabilities* and *functionings*. The functionings are the "beings and doings," while the capabilities are the "freedom to achieve" the functionings. The functionings include being employed, being healthy, and being nourished. It also includes valued activities, such as playing football and playing guitar. Functionings are not restricted to a particular context of people, such as the poor, the rich, the marginalized, or the disabled, which is why the CA can be applied to both CDEs and developed countries. Similarly, functionings alone are insufficient in evaluating individual well-being. Sen (1999) introduced the concept of capabilities to complement functionings. According to Sen (1999), capabilities are "the substantive freedoms a person enjoys to lead the kind of life he or she has reason to value." The concept of capabilities is linked to freedom, which Sen refers to as an opportunity to achieve what we value. He argues that freedom includes the processes that give rise to freedom of decisions and actions and the opportunities that people get, given their social and personal circumstances. The CA evaluates human development through the *expansion of capabilities*.

There are three conversion factors that are necessary for achieving the beings and doings between the functionings and a good (Sen, 1992; Robeyns, 2005). Physical and mental health conditions, gender, and literacy are identified as personal conversion factors that influence how an individual converts the characteristics of a commodity into functioning. Second, social conversion factors include power relations, social norms, and public policies. Third, the environmental conversion factors are infrastructures, climate, and geographical location. These are also vital in the conversion from characteristics of goods to individual functionings.

Concept	Description	Examples
Functionings (i.e. conceptualization of well-being achievements)	Peoples' beings and doings	Being literate, being healthy, being educated, not suffering from lack of self-respect or voting in an election. Functionings are held to constitute what makes the life of an individual valuable

Concept	Description	Examples
Capabilities (i.e. conceptualization of well-being freedom)	Real opportunities one has to realise those beings and doings (i.e., potential functionings)	Opportunity to be educated, healthy, mobile, doing a decent and valuable job, and not to suffer social stigmatization or opportunity to vote in an election, taking an active part in the life of the community, and so on.
Agency	Endued/endowed ability of an individual to achieve a realized goal (i.e., achieve the functionings)	Self-determination, self-realisation, autonomy, and so on.
Freedom	Equates human development with freedoms.	Freedom to convert opportunities into functionings
Conversion factors	Individual personal, social structures that enable the achievement of capabilities	These factors can be found in social, political, economic, and cultural entities
Commodity	The resources used to generate capabilities	Goods and services
Well-being	Achieved functioning	When the functionings are now achieved, or actualised, this could lead to empowerment, emancipation, or development.

Table 1: Authors' Elaboration of the Key Concepts of the Capability Approach. (Sen, 1992; Robeyns, 2005)

Technology-Augment Capability Approach

Several studies have been conducted to understand the role and implications of ICTs and CA in society (e.g., Abubakar et al., 2017; Dasuki & Zamani, 2019; Iliya et al., 2019). Sen (2010) discusses mobile technologies as commodities and how they enhance and contribute to people's freedom. The majority of the literature applying the CA to ICTs has exhibited a mixture of theoretical reflections and some empirical applications (Dasuki & Zamani, 2019) and can be classified into two groups: those that use the terminology (such as capabilities, functionings, and conversion factors) to investigate ICT4D initiatives (Abubakar et al., 2017; Hatakka & Lagsten, 2012) and those that look at the intersection of the CA around the discourse of social justice or equality in ICTs (Zheng & Stahl, 2011; Stillman & Denison, 2014). To this end, the prevailing notion of technology in the CA has not been harmonized empirically. Heeks (2010, p. 23) argues that understanding the role of ICTs is the realization that "development as freedom [is] a yet unfulfilled task" due to the lack of understanding on how technology can be situated in the CA (Andersson, Grönlund, & Wicander, 2012). However, in recent times, studies have begun integrating the notion of "technology" in the CA (Dasuki & Zamani, 2019; Haenssger & Ariana, 2018). However, there seems to be a lack of coherent ideas on how technology could be conceptualized within the CA (Andersson, Grönlund, & Wicander, 2012). Therefore, we adopted the Haenssger and Ariana (2018) Technology-Augment Capability Approach as our theoretical lens. Haenssger and Ariana (2018) contributed to the theoretical development of the CA by incorporating technology into the framework to understand the concepts of technical objects, individuals, and social structures. They argued that the technical objects consist of "generative" and "transformative" tendencies which enable and affect other objects' capabilities in the enhancement of valued capabilities. The Technology Augment Capability Approach comes with a new conversion factor called the Technological Conversion Factor.

Specifically, within the fundamental framework of the Technology-Augment Capability Approach, technology is characterized as an input. The input is defined as a means to achieve and is characterized into technical and all other objects. The technical object consists of a “generative” dimension and also a “transformative” dimension that influences the characteristics of other objects (Haenssger & Ariana, 2018); such technical objects include computers, mobile phones, etc. Further, the capability set is derived from inputs that are subject to conversion factors. The framework proposes that a new class of conversion factor, called the technological conversion factor, be placed alongside the individual, environmental, and societal factors. These conversion factors enable or restrict the ability to achieve freedom. The interaction of the technical objects with these conversion factors converts the input into valued capabilities. Haenssger and Ariana (2018, p. 4) argue that “capabilities are the basis for the achievement of functionings subject to people’s choice and agency.”

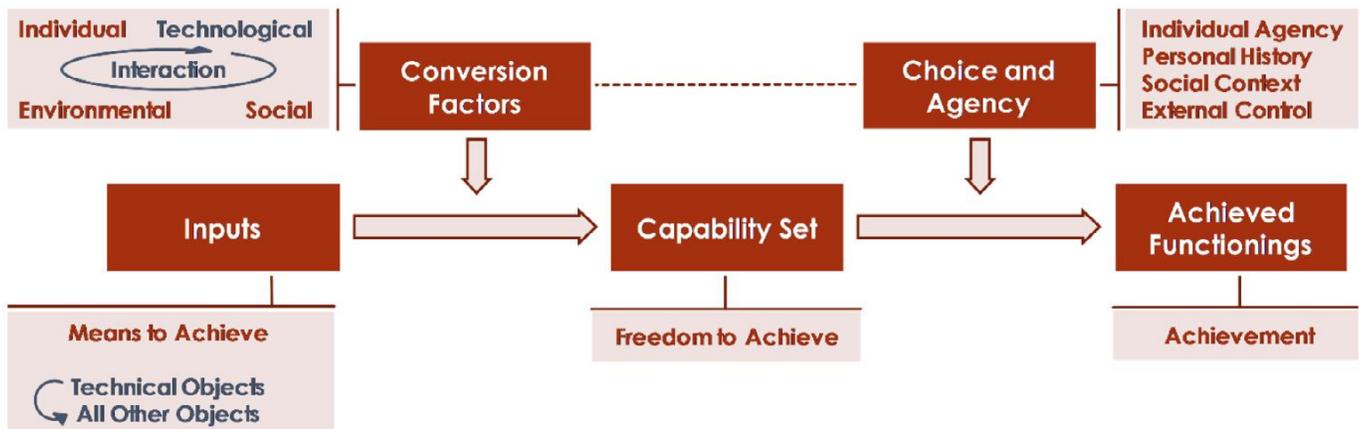


Figure 1. Technology Augment Capability Approach. (Haenssger & Ariana, 2018)

CASE STUDY

The Nigerian Context

As mentioned before, there are approximately 25 million people living with disabilities in Nigeria (Eleweke, 2013). Of these, the number of those using computers for their daily activities is not known. The Nigerian government has provided support to people with disabilities through services offered by the skill acquisition centers established in every state of the country. The skill acquisition centers are charged with the responsibility of empowering PWDs, including the physically challenged. This initiative undoubtedly has empowered PWDs. Nonetheless, evidence has shown that PWDs continue to face widespread discrimination, exclusion, and barriers in accessing basic services (Eleweke, 2013; Obiakor & Eleweke, 2014).

The concept of the ASACPC is similar to the traditional rehabilitation model of disability where the aim is to restore “a person’s dignity and/or legal status” (Helander, 1993, p. 15). This model of disability develops isolated programs, schools, and workshops for PWDs with the vision of expanding the potential of individuals to function “normally.” The objective of these rehabilitation programs is to provide skills and experience for PWDs that will offer them opportunities to achieve empowerment and live an independent life. Like many other skill acquisition centers in Nigeria, the ASACPC is responsible for empowering PWDs in the state. The center was established in 2003. It consists of about 1,800 PWDs ranging from the visually impaired (600), the hearing impaired (500), and the mobility impaired (700). The core skill acquisition in ASACPC is the making of shoes, bags, soaps, and local fabrics. Despite inadequate government support, inadequate funding, and unstable leadership within the

union, the project succeeded in empowering the physically challenged. However, the center has not been functional for several months due to the insecurity posed by Boko Haram militants during the period 2014 to 2016. In 2016, Boko Haram bombed the Jimeta divisional police headquarters in Yola and a curfew was imposed between 6 p.m. to 6 a.m. in the state. The daily routines of PWDs were affected adversely by the curfew. In general, the overall business activities in the center were significantly down during the period. However, with the return of peace in Yola, the state government introduced various empowerment programs in the center that have improved the well-being of PWDs tremendously in the center. Specifically, the empowerment program aimed at alleviating poverty, reducing inequality, and curbing marginalization. Currently, the computer-based initiative plays a very significant role in the technological and socio-economic development of PWDs in the center. The computer-based intervention consists of 20 Zinox (R) desktop computers and a 12-month Internet subscription. The initiative aims to empower, promote, and facilitate services for PWDs in the center.

METHODOLOGY

The core research question of our study is “*What is the impact of the computer initiative on individual lives of PWDs in Nigeria?*” To address this, our study adopted the interpretivist paradigm (Walsham, 2006) to investigate the impact of computers empirically on the lives of PWDs. Our study took place in ASACPC, one of the centers established by the Nigerian government to empower PWDs in Yola, Adamawa State.

Being a qualitative interpretivist case study, data was collected through semi-structured interviews and focus group sessions. The purposeful sampling technique was used to identify the participants who are engaged actively in the computer initiative program. Being in a PWD environment, our participants mainly are mobility impaired, hearing impaired, and visually impaired. Eleven one-on-one interviews were conducted and recorded with PWDs (see Table 2 for demographics) to determine the impact of the initiative on their lives. Each interview session lasted for about 30 minutes. The first focus group session consisted of 5 PWDs and lasted for about an hour. The second session consisted of 5 PWDs and lasted for 45 minutes. The focus group session and interview questions were guided by the Technology-Augment Capability Approach components, such as the inputs, conversion factors, and capability sets to ascertain how computers and non-technical objects contribute and enhance their capabilities to live a better life.

Interviewee	Gender	Age	Occupation	Impairment
PWD 1	Male	60s	Businessman	Visually impaired
PWD 2	Female	20s	Teacher	Hearing impaired
PWD 3	Male	30s	Businessman	Mobility impaired
PWD 4	Male	30s	Businessman	Mobility impaired
PWD 5	Male	40s	Farmer	Hearing impaired
PWD 6	Female	30s	Unemployed	Mobility impaired
PWD 7	Male	40s	Shoemaker	Mobility impaired
PWD 8	Male	30s	Student	Visually impaired
PWD 9	Male	50s	Bit maker	Hearing impaired
PWD 10	Male	40s	Preacher	Mobility impaired
PWD 11	Female	20s	Businesswoman	Hearing impaired

Table 2: Profile of Interviewed Participants for This Study.

During the interview/focus group sessions, the researcher explained the objectives of the study and all participants were asked to sign a consent form. Participants also were informed of the voluntary nature of the research before the commencement of the sessions. For anonymity, pseudonyms were employed

to preserve the confidentiality of the participants. Some of the interview sessions were conducted in Hausa and later translated to English, while both sessions of the focus group were conducted in Hausa and translated to English by the researchers. We employed the six principles and guidelines of thematic analysis proposed by Braun and Clarke (2006) as depicted in Table 3 for our data analysis.

Stages	Action	Description of the process
1	Familiarizing with data	We became acquainted with the data by going through the whole data collection process, verbatim transcription of the interviews, field notes and developing theoretical memos (Braun & Clarke, 2006).
2	Generating initial codes	We selected the relevant words, phrases, and sentences as basic themes to the probing questions.
3	Searching for themes	We collated codes and gathered them into relevant and potential themes.
4	Reviewing themes	We revised all the themes in detail to make sure they were relevant to the research questions posed. This included checking the themes concerning the coded extracts and the overall data set.
5	Defining and naming themes	At this stage, we stated the essence of each theme and determined the relevant aspect of the data each theme captured.
6	Producing report	All data extracts relating to the analysis of the research question and literature are presented.

Table 3: Stages of Thematic Analysis (Braun & Clarke, 2006)

We identified four major themes from our analysis which are relevant to the Technology-Augment Capability Approach as discussed below in the findings.

FINDINGS AND ANALYSIS

Findings from our study indicate that computers as commodities/technical objects interact with non-technical objects such as caregivers to generate capabilities for PWDs. These capabilities can be grouped into four themes, namely: (1) Capability to education, (2) Capability to socio-economic activities, (3) Capability to social relations, (4) Informational capabilities and capability to employment.

However, PWDs' ability to convert the use of computers into capabilities is influenced by personal, social, technological, and environmental factors. We present our findings next.

Capability Set

Capability to Education

Several respondents mentioned that the computer initiative enables them to acquire formal and informal education. They use computers to learn about school-related activities. For example:

Whenever I have an assignment from school, I usually come here to learn and browse about the assignment.

Jessica [female, 30s, mobility impaired]

Other respondents mentioned how they use computers to learn about marketing and business strategies in order to improve their economic opportunities. Computers are not necessarily tools that replace quality teachers but help in providing quality teaching and learning (Ghavifekr & Athirah, 2015).

According to Ashatu:

The use of computers in learning is important because it helps to teach and learn even when teachers and students are far apart.

Ashatu [Coordinator, ASACPC]

The computer initiative offers PWDs various interesting ways of learning, such as watching educational videos and brainstorming that will enable a fulfilling and meaningful learning process.

Capability to Socio-Economic Activities

In addition to improving their social connectivity and freedom, the computer initiative brought about entrepreneurial and economic activities. It has facilitated various aspects of business capabilities. PWDs mentioned how the computer initiative had shaped their business significantly, such as by enhancing daily business activities and maintaining customer relationships.

The computer initiative helps me maintain and communicate with customers. It is very useful.

Mika [male, 30s, mobility impaired]

The computer initiative has been instrumental in maintaining customers and sales. Some participants mentioned that they get more customers since the inception of the center. It has enabled them to be more accessible to customers and also has increased the possibility of getting new customers. For some, it has brought about flexibility and ease of obtaining orders from customers through social media platforms such as Facebook. For example, James mentioned that he advertises his embroidery products in Facebook's group chat, which increased his income. He stated:

I advertised my products by posting pictures and prices on my Facebook page. People patronized me because I have cheap and quality products.

James [male, 30s, mobility impaired]

Also, some participants mentioned that the computer initiative has improved access to knowledge and information about the agricultural business which is perceived to be a key indicator in improving the socio-economic practices in Nigeria. Johnpaul's statement elaborates this point further:

For me, my farm is everything to me. I usually go to the computer center to browse about agricultural products and know the type of insecticides to use for a fertile production. Few years before the existence of the center . . . the story was different and I lost a lot of farm produce due to lack of awareness.

Johnpaul [male 40s, hearing impaired]

While most of the respondents mentioned communication efficiency as one of the significant contributions of the computer initiative, others noted that the role of computers in business data storage is crucial in maintaining customer orders, tracking stock availability, and keeping proof of transactions. This is coupled with the ability to access these records at their convenience.

Capability to Social Relations

The finding from our study shows that computers improve the social connectivity of PWDs in the provision of better lives and services. PWDs use computers to communicate, chat, and socialize in the ASACPC. Normally, PWDs could use their mobile phones also for such connectedness, but due to the free Internet connectivity in the ASACPC computer center, they prefer to go to the center for free and easy means of communication. Several participants agreed that the computer initiative enabled inexpensive communication with their family and friends. Both Jumai, who is a female and hearing

impaired, and Musa, who is an elderly male and visually challenged, mentioned that computers help them contact and exchange support with their families who lived far away. They indicated that with the help of the caregivers, they use a range of social media and email applications to communicate and contact their friends and family:

Although I am visually impaired, I always communicate with my son who is schooling in Sudan. With the aid of the caregiver, we always chat through Facebook. We also communicate via [e]mails. I also link up with my old friends via Facebook. I am grateful to my caregiver.

Musa [male, 60s, visually impaired]

A few participants stated how they use Facebook group chat rooms for various purposes and how it helped in knowledge and information exchange among PWDs. For example, Jumai is a female teacher who teaches students with hearing impairment in a government school. She mentioned how the Facebook group chat rooms bring school teachers together for them to exchange ideas regarding their profession. She explains that these groups are made up mostly of people who have not met each other before and sometimes people exchange their phone numbers for informal networking.

Facebook enabled me to communicate with my old-school mates. We have about 100 people in our group chat. Just last year we organized some contributions to support some of our students with stuff like bags and shoes.

Jumai [female, 20s, hearing impaired]

While many participants responded that the computer initiative facilitates communications and generates positive results among social ties, some respondents stated that they would rather communicate in person than through the computer initiative, due to certain conditions. These conditions differ among respondents. John [male, 40s, mobility impaired] prefers to talk in person if the matter is not urgent; Shehu [male, 20s, hearing impaired] would rather talk in person if the person is not trustworthy and if the person is close by. Besides, some topics are not morally right to discuss via the computer initiative. For instance, Aisha [30s, female, mobility impaired] would never chat or discuss issues related to her reproductive health—she claimed this was due to her religious belief; Moses [male, 20s, visually impaired] prefers not to discuss business or family issues via computers. Such behaviors and preferences can be based on one's personal choice and explicit reasons. One of the reasons given was related to privacy issues. For instance, Leah [female, 30s, hearing impaired] expressed fears of eavesdropping or her account being hacked. A few others explained that capturing facial expression was essential in understanding people's views and feelings. As a result, some respondents mentioned that they use the computer initiative to initiate and arrange communication in-person and discuss matters in depth when they meet face-to-face.

Informational Capabilities and Capability to Employment

Several respondents mentioned how they retrieve and use information for knowledge purposes. In comparison to communication with family and friends that was discussed in the previous section, these practices do not involve the exchange information between ties. It is focused on retrieving information from unknown sources (e.g., information from the Internet).

For some people, the computer initiative served as a source of information from various sources such as online newspapers and online TV. Amadu explains how the initiative has made it easy to improve his knowledge skills:

When the computer initiative was not in existence, it was difficult to access stories because we rely on newspapers or AM radio stations . . . But looking at where we are today, it is very fast . . . with the computer center, we get access to news instantly. The computer initiative has made the world very small.

Amadu [male, 40s, mobility impaired]

Some participants prefer audio retrieval of information due to their impairment. Abbas [male, 30s, visually impaired] mentioned:

Every morning when I visit the computer center, the first thing I do is to listen to audio BBC Hausa to know what is happening around the globe . . . because of my impairment, I prefer to listen to the radio.

Abbas [male, 30s, visually impaired]

In terms of employment opportunities, some of the respondents mentioned that the initiative has provided employment opportunities. PWDs were able to search for jobs and postings online. This gave the respondents the chance to gain insight into the labor market. A respondent mentioned:

I applied for a job a few months ago via the computer initiative and I have passed the first stage of screening. Hopefully, I will pass the second stage.

James [male, 30s, mobility impaired]

Some participants used the computer initiative to search for knowledge and information. Ibrahim [male, 20s, hearing impaired] majors in statistics and usually browses the Internet for information related to his studies. Although he is hearing impaired, he claimed to use the Internet, and particularly Google Scholar, to search for articles when the need arises. Also, Jessica [female, 30s, mobility impaired] often searches for information regarding job applications and postings:

I currently do not have a job but I have signed up to a job mailing website where they advertise job updates and information. I usually go to the computer initiative center every morning to check for available jobs . . . you know the non-governmental organizations (NGOs) usually advertise for jobs online. So far, I have applied for 3 positions and I am waiting for feedback. The computer initiative has helped us. We are grateful.

Jessica [female, 30s, mobility impaired]

The availability and accessibility of information and learning materials has enhanced their learning capabilities, employability, and improved their ability to use electronic devices which improves their literacy and self-confidence. However, these capabilities are enabled or hindered by some conversion factors which will be discussed in the next section.

The Conversion factors of Computers into Freedom

While findings from our study indicate that computers can enhance the capabilities of PWDs in different ways, they also mentioned some barriers affecting the conversion of computers into freedom. These barriers are discussed below:

Personal Factors

Financial Barriers: One of the major barriers affecting PWDs in accessing and utilizing the computer initiative is the cost of maintaining an Internet subscription in the center. Ashatu, the coordinator of the center noted:

Our biggest challenge is the cost of renewing our internet subscription. Initially, when the initiative started, a two-year subscription was paid for us . . . We sometimes contribute money to pay for a monthly subscription. We are appealing to the government to please come to our aid.

Ashatu [Coordinator, ASACPC]

Illiteracy: Another barrier mentioned is the lack of technical know-how to operate the computers by PWDs. Many of them stated that without the help of the caregivers, they would not have utilized the initiative adequately.

The first time I saw a computer was here at the center. I find it interesting but I cannot operate it. Though I am hearing impaired, I want to learn how to type and browse. I also cannot speak or read English; I pray to learn it someday.

Shehu [male, 50s, hearing impaired]

Impairment: Most respondents noted how their impairment limits them from achieving their full potential. They mentioned that sometimes they would prefer to send a private email without the knowledge of the caregiver, but due to their impairment, they cannot. Abbas stated:

Most of the time, I will want to send some private messages to my friend but I can't because I am visually impaired. I rely heavily on the caregiver to send my emails and messages, but some of the messages are private.

Abbas [male, 30s, visually impaired]

Others noted that the dominance of the English language as the only medium in using the computer has had a negative impact on the conversion of computers into capabilities and as such, there is a need for localized content and dialect, like Hausa, for a positive impact.

Environmental Factors

Lack of Electrical Supply: Poor electrical supply is a major barrier in the center. The electrical supply has remained poor over the years and many of the PWDs lament how it generally has affected their day-to-day activities. In Ashatu's words:

The electricity supply is very poor; we usually receive 2-3 hours of electricity daily. It has crippled some of our businesses, especially the computer intervention. However, we are planning on buying a small generator to support the business.

Ashatu [Coordinator, ASACPC]

Social factors

Cultural and Religious Beliefs: Occasionally, religious belief affects PWD capacity to achieve their full potentials. The empirical setting where the study was conducted consists of mostly Muslims. According to the findings, the Islamic religion does not allow men and women who are not related to mingle in an open or closed system. As such, some of the participants, especially women, have difficulties accessing the computers. This is also similar for male counterparts. For example, Malam stated:

As a Muslim, it is not allowed for me to socialize with women that are not my “Muharram” (women not related to him by blood). It’s against my religion and culture. So, whenever I am in the center, I mind my business.

Malam [Male, 40s, mobility impaired]

Also, other women concur that they require permission from their spouses or a male parent before coming to the center. Although access to the center is free to PWDs, some respondents are obligated to religious belief before exercising their freedom. Additionally, the findings revealed that married and unmarried Muslim women require permission to leave their homes from their husbands or male parent respectively. This is similar to the cultural beliefs of Fulani tribal participants. The rules of engagement for some Fulanis are similar to that of Islam. This is substantiated by Jumai:

In our culture, the wife must take permission from her husband or parent before going out. This is very important. Even when I get permission to go to the center, I will have to work with the female caregiver [or] I won’t use the computer that day.

Jumai (Female, 20s, hearing impaired)

On the other hand, this is not the case for Christian participants. We observed that they go about their normal interactions without religious hindrances. We conclude that religious and cultural beliefs restrict PWDs from achieving their functionings in the ASACPC.

Technological Factors

Lack of Internet Bandwidth: Technological factors also influence and affect PWDs’ use of computers. For example, Ashatu reported that the Internet signal often goes off and as such, accessible technical objects in the center, like the computers, are underutilized due to inadequate complementary technologies. According to Ashatu:

The Internet signal is very bad. At times, the Internet signal goes off for a whole day with no explanation whatsoever.

Ashatu [Coordinator, ASACPC]

In synopsis, not only does illiteracy, poor Internet signal, and poor infrastructure affect PWDs’ use of computers, but also their culture and religious beliefs. We now move to discuss some of the enabling factors that facilitate the use of computers into achieved functionings for PWDs in the ASACPC.

The Enabling Factors

Accessibility: Access to computers is crucial and was found to be one of the key enabling factors for its adoption and continued use by PWDs in the ASACPC. Amadu mentioned that without these computers, they would not have achieved some of these benefits. The findings revealed that access to computers has empowered PWDs in the center.

Technological Know-How: The empirical data showed that some PWDs have access to computers, but due to the lack of necessary skills and knowledge to use the computers, they cannot be empowered. The assumption underlying technological know-how is that PWDs use computers because they are literate, comfortable, and able to use it for social, economic, and political benefits. According to Ashatu:

Even though we see the computers as an empowerment platform, the lack of knowledge to operate these computers is sometimes a huge setback.

Moreover, the empirical evidence showed that PWDs found computers convenient, as they could access them at any given opportunity.

Computer Features: The empirical evidence showed that computer features were another factor that enables the use of computers by PWDs for their empowerment. The action possibilities incorporated within computers provided PWDs with an avenue to use the computers directly based on their various capacities. The material properties of computers allow PWDs immediate access to their services at any given time and convenience. What computers allow PWDs to do is a necessary determinant for its continuous use. PWDs believe the material properties of computers enhance their capabilities and well-being. Further, computer features generate communication and business opportunities among PWDs that foster empowerment. (i.e., computers have facilitated direct communication in social and business opportunities). In Amadu's words:

The majority of users have an email and Facebook accounts. Their function is to communicate directly.

Amadu [male, 40s, mobility impaired]

Internet Connectivity: PWDs cannot achieve their functionings in the ASACPC without proper Internet connectivity. Even though the participants mentioned poor Internet signal as a constraint, the relative connectivity has enabled educational, informational, and business capabilities for PWDs in the ASACPC. According to James:

The Internet connectivity is not very strong, but manageable. We are appealing to the government to provide us with 4G connectivity.

James [male, 30s, mobility impaired]

Caregivers: The caregivers are the major enablers in the realization of achieved functionings for PWDs. In this study, caregivers are able-bodied people who dedicate their lives to support PWDs in their various activities. In the ASACPC, caregivers facilitate several activities for PWDs, including teaching PWDs how to use computers. In Jessica's words:

Without the caregivers, life would have been very difficult. They help use in almost everything; we are grateful to them.

Jessica [female, 30s, mobility impaired]

Choice and Agency: The choice and agency of PWDs is regarded as the ability of PWDs to achieve a realized goal (i.e., achieve functionings). In the ASACPC, choice and agency have three elements, such as self-efficacy, self-determination, and autonomy.

Self-Efficacy: Self-efficacy is regarded as the perceived ability of PWDs to use the computers for their empowerment. It is what an individual perceived they can do or is an individual's perceived capability. According to Jessica:

Even though using the computers requires a certain level of skills, my belief and confidence usually help me achieve that.

Jessica [female, 30s, mobility impaired]

Self-Determination: Self-determination is when PWDs make the effort to improve the quality of their lives. In the ASACPC, PWDs are optimistic that the computer initiative is key to improving their lives. According to the Coordinator of the center:

Everyone here is willing to be empowered. We all come here every morning with the belief that the best is yet to come. We also believe that the computer initiative will open so many opportunities for us.

Ashatu [Coordinator, ASACPC]

Autonomy: Autonomy is when individuals have total control over their lives. For PWDs in ASACPC, even though the caregivers provide support for them, some participants prefer to make and take control of their lives. In Amadu's words:

I do not want any assistance from the caregivers, I learn to operate the computers myself and I would not be where I am today if I had not declined their assistance.

Amadu [male, 40s, mobility impaired]

DISCUSSION

Our framework provides summaries and answers to the research questions by discussing our findings via the concepts of the Haenssgen and Ariana (2018) Technology-Augment Capability Approach. Having particularized the Haenssgen and Ariana (2018) Technology-Augment Capability Approach in an ICT4D project in the PWDs eco-system, our discussion therefore will align with the answers to the research questions. Thus, we start with the answer to the first research sub-question:

RQ1. What nature of achieved functionings do PWDs derive from the computer-based intervention?

Our findings, as encapsulated in our framework, depict how computers as technical objects and the agency of caregivers, when placed in PWDs eco-system, empowered the PWDs to achieve valued functionings. Such functionings include: (1) improving social connectedness and autonomy capabilities, (2) enabling business and socio-economic capabilities, and (3) improving their knowledge skills and information practices. We showed that computers not only go beyond providing and enabling social connectedness for PWDs, but also serve as an artifact for business and socio-economic development.

The benefits provided by computers have encouraged and improved knowledge discovery and information acquisition. This has empowered and brought about a sense of inclusion for PWDs. It has also facilitated timely communication between family and friends. This confirms previous studies that have found the use of ICTs enhance the lives of PWDs (Iliya et al., 2019; Khetarpal, 2014), and in our study, we have explained clearly how this can be achieved through the use of computers. It also has provided an avenue for staying up to date with the latest news and happenings around them. A novel finding from our study is that, aside from offering PWDs opportunity for social connectedness and business capabilities, the ICT project serves as a platform for PWDs to mobilize themselves, call for better services and voice their opinions and concerns to the relevant authorities.

Additionally, the computer initiative provides PWDs with a virtual platform to socialize and interact freely and autonomously. Thus, the ICT project has enhanced their self-esteem and confidence, thereby corroborating previous studies (Khetarpal, 2014). Of course, drawing from Capability Approach presuppositions, there is no way such achieved functioning would have been achieved without the

capability sets, and that leads to the second research sub-question:

RQ2. What nature of capabilities does the computer-based intervention provide for PWDs to achieve well-being?

Our findings suggest that there are four key capabilities sets derived from the computer intervention for PWDs, namely, (1) Capability to education, (2) Capability to socio-economic activities, (3) Capability to social relations, and (4) Informational capabilities and capability to employment. The computer initiative provides PWDs with the opportunity to acquire informal education. It also provides an avenue for PWDs to learn about marketing and business strategies to improve their socio-economic conditions. In terms of capability to employment, the initiative provides ways for PWDs to search for jobs online which allowed PWDs to achieve their well-being. The initiative also provides the capability for social relations where PWDs communicate with their family and friends at an affordable cost. For these capabilities to be operational there are conversion factors that either facilitate or hinder them, and that leads to the third research sub-question:

RQ3. What types of conversion factors hinder the capabilities?

Despite the potential of the computer initiative to support PWDs' capabilities and improve their lives, our findings indicate that several barriers hinder PWDs from effectively converting the technical object (computer) and non-technical objects (caregivers) into freedoms. Such barriers are categorized into

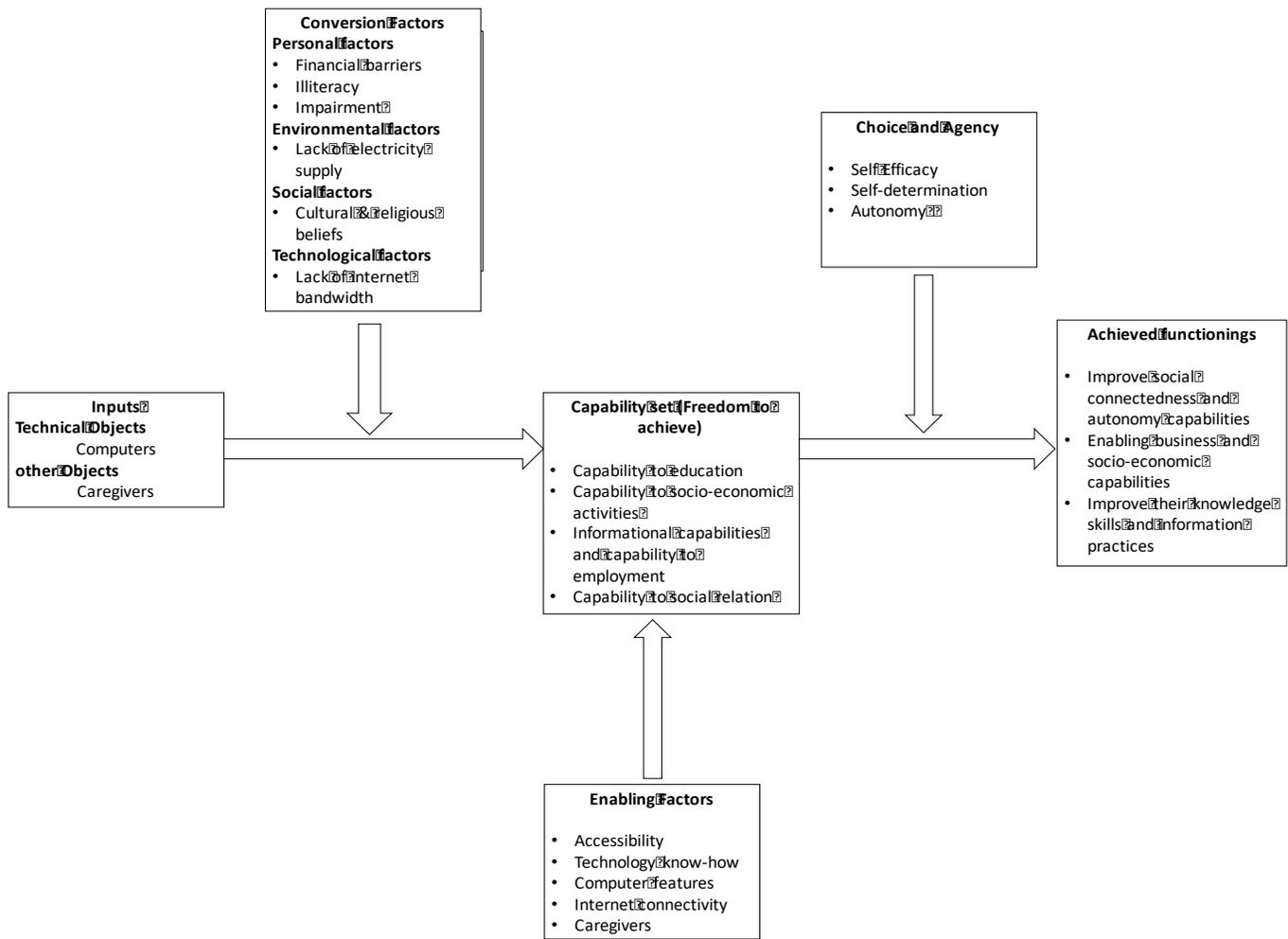


Figure 2: Summary of the study findings based on Haenssger and Ariana’s (2018) Technology-Augment Capability Approach

personal, environmental, technological, and social entities. The lack of financial support, impairment, and illiteracy are factors associated with the personal entity. This can be attributed to the government’s lack of political will to support most of the ICT projects. Additionally, similar to other CDEs, there are factors associated with the environmental entities that hinder ICT projects from achieving their full potential. Our study indicates that factors, such as the poor electricity supply to the center, have severe effects on the daily activities of the center. As a result, many PWDs cannot benefit from the full potential of the initiative. In terms of factors associated with the technological entity, the lack of Internet bandwidth is likely the main factor that also contributes to the failure of PWDs achieving the full potentials of the computer initiative. However, despite all the barriers and constraints, there were enabling factors, such as accessibility, technological know-how, computer features, and Internet connectivity that facilitate the realization of achieved functionings for PWDs in the ASACPC.

These capability sets have been achieved with the prerequisite of enabling conditions that facilitate such capabilities, and these lead to the fourth research sub-question:

RQ4. What types of enabling conditions can facilitate the capabilities?

For PWDs to achieve valued functionings (improved social connectedness and autonomy capabilities, enabling business and socio-economic capabilities and improving their knowledge skills and

information practices), our study uncovers implicit factors such as accessibility, technological know-how, computer features, and Internet connectivity as enabling factors that facilitate the use of computers into achieved functionings for PWDs. Access to computers provides an enabling condition for PWDs to be empowered. However, despite the accessibility of computers to PWDs, without the technical know-how needed to operate the computers, PWDs would not have achieved their valued functionings. Also, computer features and Internet connectivity facilitate the realization of PWDs achieved functionings. Besides this, there are other agential factors that enable the conversion of such capabilities into achieved functionings, and that leads to the fifth and final research question:

RQ5. What kind of agential capacity influences the conversion of the capabilities to the well-being of PWDs in Nigeria?

In RQ4, we showed the various enabling conditions that facilitate the conversion of PWDs capabilities into achieved functionings. In RQ5, our aim is to explain the agential capacity (i.e., PWDs choice and agency) that facilitate the conversion of capabilities into achieved functionings. We argued that the basis of achieved functionings is subject to PWDs agency and choices, such as autonomy, self-efficacy, and self-determination. For PWDs, the initiative provides them with an autonomous platform to socialize and conduct business activities. Autonomy here refers to PWDs' ability to be independent. In terms of self-efficacy, PWDs' beliefs about their capabilities to achieve a particular task influence the conversion of capabilities into achieved functionings (i.e., PWDs confidence and belief in themselves and that computers are invariably good as empowerment enablers and as facilitators for achieved functionings. Last, the self-determination of PWDs, which is the ability to control their own lives, enables the realization of capabilities into achieved functionings.

In contributing to the core research question of this paper (viz., *What is the impact of the computer-based intervention on individual lives of PWDs in Nigeria?*), our findings suggest that the computer initiative has empowered PWDs in improving their social connectedness and autonomy, enabled business and socio-economic capabilities, improved their knowledge skills and information practices, and enabled their employment opportunities.

CONCLUSION

In this paper, we looked into the on-going debate of how ICT leads to development. Specifically, we presented a case study of PWDs and how computers impact their day-to-day activities in the ASACPC, Yola, Nigeria. The Technology-Augment Capability Approach was employed to understand how computers contribute to human development in a CDE, such as Nigeria. Our findings illustrate that computers can contribute and improve the social, economic, and political opportunities for PWDs in Nigeria. Despite the positive effects of computers on PWDs, we identified the personal, social, technological, and environmental barriers hindering the full conversion of computers into capabilities in the ASACPC ecosystem.

In contributing to Haenssger and Ariana's (2018) Technology-Augment Capability Approach, we demonstrated how technical objects (computers), non-technical objects (caregivers) and technological factors (poor Internet signal) facilitate or impede the use of computers in the ASACPC. We argue that our new framework provides an implicit enabling factor which facilitates the realization of achieved functionings.

Our findings have implications for researchers and policy and decision-makers concerned with ICT projects, especially in CDEs. First, we have illustrated an alternative approach to evaluating ICT projects by drawing on the Technology-Augment Capability Approach and how technical objects

(computers) and non-technical objects (caregivers) enhance and facilitate capabilities. Our findings also identified the barriers that hinder valued capabilities. Such barriers can be addressed by policy and decision-makers to impact the lives of PWDs effectively and positively in Nigeria. Our findings also confirm previous studies in the ICT4D domain on the need to address the socio-cultural barriers for ICT projects to achieve their full potential.

Our study is limited to a single case study of ASACPC and as such, it is difficult to generalize to other contexts and regions. Furthermore, future studies could focus on other forms of ICT, such as mobile phone use in the PWD ecosystem and the capabilities that shape its use for empowerment, in addition to an ethnographic research approach, which allows for a longer and deeper understanding of the participants.

REFERENCES

- Alkire, S., & Deneulin, S. (2009). The human development and capability approach. In S. Deneulin & L. Shahani (Eds.), *An Introduction to the human development and capability approach: Freedom and Agency* Earthscan. <https://doi.org/10.4324/9781849770026>
- Akpan, P. I. (2003). Basic-needs to globalization: Are ICTs the missing link? *Information Technology for Development*, 10(4), 261-274. <https://doi.org/10.1002/itdj.1590100405>
- Andersson, A., Grönlund, Å., & Wicander, G. (2012). Development as freedom: How the capability approach can be used in ICT4D research and practice. *Information Technology for Development*, 18(1), 1-4. <https://doi.org/10.1080/02681102.2011.632076>
- Avgerou, C. (2003). The link between ICT and economic growth in the discourse of development. In *Organizational information systems in the context of globalization* (pp. 373-386). Springer. https://doi.org/10.1007/978-0-387-35695-2_23
- Avgerou, C., & Walsham, G. (Eds.). (2000). *Information technology in context: Implementing systems in the developing world*. Ashgate Publishing.
- Bawack, R.E., & Kamdjoug, J. R. K. (2018). Adequacy of UTAUT in clinician adoption of health information systems in developing countries: The case of Cameroon. *International Journal of Medical Informatics*, 109, 15-22. <https://doi.org/10.1016/j.ijmedinf.2017.10.016>
- Bernardi, R. (2017). Health information systems and accountability in Kenya: A structuration theory perspective. *Journal of the Association for Information Systems*, 18(12), 931-957. <https://doi.org/10.17705/1jais.00475>
- Bhatnagar, S., & Singh, N. (2010). Assessing the impact of E-government: A study of projects in India. *Information Technologies and International Development*, 6(2), 109-127.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101. <https://doi.org/10.1191/1478088706qp063oa>
- Chaudhuri B., Dasgupta P., Hoysala O., Kendall L., & Srinivasan J. (2017). Actor-Networks and “practices” of development: Impact of a weather information system in West Bengal. In J. Choudrie, M. Islam, F. Wahid, J. Bass, J. Priyatma (Eds.), *Information and communication technologies for development: Advances in information and communication technology* (pp. 809-815). Springer. http://doi-org-443.webvpn.fjmu.edu.cn/10.1007/978-3-319-59111-7_66
- Chipidza, W., & Leidner, D. (2019). A review of the ICT-enabled development literature: Towards a power parity theory of ICT4D. *The Journal of Strategic Information Systems*, 28(2), 145-171. <https://doi.org/10.1016/j.jsis.2019.01.002>
- Cohen, J. F., Coleman, E., & Abrahams, L. (2015). Use and impacts of E-health within community health facilities in developing countries: A systematic literature review. In *The twenty third European conference on information systems*. ECIS.
- Dasuki, S. I., Quaye, A. M., & Abubakar, N. H. (2017). An evaluation of information systems students’ internship programs in Nigeria: A capability perspective. *The Electronic Journal of Information Systems in Developing Countries*, 83(1), 1–19. [doi:10.1002/j.1681-4835.2017.tb00614.x](https://doi.org/10.1002/j.1681-4835.2017.tb00614.x)
- Dasuki, S. I., & Zamani, E. D. (2019). Assessing mobile phone use by pregnant women in Nigeria: A capability perspective.

- The Electronic Journal of Information Systems in Developing Countries*, 85(5). [doi:10.1002/isd2.12092](https://doi.org/10.1002/isd2.12092)
- De', R., & Ratan, A. L. (2009). Whose gain is it anyway? Structural perspectives on deploying ICTs for development in India's microfinance sector. *Information Technology for Development*, 15(4), 259-282. <https://doi.org/10.1002/itdj.20129>
- Eid, N. (2016). Disability and bridging the digital divide: ICT accessibility and assistive technology for people of all abilities. Retrieved from <https://pdfs.semanticscholar.org/presentation/156f/85be88f8b00b71b0c0f1a375def02a406808.pdf>
- Eleweke, C. J. (2013). A review of the challenges of achieving the goals of the African Plan of Action for people with disabilities in Nigeria. *Disability & Society*, 28(3), 313-323. <https://doi.org/10.1080/09687599.2012.710009>
- Eleweke, C. J., & Ebenso, J. (2016). Barriers to accessing services by people with disabilities in Nigeria: Insights from a qualitative study. *Journal of Educational and Social Research*, 6(2), 113-123. <https://doi.org/10.5901/jesr.2016.v6n2p113>
- Ghavifekr, S., & Rosdy, W. A. W. (2015). Teaching and learning with technology: Effectiveness of ICT integration in schools. *International Journal of Research in Education and Science*, 1(2), 175-191. <https://doi.org/10.21890/ijres.23596>
- Greenberg, A. (2005). *ICTs for poverty alleviation: Basic tool and enabling sector*. Sida. Retrieved from <http://www.sida.se/shared/jsp/download.jsp?f=SIDA4937en.pdf&a=3607>
- Grimsley, M., & Meehan, A. (2007). E-government information systems: Evaluation-led design for public value and client trust. *European Journal of Information Systems*, 16, 134-148. <https://doi.org/10.1057/palgrave.ejis.3000674>
- Grunfeld, H., Hak, S., & Pin, T. (2011). Understanding benefits realisation of iREACH from a capability approach perspective. *Ethics and Information Technology*, 13(2), 151-172. <https://doi.org/10.1007/s10676-011-9268-4>
- Hatakka, M., & Lagsten, J. (2012). The capability approach as a tool for development evaluation: Analyzing students' use of Internet resources. *Information Technology for Development*, 18(1), 23-41. <https://doi.org/10.1080/02681102.2011.617722>
- Haenssger, M. J., & Ariana, P. (2018). The place of technology in the capability approach. *Oxford Development Studies*, 46(1), 98-112. <https://doi.org/10.1080/13600818.2017.1325456>
- Heeks, R. (2002). Information systems and developing countries: Failure, success, and local improvisations. *The Information Society*, 18(2), 101-112. <https://doi.org/10.1080/01972240290075039>
- Heeks, R. (2010). Do information and communication technologies (ICTs) contribute to development? *Journal of International Development*, 22(5), 625-640. <https://doi.org/10.1002/jid.1716>
- Helander, E. (1993). *Prejudice and dignity: An introduction to community-based rehabilitation*. UNDP.
- Ibrahim-Dasuki, S., Abbott, P., & Kashefi, A. (2012). The impact of ICT investments on development using the capability approach: The case of the Nigerian pre-paid electricity billing system. *The African Journal of Information Systems*, 4(1), 31-45.
- Iliya, A. A., & Ononiwu, C. (2020). Mechanisms for mobile phone use in empowerment: A critical realist study of people with disabilities in Nigeria. *The Electronic Journal on Information Systems in Developing Countries*, 2020, e12158. <https://doi.org/10.1002/isd2.12158>
- Iliya A., Ononiwu C. G., Kah M. M. O., & Quaye A. K. M. (2019). Mobile phone use for empowerment and well-being of the physically challenged in Nigeria. In P. Nielsen & H. Kimaro (Eds.), *Information and Communication Technologies for Development: Strengthening Southern-Driven Cooperation as a Catalyst for ICT4D*. Springer. https://doi.org/10.1007/978-3-030-18400-1_28
- Iliya, A., Ononiwu C. G., Kah, M. M. O., & Quaye, A. K. M. (2019b). A systematic literature review of the application of capability approach in the ICT4D studies. MCIS 2019 Proceedings. Retrieved from <https://aisel.aisnet.org/mcis2019/16>
- Ilozumba, O., Abejirinde, I. O. O., Dieleman, M., Bardají, A., Broerse, J.E., & Van Belle, S. (2018). Targeting strategies of mHealth interventions for maternal health in low and middle-income countries: A systematic review protocol. *BMJ Open*, 8(2). <https://doi.org/10.1136/bmjopen-2017-019345>
- Kamel, S., Rateb, D., & El-Tawil, M. (2009). The Impact of ICT investments on economic development. *Electronic Journal of Information Systems in Developing Countries*, 36(1), 1-21. <https://doi.org/10.1002/j.1681-4835.2009.tb00248.x>
- Khetarpal, A. (2014). Information and communication technology (ICT) and disability. *Review of Market Integration*, 6(1),

96–113. <https://doi:10.1177/0974929214560117>

- Krauss, K. (2016). Moderator's comments on "Is it really better to be 'developed.'" In *Panel discussion at SiGGlobDev workshop*.
- Kumar, R., & Best, M. L. (2006). Impact and sustainability of E-government services in developing countries: Lessons learned from Tamil Nadu, India. *The Information Society*, 22(1), 1–12. <https://doi:10.1080/01972240500388149>
- Lee, S. H., Nurmatov, U. B., Nwaru, B. I., Mukherjee, M., Grant, L., & Pagliari, C. (2016). Effectiveness of mHealth interventions for maternal, newborn and child health in low- and middle-income countries: Systematic review and meta-analysis. *Journal of Global Health*, 6(1). <https://doi.org/10.7189/jogh.06.010401>
- Lin, Z., Yang, L., & Zhang, Z. (2018). To include, or not to include, that is the question: Disability digital inclusion and exclusion in China. *New Media & Society*, 20(12), 4436–4452. <https://doi.org/10.1177/1461444818774866>
- Lin, C. I., Kuo, F. Y., & Myers, M. D. (2015). Extending ICT4D studies: The value of critical research. *MIS Quarterly*, 39(3), 697-712. <https://doi.org/10.25300/MISQ/2015/39.3.09>
- Ngwenyama, O., Andoh-Baidoo, F. K., Bollou, F., & Morawczynski, O. (2006). Is there relationship between ICT, health, education and development? An empirical analysis of five West African countries from 1997-2003. *Electronic Journal of Information Systems in Developing Countries*, 23(5), 1-11. <https://doi.org/10.1002/j.1681-4835.2006.tb00150.x>
- Niemöller, C., Metzger, D., Berkemeier, L., Zobel, B., Thomas, O., & Thomas, V. (2016). Designing mHealth applications for developing countries. In *The twenty-fourth European conference on information systems*. ECIS.
- Nussbaum, M. (2000). Women's capabilities and social justice. *Journal of Human Development*, 1(2), 219-247. <https://doi.org/10.1080/713678045>
- Nyemba-Mudenda, M., & Chigona, W. (2018). mHealth outcomes for pregnant mothers in Malawi: A capability perspective. *Information Technology for Development*, 24(2), 245-278. <https://doi.org/10.1080/02681102.2017.1397594>
- Obiakor, F. E., & Eleweke, C. J. (2014). Special education in Nigeria today. In A. Rotatori, J. Bakken, F. Obiakor, & U. Sharma (Eds.), *Advances in special education: International perspectives* (pp. 379-397).
- Pathak, R. D., Singh, G., Belwal, R., & Smith, R. F. (2007). E-governance and corruption: Developments and issues in Ethiopia. *Public Organization Review*, 7(3), 195-208. <https://doi.org/10.1007/s11115-007-0031-6>
- Robeyns, I. (2005). The capability approach: Theoretical survey. *Journal of Human Development and Capabilities*, 6(1) 93-117. <https://doi.org/10.1080/146498805200034266>
- Sam, S. (2017). Towards an empowerment framework for evaluating mobile phone use and impact in developing countries. *Telematics and Informatics*, 34(1), 359–369. <https://doi.org/10.1016/j.tele.2016.06.003>
- Seidel, S., Recker, J., & vom Brocke, J. (2013). Sensemaking and sustainable practicing: Functional affordances of information systems in green transformations. *MIS Quarterly*, 37(4), 1275- 1299. <https://doi.org/10.25300/MISQ/2013/37.4.13>
- Sein, M. K., Thapa, D., Hatakka, M., & Sæbø, Ø. (2018). A holistic perspective on the theoretical foundations for ICT4D research. *Information Technology for Development*, 25(1), 7-25. <https://doi.10.1080/02681102.2018.1503589>
- Sen, A. (1999). *Development as freedom*. Knopf.
- Sen, A. (1992). *Inequality reexamined*. Oxford University Press.
- Soeftestad, L. T., & Consult, S. (2003). ICT and development: East is east and west is west and the twain may yet meet. In S. Krishna & S. Madon (Eds.), *The digital challenge: Information technology in the development context* (pp. 63-82). Aldershot.
- Stillman, L., & Denison, T. (2014). The capability approach community informatics. *The Information Society*, 30(3), 200-211. <https://doi.org/10.1080/01972243.2014.896687>
- Thompson, M., & Walsham, G. (2010). ICTs for the broad development of India: An analysis of the literature. *Electronic Journal of Information Systems in Developing Countries*, 41(4), 1-20. <https://doi.org/10.1002/j.1681-4835.2010.tb00293.x>
- Unwin, P. T. H., & Unwin, T. (Eds.). (2009). *ICT4D: Information and communication technology for development*. Cambridge University Press.

- Venkatesh, V., & Mendelson, O. (2011). Digital divide initiative success in developing countries: A longitudinal field study in a village in India. *Information Systems Research*, 24(2), 239-260. <https://doi.org/10.1287/isre.1110.0409>
- Walsham, G., (2006). Doing interpretive research. *European Journal of Information Systems*, 15(3), pp.320-330. <https://doi.org/10.1057/palgrave.ejis.3000589>
- Walsham, G. (2010). ICTs for the broader development of India: An analysis of the literature. *The Electronic Journal of Information Systems in Developing Countries*, 41(1), 1-20. <https://doi.org/10.1002/j.1681-4835.2010.tb00293.x>
- Walsham, G. (2017). ICT4D research: Reflections on history and future agenda. *Information Technology for Development*, 23(1), 18–41. <https://doi.org/10.1080/02681102.2016.1246406>
- WHO. (2011). World report on disability. World Health Organization. Retrieved from http://www.who.int/disabilities/world_report/2011/report.pdf
- Zheng, Y., & Stahl, B. C. (2011). Technology, capabilities and critical perspectives: What can critical theory contribute to Sen's capability approach? *Ethics and Information Technology*, 13(2), 69-80. <https://doi.org/10.1007/s10676-011-9264-8>