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Nune Harutyunyan

**Does the Type of Local Governance Influence the
Implementation of ICTs for Rural Development Initiatives?**

Abstract

The external factors that influence the implementation of ICTs for rural development initiatives have not been widely surveyed. This paper will attempt to present a novel spectrum of research, examining the role of the type of local governance in implementing ICTs for rural development initiatives within agriculture, choosing mobile phones as the type of technology for examination. Comparing Bolivia and Armenia, the paper finds that though often overlooked by the central government and other stakeholders, the local administration indeed possesses a role in how these ICT initiatives are structured and implemented. However, given the multisided layers of such activities, its significance to be defined in isolation remains challenging.

Table of Contents

Abstract	3
List of Abbreviations	5
1. Introduction	6
2. Literature Review	8
2.1. ICTs for Development	8
2.1.1. ICTs for Rural Development	10
2.1.2. ICTs for Agriculture	12
2.2. Types of Governance	13
3. Theoretical Framework	14
4. Methodology	16
4.1. Country Choice	17
5. Analysis	18
5.1. Bolivia.....	18
5.2. Armenia.....	21
5.3. Comparative analysis	24
5.3.1. ICTs for Rural Development	25
5.3.2. ICTs for Agriculture	25
6. Conclusion and Discussion	26
6.1. Limitations	27
6.2. Recommendations for Further Research.....	28
7. Bibliography	29
8. Appendix	37

List of Abbreviations

Agri-tech – Agricultural technology

CA - Capabilities approach

CIS - Commonwealth of Independent States

EBRD - European Bank for Reconstruction and Development

FAO - Food and Agriculture Organization

GDP - Gross domestic product

HDI - Human Development Index

ICTs - Information and communication technologies

ICT4D - Information and communication technologies for development

INIAF - National Institute for Innovation in Agriculture, Livestock and Forestry

ITU - International Telecommunication Union

LDA - Law on Administrative Decentralisation

LLDCs - Landlocked developing countries

LPP - Popular Participation Law

PPL - People's Participation Law

SMS – Short Message Services

1. Introduction

The Information and Communications Technologies for Development, commonly referred to as ICT4D, is an academic discipline within the broader field of International Development. Present in the literature for slightly more than three decades, ICT4D is constantly reimagined, redefined, debated, and modified (Zheng et al, 2018). With the novelty and rapid growth within the sector, even the definition of the term ICTs is presented differently by various authors and multilateral institutions. International Telecommunications Union (ITU), for instance, describes ICTs as the technological means to generate, gather, stock, transfer, obtain and share given information and communication (ITU, 2018). The “D” in the phrase ICT4D is not easy to clarify either, as the change technologies may bring to beneficiaries is not always distinct or visible (Abdelnour-Nocera and Densmore, 2017).

Overall, there is no singular method of measuring the effect of ICTs in bringing change and development on its own. The fields ought to relate to others to contribute to the bigger picture, since having access to technologies or utilising them cannot demonstrate a measurement of progress in isolation. For example, Hudson (2001) considers ICTs to be a channel of “sharing information” which can eventually contribute to the overall “chain of development itself.” The academic and grey literature in this interdisciplinary field primarily presents research that incorporates the connection between two separate areas – first one being ICTs and second one being another field within International Development. Consequently, ICTs can, for instance, intersect with health, governance, agriculture, education, and other spectrums (Nyika, 2020). Measuring the impact of initiatives related to these fields are often evaluated through standards of economic models, such as understanding growth of GDP or an increase in employment (Walsham, 2017; Zheng et al, 2018). Nonetheless, to dive deeper into assessing the impact of technologies on the lives of societies, more layers need to be explored to be able to present a comprehensive picture. This paper, therefore, aims to address this gap, by looking into a broader scope of research and the way different fields interconnect with technology, presenting more multi-layered inferences.

Outside of the fields ICTs intersect with, the geography and setting of the research is also equally important. To narrow the scope of the research, this study will focus on examining the impact of ICTs for *rural* communities. ICTs for rural development in general involves evaluation of initiatives such as disaster risk reduction, improving public services and working with small and medium entrepreneurs through e-governance or e-commerce tools (Heeks, 2010; Pramanik et al., 2017.) Additionally, in contrast with ICTs for urban areas, the literature for the rural field focuses not only on the results of ICT enhanced rural development programmes but also states the value of having simple access to broadband connection or the application of different types of technology in the citizens’ livelihoods, such as mobile phones or computers. Similarly, the impact of ICTs for rural development heavily depends on numerous aspects, associated with social connections, education, culture, state, ethnicity, and others (e.g., Saleminik et al., 2017).

When exploring any initiative that is implemented towards rural development, local politics and type of governance play a major role in how they are implemented (Vasstrøm & Normann, 2019; Ibietan, 2010). Therefore, this dissertation will discuss this aspect, when analysing rural initiatives realised through ICTs. The purpose of this paper is, thus, to examine the role of local governance in implementing ICTs for rural development programmes, focusing on *agricultural* initiatives in *decentralised* versus *centralised* states. The impact of ICTs on agriculture and state governance have certainly been examined as separate fields, such as e-agriculture or e-governance (e.g., Aker et al., 2015; Gigler, 2015). However, research that can merge both topics into one is not widely common. Therefore, this paper will attempt to pioneer a novel scope of study. Instead of examining what role ICTs have in implementing programmes towards improving agriculture or state governance in rural communities it will rather explore them in unison – understanding what impact the local governance has on agriculture initiatives that are realised through ICTs. Figure 1 below presents the scope of research. Here, the independent variable is local governance, which is divided into decentralised and centralised states. Bolivia and Armenia will serve as the specific countries of examination, first one representing a decentralised model of governance, and the second - a centralised one.

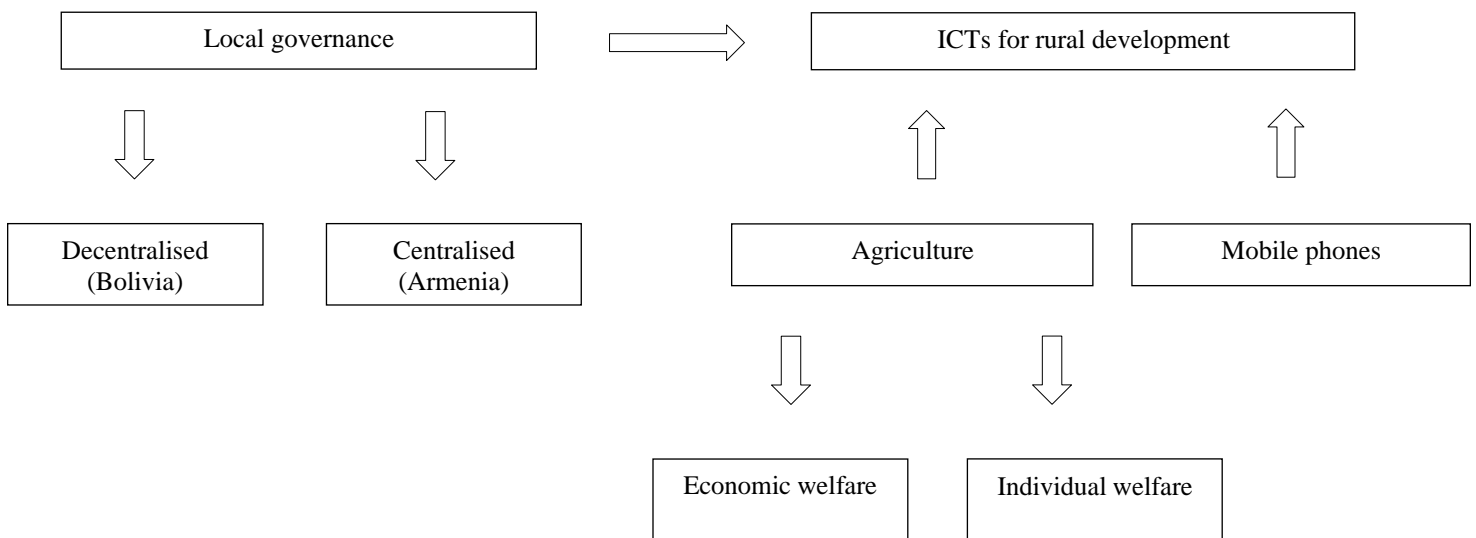


Figure 1. Scope of research

Due to the ample literature about the connection among social networks, local government, and the overall sense of community in rural areas (e.g., Aker et al., 2016), I assume that the independent variable (i.e., *local governance*) directly influences the dependent variable of *ICTs for rural development*. Therefore, **I hypothesise that the difference between the types of local governance (i.e., decentralised versus centralised state) plays a role in how ICTs for rural development practices are conducted.**

The sub-variables that I am analysing are agricultural practices, conducted through mobile phones. Hence, they both belong to the dependent variable – ICTs for rural development. The outcomes this paper

will investigate are the impact of agricultural development through ICTs not only within the scope of how they contribute to the economy but also what role they possess in bringing individual welfare, hence considering human development. As it will be discussed later in the paper, the relevant theoretical framework through which the analysis will be conducted is the Capabilities Approach. This approach is directly connected to the non-traditional measurement of impact, considering individual wellbeing (Sen, 1998). It focuses on people's ability to utilise the technology for their own welfare within the context of access to technologies, outside of focusing on evaluating what has benefited the state through traditional dimensions of economic development (Zheng et al, 2018).

For the purposes of specifying the scope of research even further, mobile phones will serve as the type of ICTs to be examined throughout the paper. Since the application of mobile phones can drastically vary from one user to the other, and their functions are simply too many to list in one figure, the analysis section will dive deeper into the different opportunities they provide for farmers. The goal of this paper is to contribute to creating space for more novel academic research that explores beyond the traditional methods of measuring success of such initiatives, challenging the existing tools of evaluation, and considering new independent and dependent variables for the analysis.

The main research question for this paper, therefore, is the following:

- **What role does the type of local governance possess in implementing successful programmes in ICTs for rural development in agriculture?**

This research is structured as follows: section 2 covers the literature review, including ICTs for development separately and within the rural context. It also explains the discussions and challenges in ICTs for agriculture, as well as presents the debates and nuances of local governance in decentralised and centralised states. Section 3 explains the theory that is best suited for this analysis and the way it will be integrated into the analysis. Section 4 presents the methodology for this research, including the justification for the choice of these two countries. Section 5 demonstrates the findings in both countries and what can be inferred about each type of governance through a comparison. Section 6 concludes, considering the wider implications for this research, its limitations, and recommendations, inviting more insights to be derived from this analysis.

2. Literature Review

2.1. ICTs for Development

As stated, current literature within ICT4D covers a vast variety of topics, identifying and discussing how technology serves the well-being of beneficiaries in various aspects of their lives. This subsection will focus on three main debates within the field, which are particularly relevant to this scope of research – (i) are

ICT4D activities serving all groups of society, (ii) are they deepening inequality even further, and (iii) are their activity measurements accurately presenting the picture to all their stakeholders and beneficiaries.

The first two debates are connected to clearly identifying who do ICTs serve in terms of target groups and beneficiaries and are they benefiting or harming the socially vulnerable and disadvantaged groups. For instance, multilateral institutions, such as ITU, pride themselves in bringing longer term sustainable solutions for development through ICTs. Their projects include digitalisation of public services served by governments, offering advisory services to Communication and Information Technology Commissions in various states, organising trainings for recipient communities across the world about technology application in their routines, developing broadband wireless networks for states that are deprived of the needed infrastructure, building capacity, and others (ITU, 2019). The World Bank works directly with governments to enhance their digital economy, increase their citizens' access to ICTs as well as contributes to private sector engagement (World Bank, 2013). Both organisations are also encouraging national governments across member countries to further promote national strategies of digitalisation or broadband plans (ITU, 2018 and 2021).

However, critics argue that these projects can often be dismissive of certain disadvantaged groups and promote further injustice in serving the real beneficiaries of the projects (e.g., Figure 2). Chaudhuri (2011) has argued that the beneficiaries of these projects are not the end users but instead are public and private organisations, academia, governments, and other actors. Heeks (2021) brings forward a new concept of “adverse digital incorporation”, where the group that possesses more advantage has the privilege to “extract disproportionate value from the work or resources of another, less-advantaged group (ibid)” further deepening not only the existing inequalities between the global North and South but also between the disadvantaged communities inside singular countries. Relevant to this dissertation are the rural communities, as the ICT initiatives created within urban settings, naturally provide internet and technology accessibility. Instead, not all rural areas have this privilege, because of a multitude of factors, including economic and social inequalities. This results in ‘a spatial digital divide’ (Townsend et al., 2013) otherwise known as ‘the rural penalty’ (Malecki, 2003) which showcases the cost of being deprived of opportunities that would be traditionally offered in an urban socio-economic setting. Inequality of access to ICTs referred to as “social marginalisation” (Castells 1998) is questioning whether coercing the developing world into participating in modern processes of ICT integration is serving their needs. As stated, embedding ICTs into the everyday lives of people might favour the advantaged groups, while the disadvantaged will continue to witness the widening of the already existing socio-economic gap (Gigler, 2011).

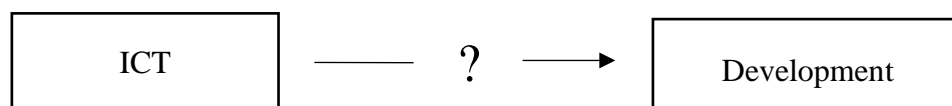


Figure 2. “Elusive Link between ICT and Development” (Source: Sein et al., 2018)

The third debate is about finding the consensus in rightly evaluating the ICT4D initiatives, where projects are often looked through the donor’s viewpoint rather than responding to the real local needs (Grimshaw, 2015). Although measuring ICTs in statistical terms has been a focus for multilateral institutions and has contributed to their partnerships (ITU, 2020), the concern of critics is not about the lack of measurements but what the measurements represent. They argue that ICT induced activities’ impact evaluations are rarely focused on people’s well-being but are, instead, more motivated by the betterment of the country’s economy. It is highly probable that the two may not happen at the same time, and as a result, individual well-being might stay neglected (Grimshaw, 2015).

The aforementioned traditional measurements of GDP growth through ICT prompted activities evidently serve the needs of the state actors but overlook what people gain from it on an individual level. Kleine (2009) brings forward the importance of considering the type of “social, cultural, and human capital” that can be gained through ICT initiatives for development, arguing that providing the individuals with freedom should be the ultimate goal of ICT4D (ibid). For this reason, Kleine (2009), Gigler (2011) and other authors within the field have called for looking into alternative options of measurement for identifying the effect of ICTs on human prosperity, as hard as it might be to measure them. One of the most prominent frameworks that has been repeatedly applied in ICT4D research and suits well within this context is the Capabilities Approach. This approach emphasises the importance of focusing on well-being on an individual level. Though Gigler (2011) does acknowledge the difficulties of evaluation in this method, the Capabilities Approach has been profoundly integrated into ICT4D research theories, particularly focusing on its aspects of measurement.

2.1.1. ICTs for Rural Development

Outside of considering certain debates within the broader scope of ICT4D, this research is mainly concerned about rural communities and rural development. Isolating this specific group of ICT4D beneficiaries, more layers within this area need to be covered. This section discusses (i) the debatable impact of ICTs for rural development, (ii) the type of conditions needed for rural integration within the connected world and how to measure them, and (iii) the certain technologies that serve the rural populations’ needs better than the others.

First and foremost, even though targeted activities towards rural communities about enhanced government services, promotion of e-commerce, or building resilient communities are continuously evolving, there is a major lack in clarity about how ICTs can specifically contribute to the socio-economic

enhancement of the rural communities. Gigler (2015, p. 4) discusses the multifaceted interconnection “between people, social institutions, and technology” based on evidence collected in rural Bolivia. Nonetheless, he states that the ICT and development connection in rural communities of the developing world is still somewhat unclear.

Secondly, for initiatives to occur, like the ones mentioned above, many rural communities firstly need to have equal access to technologies. With the economic divide and bigger poverty rates in rural communities, oftentimes, they are deprived of the appropriate infrastructure as well as the actual technology itself for ICT encouraged programmes. Building internet accessibility, such as improving broadband connections for remote communities in the developing world, is therefore, of crucial importance (Zhenwei et al., 2012). Ramamurthy and Srivastava (2021) argue that it is indeed true that having access to technology does not lead to solving issues of health concerns, unemployment, or other related problems in the rural setting. Having access to ICTs, however, does provide knowledge and can resolve the villagers’ “information needs,” delivering data about the environment, potential resources in their community, funds allocated to their village from the state, and other interrelated aspects of their everyday lives. Solutions, therefore, can be considered in the local setting and address ways of resolving poverty issues in unconventional methods (Grimshaw et al., 2010). For this, Gigler (2011, p. 1) suggests an alternative framework towards focusing on enhancing the “human capabilities of the poor and marginalised” towards their own well-being and contributing to choosing the freedom of leading the life they value, instead of solely focusing on the economic growth as the idea for measurement. This specifically leads to enhancement of informational capabilities of the poor, transforming them into expanded human and social capabilities within the economic, political, social, organisational, and cultural dimensions of their lives (ibid).

Lastly, the technology most relevant and popular within rural settings, directly enabling many ICT for rural developmental initiatives to occur, is mobile phones. Since mobile phones appear to have the highest appeal to successful penetration in developing countries (Chaudhuri, 2011), these technologies can also bypass the traditional infrastructure needed for wireless broadband connections. While literature does provide evidence about correlation between growth of productivity and increase in mobile subscriptions (Groupe Speciale Mobile Association – GSMA, 2022), the statistics are still generalising the picture. They are merging the results from both urban and rural areas, whereas rural communities often simply lack connectivity with mobile networks. Consequently, more private and government partnerships are needed and are continuously being created to cover this deficiency in remote communities (ibid). Utilising such technologies can, therefore, contribute to providing space for not only economic activities for GDP growth but more importantly, generate opportunities of enhancing human capabilities.

2.1.2. ICTs for Agriculture

This section will dive deeper into the specificities of ICTs for rural development initiatives within agriculture. It will (i) explain how ICTs are used by rural population for agricultural purposes, (ii) discuss what challenges farmers face in applying these technologies in their day-to-day activities, and (iii) how mobile phones function on tackling them.

Agricultural technologies or ‘agritech’ is mainly concerned about increasing the productivity and quality of the agricultural practices by farmers, connected to “fertilizers, seeds, and cropping techniques (Aker, 2011).” ICTs for agriculture, on the other hand, are focused on bringing information to the farmers that can contribute to the traditional agricultural processes, starting from improving productivity to increasing awareness about the existing sales prices, supporting the farmers situate themselves better in the bigger market, thus, improving the overall “agricultural supply chain management (Deichmann et al., 2016).” These initiatives are often implemented through internet kiosks, hotline voice services, online websites, and other means of communications (ibid). They are intended to equip the farmers with better knowledge that can provide the opportunity for economic well-being, as they will be less vulnerable to biased information from the middlemen or traders. Nonetheless, literature brings out debate about the feasibility of such initiatives, considering several factors, which are directly related to the topic of this paper’s discussion.

Barakabidze et al. (2017) argue that farmers often fail to identify what information or technology they might need for prosperity within their practice and may not utilise the given technological resources. This derives from the lack of participation from farmers during the initial creation period of these initiatives. Their active engagement in groups in the creation period was empirically proven to lead to more effective usage of technologies afterwards (ibid). Authors find out that participatory research and communication through videos or mobiles could serve towards measurable results in improved usage of activities in the later stages. The need for this participatory approach also comes from the rural setting, where social connections and the sense of community is stronger, hence information from external sources may, socially and anthropologically speaking, appear to be less trustworthy for farmers (Aker et al., 2016). Buck and Alwang (2011) mention that farmers appear to build more trust towards trainings delivered by agents with whom they had connected or were given advice from them in the past. This is a particularly crucial factor in analysing the programmes in ICTs for agriculture in the two countries of this study, considering the source of information and the agents of delivery for it in decentralised and centralised states. The implementors are often local personnel in the first case, while the decision-makers and trainers might be provided by the central government in the second instance.

In continuation from the previous section, the type of ICT that has been widely successful for agricultural practices are mobile phones. In contrast with other devices, mobile phones significantly cut the expenses for communicating and receiving information for rural farmers. They provide information about

agricultural practices, prices in a given market, transportation, weather conditions through channels such as SMS, voice messages, and in more advanced instances, through access to online websites (Aker, 2011). Outside of these extra services, mobile phones, first and foremost, provide an opportunity for farmers to connect with others via simple phone calls. With this device, they can contact fellow farmers, buyers, and suppliers, as well as speak with other agents within agricultural advisory services (Dissanayake and Wanigasundera, 2017). As pointed out by Chaudhuri (2011), mobile phones also provide more success rates due to their personal “emotional appeal” as other ICTs do not involve talking and directly communicating with other farmers or social networks. The issues to be later discussed within the analysis of this study is whether farmers are provided with the needed conditions for utilising these mobile phones in their day to day lives.

2.2. Types of Local Governance

This section will present two contrasting types of local administration, i.e., decentralised, and centralised governance, as well as showcase the current debates within the field.

First, the concepts of decentralisation and centralisation may exist within one state, where one aspect of governance may dominate over the other in certain tasks (Witesman et al., 2020). In a centralised governance, the state enjoys the authority to make decisions that can potentially influence the lives of all citizens, regardless of their background, where they live, or what ethnicity they have. In other words, the power is concentrated within the top rather than disseminated towards subordinate levels (Aucoin & Bakvis, 1988). In centralised administration, the resources are concentrated in the hands of the central governance, and the decisions of “a few people affect the lives of many (Witesman et al., 2020).” Though decentralisation has the goal of boosting the effectiveness of public sector, Parker (1995) argues that decentralisation can only be proven to be efficient, if the local actors are properly provided with “financial, political and administrative capacity” to undertake the needed responsibilities. In this system, individuals can represent their groups’ interests, where their vote towards choosing local authorities can, therefore, present a bigger value (Witesman et al., 2020). In decentralised systems, the decision makers are many and local governments possess the autonomy to make their own choices “within a legally delimited geographic and functional domain (Faguet, 2012, p. 2).”

More efforts are concentrated in shifting from centralised governance towards decentralised form of administration, particularly for promoting more democratic institutions, “accountability, political stability, and responsiveness (Pius Kulipossa, 2004; Iqbal et al., 2012).” Nonetheless, critics believe that local governments simply cannot own the same level of human and economic capabilities and resources, as the central government. Hence risks for corruption increases and the policies made locally may not be as comprehensive (e.g., Crook and Sverrisson, 1999). Litvack et al. (1998) argue that decentralisation does not make any difference in terms of efficient governance or decision making. Instead, these factors are highly

dependent on the infrastructure of given institutions. Be-ere (2021) states that throughout the four decades of implementation, decentralisation has not delivered radically inspiring results. Instead, political interests often disallowed the realisation of the theoretical promises of the decentralisation for achieving better results on grassroot levels, limiting the local governments rather than expanding their given opportunities.

3. Theoretical framework

The theory that will serve the scope of this analysis is the Capabilities Approach (CA). Briefly covered in the previous sections, this sub-section will particularly (i) define the CA in detail, (ii) discuss the implications of its application and measurements, and (iii) adopt the theory into the framework of this research.

Developed as an alternative framework for traditional economic progress measurements (Qizilbash, 2009), the CA focuses on individual well-being and the opportunities provided for individuals to achieve that prosperity. Developed by Amartya Sen, the CA focuses on the importance of freedom that is delegated to individuals for achieving prosperity, and the “capabilities” and “functionings” that serve as the framework to define what their well-being represents and how it can be evaluated (Sen, 2001; Robeyns, 2020). Capabilities are what people have the opportunity to choose to achieve, defined by what they are willing to undertake (‘doings’) and the type of persons they aspire to be (‘beings.’) For instance, they can possess the opportunity to choose nutritious food, or get married. Functionings, are, then, the capabilities that have been achieved or have occurred. The path towards achieving them strongly depends on the “personal, socio-political, and environmental conditions (Robeyns, 2020),” which serve as the ‘conversion factors.’ Consequently, through the CA, the focus shifts from what goods people have access to towards what they are able to do with those given resources. The goal of the theory is that they will eventually turn these opportunities into aspects of a prosperous life they are able to lead. Sen has not provided the academia with a list of capabilities for classification, as he believed that these are customisable, depending on the “geographic region, social history, and cultural values (Jacobson & Chang (2019).” Similarly, Sen argues that citizens should be able to decide what they believe is important in their lives (ibid). This is in direct connection to Sen’s initial proposal of viewing development as freedom, instead of wealth, or any other set of particular social aspects, such as education or health (Sen, 2001; Schokkaert, 2008).

Relevant to measuring ICT initiatives for development outside of economic growth is the United Nations Human Development Index (HDI), co-created with Sen. It is a modern-day measurement tool for human welfare, outside of conventional economic representations. The HDI, according to Sen, is aimed to be a complementary rather than a singular tool of measurement, where the theory behind it is still left open-ended, inviting more aspects to be integrated into the index (Sen, 2000). Nonetheless, Andersson et al (2012) argue that the HDI does not fully capture the essence of the CA but rather focuses on universal aspects of

well-being, while the CA is heavily individualised, focusing on the person's choices and their own decision making about what they believe is valuable for them and what contributes to their affluence. What Sen believes in is encouraging the "entrepreneurial spirit in every person," putting their own choices at the forefront, which can lead to realising the real development within ICT4D and beyond (Andersson et al., 2012; Sen, 2000; Kleine, 2009). Debating the contrary are Thapa et al. (2012)'s findings, exploring the impact of ICT activities in rural communities of Nepal. The authors conclude that an individual wellbeing appears to often directly be dependent on a collective community action and its social capital, equally leading to the desired human development (Andersson et al., 2012; Dasuki et al., 2013). Hence, personal satisfaction for change cannot be solely achieved on an individual level but may also directly depend on the bigger collective act (Hatakka & Lagsten, 2011) within ICTs for individual progress. While marking the impact of ICTs for rural development and agricultural practices, these implications of united power and individual positioning are extremely relevant, where farmers must communicate with a multitude of actors to achieve prosperity, starting from local agents to buyers, information providers, other farmers, and indirectly or directly, the local authorities. It can also measure what farmers gain outside of potentially increased economic income, e.g., knowledge and opportunities to utilise technology in their agricultural practices, aiming to achieve the freedom for their desired well-being.

Putting the CA into practice, it is evident that some capabilities become more challenging to measure than the others (Gigler, 2011). Hence, as it can be seen, providing access to technology, or teaching beneficiaries how to use them does not immediately equal empowerment or a progressive result. In this context, therefore, technology does not possess the main role, but rather does its interdependence with the given social context (Orlikowki, 2000; Avgerrou, 2001). The role of intermediary organisations, in particular, is instrumental, in building these capabilities for individuals in the communities, by supporting them in the usage and adaptation of the given technologies into their lives (Gigler, 2011). These institutions include but are certainly not constrained to non-governmental agencies, local governments, or grassroots organisations. In fact, Gigler (2011) finds out that intermediary organisations appear to have the biggest impact on contributing to the beneficiaries' achievement of obtaining informational capabilities.

Based on the common application of CA in ICT4D research, Figure 3 has been adapted and modified from Gigler's (2011) model (the original model is located in the appendix), customising the steps of ICT Impact Chain to the specific context of this study, i.e., considering local governance, rural communities, and agricultural activities through mobile phones.

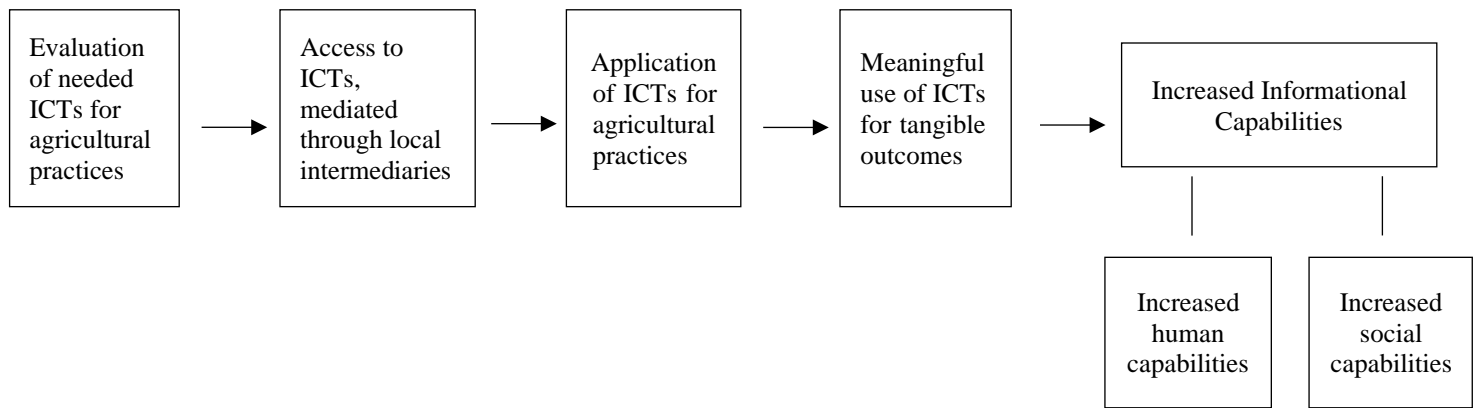


Figure 3. Model adapted from Gigler's (2011) "ICT Impact Chain"

The first step in this customised figure is evaluating the appropriate technologies and the needed information for the farmers to be able to successfully conduct agricultural activities through the aid of the device. In the case of this research, it is gaining information on a variety of factors for agricultural practices via mobile phones. After the assessment period, the beneficiaries can obtain access to the ICTs, where the local intermediaries (in this case – the local government) can assess the needs and conditions in the community, such as the appropriate infrastructure, levels of poverty, and other factors. Third, the factors that contribute to successfully applying these ICTs involve trainings by local intermediaries (e.g., non-governmental organisations, local groups, agriculture extension agents, local government, and others), considering the education levels, ethnic compositions of the community as well as the costs of maintaining the technology. The fourth step involves the meaningful usage of the mobile phones for achieving real results in agricultural practices – i.e., allowing the beneficiaries to adapt the technology to their needs, such as applying the received information in their work or requesting information from others for better results. Lastly, the chain ends with the increased informational capabilities by the beneficiaries (e.g., increased informational literacy) where they can not only use the technology for their own benefits but also elevate its impact through bringing together various outcomes of usage that may not have been intended by the initial provider. They become individually empowered through collectively obtained social capabilities, bringing forward solutions beyond the limited knowledge targeted towards agriculture and mobile phone technology capacities. The comparative analysis that follows in the later sections will be presented through the lens of this adapted Impact Chain.

4. Methodology

To analyse the role of the local governance on ICT induced agricultural initiatives implemented through mobile phones, I will be using the methodology of a comparative qualitative case study, analysing the obtained data through the CA lens.

A case can be positioned into a broader picture and help researchers make better judgement at “reaching situational appraisals” (O’Neill, 1986, p. 28). In a case study, some aspects of research are more asserted than others that fade into the background (Lund, 2014). The reason for choosing a comparative case study for this research is for considering not simply one aspect of one country’s ICT4D practices but to inform its broader implications, reflecting on another experience by a state that has adopted a different approach. This comparative case study is also a complementary method in interpreting the theoretical associations of the CA in taking the analysis to a country specific context, diving deeper into a multitude of features, that can serve as materials for understanding the given findings. Comparative case studies provide the opportunity for informing a more general understanding on the bigger questions, analysing the reasons behind how and why certain programmes or policies may succeed or fail, looking into certain patterns, similarities and differences between cases that may have the same goal (Goodrick, 2014).

Given the selected theoretical framework, which is focused on human well-being beyond economic growth, it is an appropriate choice to compare predominantly qualitative data. It will focus on ICT for rural development initiatives as well as incorporate aspects of local governance and the role of intermediary organisations in implementation of such agricultural initiatives in the communities. The main analysis will focus on the practices which are implemented in each stage of the ICT Impact Chain, adapted from Gigler (2011). It will survey literature from academic papers that incorporate empirical studies in both Bolivia and Armenia, as well as refer to grey literature. These include country reports by multilateral organisations, such as the World Bank, European Bank for Reconstruction and Development (EBRD), non-governmental organisations, government agencies, and others. Quantitative data will mainly contribute to the background information about the countries analysed, rather than serve as a significant measure of comparison. It will inform the broader inferences of the given findings, tailoring them to the country’s profiles, in terms of population, economy, and other aspects. This data will primarily be collected from sources, such as the World Bank open-source platforms.

4.1. Country Choice

The motivation behind selecting these two countries for the comparative case study involves multiple reasons. First, the analysis aimed to look into regions that could be comparable in terms of their ICT penetration rates. For instance, Commonwealth of Independent States (CIS) countries recorded 82% of individuals using the internet, while The Americas had 81% (ITU, 2021). However, similar to other economic welfare statistics that the CA is criticising, this kind of regional statistics was extremely broad and could be particularly biased towards individual countries within this context. Hence, it was crucial to also investigate additionally related aspects, when making choices for the countries of comparison.

Based on similar internet penetration rates, I looked into comparing two countries from these distant regions and presenting more contrasting and unique findings in the comparative analysis. The crucial role of ICTs in increasing the competitiveness of the landlocked developing countries (LLDCs) has long been identified (ITU, UN-OHRLLS, 2013). Therefore, the choice narrowed to selecting between landlocked countries within these two regions that had already shared one common feature mentioned above. None of the North American or Central American countries qualified for this geographical factor (i.e., being landlocked), and Bolivia and Paraguay were the only two landlocked countries in South America. Both countries are classified as “partly free” by Freedom House (2022). Hence, the other country of comparison from the CIS region was left between Armenia and Moldova, which were also landlocked and had similar scores (the other countries in the region are classified as “not free” - therefore, comparing two drastically different regimes in terms of local governance was not feasible (e.g., authoritarian vs hybrid/democratic).

The choice was left between four landlocked countries. Both Paraguay’s and Moldova’s economic welfare (e.g., GDP per capita) was recorded to be higher than Bolivia and Armenia (World Bank, 2020a and b). Bolivia and Armenia also recorded to have had similar lower value-added economic exports in their economy - i.e., mining (Harvard Growth Lab, 2019). In addition to mining as a major economic export activity, the two also had similarly high levels of urbanisation, often neglecting the challenges and opportunities for rural communities, they have both adopted strategies on internet accessibility, and highly relevant to this research, had recorded low rates of productivity within agriculture (ITU, 2018; World Bank, 2018c and 2021). Therefore, these aspects made these two landlocked countries – Bolivia and Armenia, possess reasonable grounds for comparison.

In terms of their differences, since the local governance is the main independent variable of comparison, Armenia and Bolivia appeared to be a suitable contrasting example. Here, the first country is centralised with very little agency provided to local municipalities, while the second is highly decentralised, providing more support to local municipalities to make decisions. Additionally, Armenia is a homogeneous country, where most of the population is Armenian while Bolivia is heterogeneous, comprising a variety of ethnic groups with their own language, lifestyle, and customs (Government of the Republic of Armenia, 2022; World Bank, 2016).

These factors, therefore, serve as a basis for a reasonable comparison, while the differences create a suitable platform to contrast two different governance types for different populations.

5. Analysis

5.1. Bolivia

Agriculture is one of the main sectors in Bolivia’s economy that contributes to 12.9% of its GDP (World Bank, 2021), and possesses more than 30% of the overall labour force in the country (Netherlands

Enterprise Agency, 2017). Despite these numbers, Bolivia is considered to have one of the lowest rates of agricultural productivity¹ within the Latin American and the Caribbean region (Salazar et al., 2015). Additionally, the country lacks significant infrastructure in providing ICT access to rural communities, particularly for mobile phones and broadband connection. Much like its population, Bolivia’s geographical composition is also very diverse, and as observed in Table 1, more than half of the population in the regions of Highlands and the Amazon, for example, appears to be deprived of mobile and/or landline phone access (World Bank, 2019). With such inability to have a simple connection with the outside world, it becomes even more challenging to implement ICT related agricultural initiatives that can foster research, innovation, or technological advancement on a regional level.

	Highlands	Amazon	Lowlands	Sub-Andean	Bolivia
Access to mobile phone and/or landline	35%	34%	50%	43%	43%

Table 1. Access to telephones. Source: World Bank, 2021

Providing an infrastructure for obtaining and utilising mobile phones falls into the first two steps of the ICT Impact Chain, adapted from Gigler (2011). The central government owns a telecommunications company (Entel, 2022) and has funded the Bolivian Space Agency to launch a national satellite to provide coverage across the country, especially targeting the isolated rural areas (Lancaster, 2021). As evidence shows, the first two steps do not allocate a clearly defined role to the local authorities in neither identifying nor providing the needed infrastructure and technologies for rural communities. Instead, it appears that these steps are mainly administered by the central government, while if the local government does have any role, it is at least not visible on paper. The next three stages of implementation, however, appear to recognise the role of the local government in the implementation process.

First, it is crucial to mention that decentralisation has been practiced within the Bolivian administration through the Law on Popular Participation (LPP) and the Law on Administrative Decentralisation (LDA) since 1994, allocating more resources to the local municipalities (Nijenhuis, 2002; Faguet 2012). Faguet (2008) finds out that as a result of decentralisation, more national investment was allocated towards “human capital and social services” matching to the needs of the given community. Even though the responsibility of assessing and building the needed infrastructure appeared to rely on the national rather than the local government, in terms of applying and meaningfully utilising ICTs within the rural context (which coincide with the third and fourth step of the Chain), the central government indeed

¹ Productivity is defined as the modern technologies used in the agricultural practices, efficiency in technical tasks, and the organisational capacity (Salazar et al., 2015)

cooperated with the local one. The national government has declared access to information to be a human right (United Nations, 2021) and as part of its decentralisation plan, it provided an opportunity for local municipalities to take charge of local development through involving the citizens in the planning process for agriculture and managing the given natural resources on a rural level. The role of the local grass-root organisations is also evident in co-directing and monitoring the resources provided through the People's Participation Law (PPL). Regarding disseminating information about agriculture, the local government is again working with other actors, such as non-governmental organisations and farmer associations in their respective communities to efficiently disseminate information from the national to the local level through provided technologies. They also provide the agency to local organisations for arranging trainings and providing farmers with a platform for social interaction as beneficiaries of local programmes for ICT integration (Pafumi, 2011; Gigler, 2015).

Elevating the application of the provided technologies, with appropriate arrangements rural farmers can also enhance their informational capabilities, reaching the final step of the ICT Impact Chain. The first step is indeed receiving timely news about the market prices, learning about prevalent agricultural technology for efficient agricultural practices, or having the opportunity to call potential producers or buyers, if need be (Chhachhar & Hassan, 2013). Nonetheless, once having adapted the given technology to their needs (i.e., mobile phones), they can also utilise it for the purposes beyond its original motivations. For instance, a case study on potato harvesting in Coachabamba region in the Andes found out that having simple access to mobile phones created a platform for farmers to stay informed about the prices in the market, weather, and successful agricultural practice guidelines. Additionally, it also provided an opportunity for them to make even more well-versed decisions about where and for how much to sell their products, both in nearby regions or further urban areas, such as Santa Cruz - one of the biggest hubs, serving as a market for Bolivian agriculture (Amaya and Alwang, 2012). These farmers also started calling their fellow farmers across different regions to exchange information before making decisions. Similarly, another successful initiative that targeted 300 beneficiaries permitted not solely farmers but also producers receive information and market practices in the country (Salazar et al., 2015).

Another national government initiative also ties well with involving the local government in the last three steps of the ICT Impact Chain. Here, the role of the local authorities is clearly spelled out, aiming to promote collaboration on all levels. National Institute for Innovation in Agriculture, Livestock and Forestry (INIAF) was established to achieve public and decentralised services through their provided research, serving innovative solutions (Pafumi, 2011). The INIAF Technical Assistance Methodology is particularly helpful to observe in action. Figure 4 explains how a national level organisation directly collaborates with local communities, providing them with services in identifying potential problems, conducting research, hosting suitable workshops, and using a participatory approach for both initial planning and evaluating the results of the programmes.



Figure 4. INIAF Technical Assistance Methodology (Source: Pafumi, 2011)

Nevertheless, Pafumi (2011) states that often disagreements between the central and local level governments directly affect the implementation of the national agricultural policy vision, even though the collaboration between the two parties is promoted on a state level. This can explain why despite these efforts, the mobile phone penetration is continuously low in the country and the role the lack of trust plays towards national institutes from the local authorities.

This section was structured through the five steps of the ICT Impact Chain for Bolivia. It becomes evident that the local government did not have a clearly defined role in the identification and provision process of needed ICTs for agricultural activities in rural areas. Nonetheless, in the next three steps, it appeared to have been considered a valuable stakeholder and incorporated a multitude of actors in implementing decentralised agricultural activities with the support of national level agencies. It played a role in the process of adaption of devices, empowering the local farmers to internalise the ICTs for their own needs and purposes, as well as had a role in the Technical Assistance Methodology research process by INIAF, maximising the gained impact from the given technologies. It is clear, however, that the local government is only one out of the many stakeholders in the process, therefore, measuring the impact of its role in isolation may be challenging.

5.2 Armenia

More than one third of the population of Armenia lives in rural areas and is employed in agriculture (World Bank, 2018a; Macmillan, 2016). Though it is the least productive sector in the country (EBRD, 2019), as of 2015, agriculture contributed to 20% of Armenia's GDP and a third of its exports (World Bank, 2018b). Much like parts of Bolivia, Armenia is geographically mountainous. However, in contrast with

Bolivia, 83.5% of Armenia's population is essentially exposed to mobile broadband connection (Garnet et al., 2021). The penetration rates are higher in urban areas (Freedom House, 2021) while international multilateral institutions are aiming to close the gap with the rural communities (EBRD, 2022). Additionally, it is crucial to note that the separate ICT sector in Armenia's economy is strongly present. For instance, International Trade Administration (2022) has qualified Information and Telecommunication Technology as the "best prospect industry" in the country, in accordance with the country's human potential, existing connections with ICT companies abroad, and more. Nonetheless, since the sector has primarily boomed within the capital, it has not been recorded to have played a significant difference in the lives of the rural communities and their agricultural practices.

E-agriculture, has become prevalent in the Armenian digitalisation strategy, elevating the use of not simply radio, TVs, or mobile phones for SMS purposes but also digital services and digital technologies to further elevate agricultural progress. However, the continuous political tensions within the country have often hampered the progress of these activities to be implemented at a faster pace. The central government frequently faces resistance from local government members, due to political and personal differences, which clearly affect the implementation of practices within various spectrums of the economy (Caucasus-Asia Centre, 2021).

Governance in Armenia has remained highly centralised, even though the constitution of the Republic of Armenia has allocated articles 104-110 of Chapter 7 to local self-government (Constitution of the Republic of Armenia, 2015). There are state, regional, and local level self-governments, where the communities share the "administrative power" along with the central leadership and the Ministry of Territorial Administration (Assembly of European Regions, 2017). Regions receive their decision-making influence from the central government as neither their budgets nor their administrative powers are independent. The role of the regional governors is to act as a bridge between the central and local government members. They are only partially provided with agency, where they can make policy decisions on infrastructure, agriculture, land usage, education, culture, and other related services.

Modern day foreign institutions support decentralisation in Armenia with a goal of more participatory local governance in the country, empowering the local authorities and increasing the citizens' confidence towards local authorities (Council of Europe, 2021). Nonetheless, the political system of the country is still heavily centralised, and local government has no separate revenues, relying on the central government for 80% of its' funding (IMF, 2019; BTI, 2022). Babajanian (2008) also finds out that local citizens often lack agency, facing hesitant attitude from local officials. Partnership between local authorities and local civil society organisations is lacking too and Alaverdyan et al. (2015) argue that research institutions should be well connected with the farmers for improving their knowledge and skillset, as they are deprived of utilising any potential resources from the local authorities.

As it became evident in the first two steps of the Impact Chain, the local authorities themselves are disadvantaged in making decisions about what ICTs their communities need for more efficient agricultural practices. Rather, they abide to the state administration policies and locally implement what they are centrally instructed.

Following on the next three steps of the Chain, where farmers are able to learn about the given ICTs, and utilise them for lasting social and human capabilities, the local government lacks to possess any pivotal role in these aspects as well. Though agriculture is a major source of employment for rural population, oftentimes farmers are lacking information that is needed for a smooth transaction to make profit. They are deprived of the market information, which often results in misinformed communication with the middlemen, paying less to the farmers than the actual market price (Oxfam, 2012). One of Oxfam's efforts in the country, for instance, was promoting agricultural co-operatives in rural communities and supporting them to obtain information about market prices, using mobile technologies (ibid). This empowered the farmers to select the markets they would like to enter for better profits and better living. The programme "Digital Vision Small Grant Programme", for instance, gave the opportunity to obtain information on weather for reducing the risk of disasters through SMS. This programme also provided an opportunity for users to communicate with each other, outside of receiving centralised information about the weather, market prices, and other related information from Oxfam. The organisation's main partners were the local NGOs, local telecommunications companies, and National Hydrometeorological Services for obtaining customised weather information for each operating region. A similar programme worked on empowering local women in rural agricultural practices, by providing mobile phones to centrally disseminate and locally exchange information about agricultural activities between the recipient agricultural co-operatives (ibid). However, in neither step of the implementation process of this programme was the local government allocated an official role or recorded a participation on an informal level. It becomes evident that the local government did not secure any official role in any stage of the identification or the implementation process for any of these rural ICT initiatives for agricultural development.

Similar to Bolivia, the central government in Armenia has emphasised the importance of access to technology and innovations. This is stated in the country's 2014-2025 Development strategy, while the Ministry of Agriculture developed a concept paper, that supports the establishment of seven research bodies, adjunct to it, providing them with relevant information to be later disseminated to the regions across the country. Nonetheless, in contrast with Bolivia, there is no mention of leveraging the agency of local authorities. Initiatives, such as establishing a Virtual Extension and Research Information and Communication Network (VERCON) have provided knowledge and skills to the research and advisory bodies within the country for improving their services (Yaralyan, 2011). AgroWeb, created by FAO, have enabled farmers to receive timely news about market prices and what organisations operate within the sector (FAO, 2018).

In Figure 5, Shatberashvili et al. (2008) present how agrarian information is collected and disseminated in the country, through the participation of multiple actors. Clearly envisioned as a centralised system, farmers receive information from central bodies and make meaningful inferences.

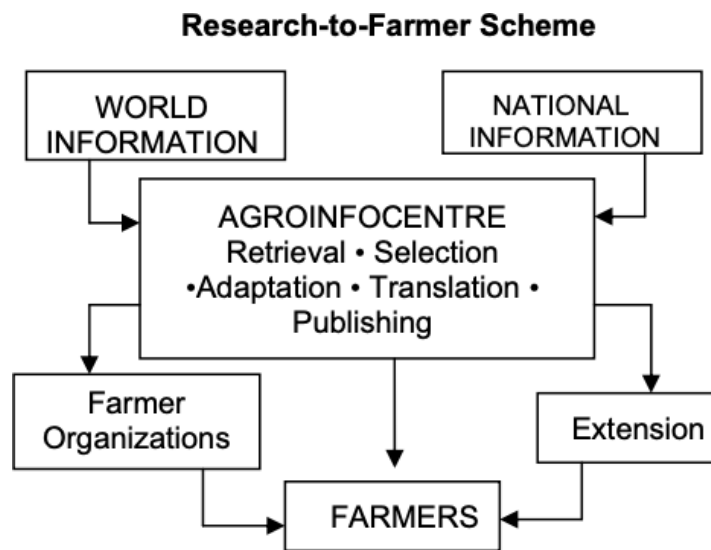


Figure 5. Research-to-Farmer Scheme. Source: Shatberashvili et al., (2008)

Despite the encouragement of practicing more decentralised type of administration, all of these initiatives significantly overlook any assets that could be provided by the local authorities in any stage of the ICT Impact Chain, failing to allocate them a separate role in the process. Rather, they are implemented by non-state actors locally, and funded by foreign aid agencies or the central state government. Interestingly, however, the outcomes of these initiatives do not drastically vary from Bolivia. In fact, the country's rural access to ICT infrastructure, for instance, is significantly higher, and the results from local initiatives appear to report at least some success in their implementation. Once again, these results prove that the separate role of the local government is highly relevant but equally perplexing to measure in this context.

This section was, again, structured, following the adapted model by Gigler (2011). The analysis found out that (i) the local government had limited authority to provide the needed infrastructure and access to ICTs for their communities and (ii) the implementation of ICT induced agricultural activities are primarily conducted by central government and foreign donor agencies, in cooperation with national research centres and local rural farmer associations, overlooking the significance of the local authorities.

5.3 Comparative analysis

This section will compare the findings according to the same model, as it did in the previous sections of the analysis. It will divide the results, comparing decentralised and centralised governance in two sections, in accordance with the (i) first interconnected two (i.e., evaluating and providing access to ICTs for

agricultural practices), and (ii) the last interconnected three steps (i.e., learning and using the ICTs for agriculture, and gaining informational capabilities).

5.3.1. Steps 1 and 2 of ICT Impact Chain

In Bolivia's example as a decentralised state, even if the role of the local authorities is embedded within the LPP and LDA (Faguet, 2012), assessing the infrastructural needs for ICTs within the local communities and aiming to provide that infrastructure is still in the hands of the central government. Though the local government naturally possesses more timely information about the unique needs of their community, their role is still not clearly defined in that process (World Bank, 2021). In accordance with the critique of decentralisation that argues about the lack of resources the local authorities possess, the implementation of providing access to mobile phones and infrastructural connections for better agricultural practices could indeed cost significant amounts from the modest local budgets in Bolivia's rural communities. Nonetheless, leveraging the assets of the local authorities in terms of at least providing concurrent picture about the community, and presenting the results ICT enhanced agricultural practices would bring to their municipality is still widely overlooked by the central government.

In Armenia's case as a centralised state, local authorities evidently have little to no say in presenting the needs of their municipalities or the wider region. Not only are the budgets locally allocated from the central government, but the local authorities are also deprived of officially acting as a stakeholder within the decision-making process, even though state governors or mayors are officially provided with some agency for regional policymaking in various fields, including but not constrained to agriculture and infrastructure (Assembly of European Regions, 2017). Though the overall mobile penetration appears to be similar across the country, rural areas are still recording a lower number of accessibility to both devices and internet connectivity (ITU, 2021). Therefore, even if the central government possesses the ultimate decision-making power, the rural communities are still neglected centrally, regarding their custom needs and opportunities for more efficient agricultural activities.

5.3.2. Steps 3, 4, and 5 of ICT Impact Chain

In a decentralised governance in Bolivia, the national government appears to work more closely with the local authorities in bringing tailored solutions for the well-being of the local communities. For instance, the INIAF methodology in Figure 4 clearly stated the role of local authorities in integrating them in the process of identifying the research needs for a certain community, as well as incorporating the participation of farmers themselves, who will be the ones to benefit from utilising the technology for their agricultural practices (Pafumi, 2011). External organisations, such as foreign aid donors, also provide financial and logistic support in project implementations in local communities but the aspect of collaboration with local

authorities seems to be vague. The feature of increasing the informational capabilities of the local farmers, i.e., the beneficiaries, appear to be a result of the projects, rather than a separately considered aspect to work on from the local or central actors.

In a centralised governance, the local authorities are limited in their allocated role or simply excluded from the implementation of ICT related initiatives in their communities. The main actors in the sector appear to be the central government, which makes decisions or allocates funds for the initiatives they rather than the local authorities believe to be important for the rural communities (Uvarova, 2020). In the examples of encouraging local co-operatives across the country by Oxfam or promoting cooperation between farmers and research institutions, adjunct to the Ministry of Agriculture in Armenia, the local authorities are simply left outside of the stakeholder picture, even though the local potential is what was targeted to be leveraged as a result of the given projects in different parts of the country.

6. Conclusion and Discussion

The aim of this paper was to examine the influence of the type of local governance in implementing ICTs for rural development initiatives. The industry that the paper investigated was agriculture, exploring Bolivia and Armenia as the two countries of comparison for this case study. The type of examined ICTs for this paper were mobile phones.

The paper adapted one of the most prominent theories used within ICT4D research, namely, the Capabilities Approach. It particularly looked further into Gigler's (2011) work, adapting the model of ICT Impact Chain throughout the analysis, taking into account the specific spectrum of this study: i.e., aspects of local governance, ICTs for rural development, agriculture, and mobile phones.

What the paper found out based on the model of the ICT Impact Chain, is that decentralised governance in Bolivia indeed provides agency to local authorities to make decisions on paper. However, with the limited financial and human resources the local government possesses, the central government still conducts its own operation in identifying the need for the type of ICTs in the rural communities and allocates funds on providing the necessary infrastructure for them. Nonetheless, it cannot be overlooked that the process of adopting the given ICTs (i.e., mobile phones) and utilising them in agricultural practices and beyond its scope involved not only national and foreign agencies but also emphasised the participation of local organisations and more importantly, local authorities. In Armenia's centralised governance, on the other hand, the significance of local authorities and their resources were considerably overlooked, neglecting their potential in aiding the central government to assess the needs for certain ICTs and providing funds for the opportunity for rural communities to access them. Instead, in its decision-making process, the central government either relied on the assets of foreign aid agencies, research groups adjunct to the Ministry of Agriculture, or other stakeholders.

Additionally, both the central government and donor organisations also disregarded any potential support that could be obtained from the local authorities when working closely with local communities, to internalise the provided ICTs for their agricultural practices. Nonetheless, looking into the case examples in the study and the clear advantage of Armenia over Bolivia in providing an ICT infrastructure for rural communities, one type of governance does not appear to possess certain significant advantages over the other. As observed, the opportunities and challenges noted in both countries' case examples of project implementations did not record seemingly different results.

The paper's hypothesis was confirmed: the type of local governance indeed plays a role in the way ICTs for rural development initiatives are implemented. Nonetheless, the whole analysis section attempted to answer the original research question about *what role* the type of local governance plays in implementing these programmes, and instead, it found out that this role is evidently still a very vague one, failing to be specifically defined by both the central government and other stakeholders involved in the sector.

The broader implications of this specific comparative case study involve multiple aspects. First, it was certainly displayed that there are more layers to ICTs for rural development initiatives than solely the aspects of health, governance, agriculture, disaster risk reduction, or any other field. The theoretical lens of CA certainly also brought forward spectrums of attempting to observe the role of the local authorities in providing their citizens' well-being outside of reporting economic activities increase through mobile phones within agriculture. Second, it became evident that more analysis is needed in interpreting the politics and dynamics between the local and central governments in the implementations of these projects, since the provided agency to local authorities appeared to be widely neglected in both types of administration in certain aspects (BTI, 2022; Pafumi 2011). Lastly, failing to clearly define the role of the local governments and how they can contribute to these initiatives manifestly hinders a smoother cooperation among all stakeholders involved in these activities, including the research bodies, the funding institutions, and the implementing actors in the local context. It does not necessarily imply to provide more power to local authorities in terms of allowing them to make more decisions or allocating more funds for locally implementing these initiatives. Rather, it appears that the potential resources they are able to bring to the table are certainly underestimated in both decentralised and centralised types of governance.

6.1. Limitations

Case studies evidently limit the findings to only the examined states in this comparison. Hence, more research, comparing other states with decentralised and centralised governance is invited to be conducted, as these results can be very specific to this case, instead of informing the broader picture. Secondly, the specific initiatives discussed in this case study were also done by foreign aid organisations rather than national agencies. Therefore, the role of the local governance may not have been highlighted in the official reports, as it might have, had the reports been written by the national governments. Thirdly, the secondary data

collected as part of the research was exclusively in English. Undoubtedly, more data would have been found, had the study expanded the language of the research to Spanish and Armenian, particularly in examining government papers and reports. Lastly, with the reported differences between the national and local governments, taking into account the lack of trust and conflicts between one another, this study limited itself to secondary data, while interviews with the stakeholders involved in these reports (e.g., central and local government members, foreign aid donors, local associations and farmers themselves) could have provided more socio-anthropological implications on what the reports and this analysis recorded in the first place.

6.2. Recommendations for Further Research

It is clear more research is needed for examining the external factors and the role of various stakeholders in the implementation process of ICT induced initiatives, be it through mobile phones, the field of agriculture, or any other spectrum. The role of the local governance in itself can be further analysed in relation to other variables, or simply examined through a different methodology (e.g., primary data collection) and a different theoretical lens within ICT4D (e.g., Actor-Network theory). Additionally, it is important to reiterate that no country is fully decentralised or centralised, and with each case study, every country under the examination can bring numerous layers into examination. Hence, it is evident that this research brought results specifically targeted to Bolivia and Armenia, while if other countries are chosen for the exact same type of comparative case study, the findings can be drastically different.

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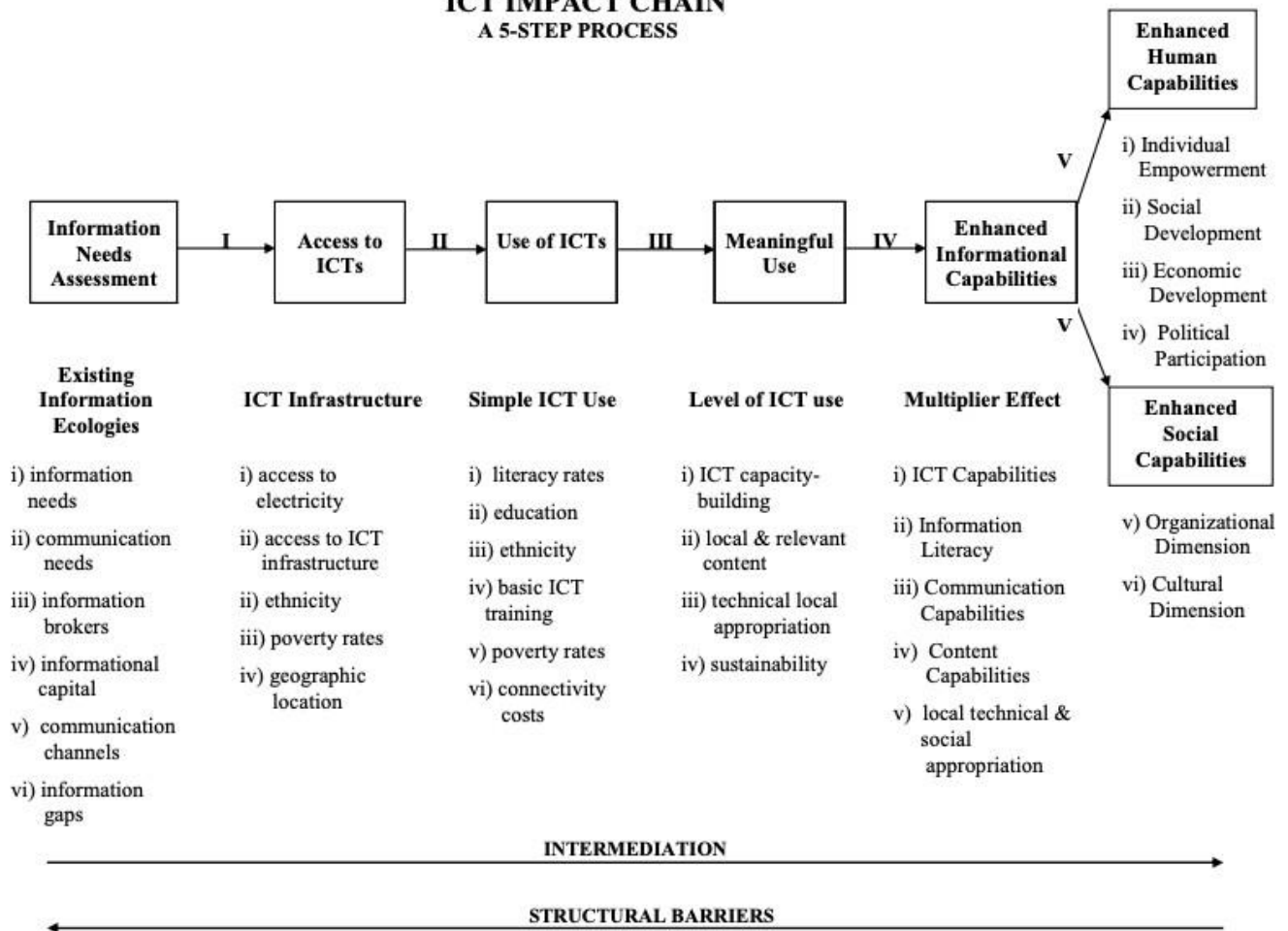
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Appendix

ICT IMPACT CHAIN A 5-STEP PROCESS



Gigler's (2011) original model of ICT Impact Chain