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Exploring the Opportunities and Challenges of ICTs for Women Farmers in Kenya

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Abstract

In Kenya, women contribute significantly to the dairy sector. While their role may differ, common for most of them is that they all lack access to productive resources, in comparison with men farmers. The sector is severely underperforming and has been in decline during several decades. The development of the sector relies on the empowerment of women and the achievement of gender equality to turn this trend. By using the qualitative research methods of focus group discussions and individual interviews in Nakuru County, this study examined the influence of Information and Communication Technologies (ICTs) on 24 women and men engaged in dairy farming. The study aimed on contributing to our understanding of how ICTs can be used as a tool for empowering women in agriculture and close decades of gender gaps. The collected data were analysed through the three concepts of *Assets, Mobility and Empowerment.* The findings showed that the women farmers in this study were making constructive use of mobile phones and radios, but not of the TVs or computer related ICTs, such as the Internet, due to either associated with high costs, not finding it relevant or useful for their survival needs and in to some extent unaware of the possibilities. Furthermore, the women in this study have been self-empowered to some extent through the use of ICTs by expanding on their assets and capabilities. But ICTs alone do not empower and are inadequate for significant benefits to rise or emerge, not because they do not find them to be useful, but rather because they are firstly fighting on a day-to-day basis for their and their families' survival.

Keywords: Kenya, Dairy Sector, Women's Empowerment, ICT access and usage

Table of Contents

1 Introduction

In agriculture, information is a critical factor that has always mattered, and even though farmers may have undertaken the same activities for years, decades or even centuries, producers have not always found it easy to obtain answers when conditions for them have changed (World Bank 2011). Usually for many farmers in low-income countries, information is obtained through a complex web of social networks (Manfree & Nordehn 2013). Applying modern Information and Communication Technologies (ICTs) such as mobile phones, radios, TVs and Internet services in agriculture may offer a new way of sharing information and knowledge amongst farmers. But due to prevailing inequalities in accessing ICTs, many groups in low-income countries are often left out from using ICTs, especially women (Wamala 2012). The inequality experienced by women is often referred to as the "gender digital divide", as empirical evidence shows that women have worse access to, and use ICT less, than men, both in rich and poor countries (UN Women 2015).

In Kenya, as in many other African countries, the agricultural sector is the backbone of the economy (GOK 2012). It contributes to over one third of the total gross domestic product (GDP) and provides a livelihood for 80 per cent of the population, mainly smallholder farmers (ibid). The sector is however severely underperforming and has been in decline during several decades (ibid). According to a new flagship report eTransform Africa (2012), ICTs offer the best opportunity to alter this trend. One of the main reasons is that new information and knowledge fuel innovations and competitiveness, which in turn can lead to increased productivity (Manfree & Nordehn 2013).

Women make up 80 per cent of the farmers in Kenya (GOK 2010). Most of these women are operating in single coupled household due to either being a widow or not being married (ibid). Statistics shows that just over 30 per cent of the farming households in Kenya are headed by women and out of these nearly 60 per cent are widows, 3 per cent are not married at all, while the rest is married (ibid). Despite outnumbering the men farmers, they are still not usually seen as the "typical farmer" by policymakers and administrators such as extension officers, and are therefore often bypassed by agricultural services (ibid). Women's potential to become successful farmers have also been limited due to that they are facing many other obstacles and challenges such as lack of access to productive resources, information and credit (FAO 2011a). In addition, women's social networks are often more local, connected to the rural

village and therefore often more restricted than men's, whose mobility is often greater and reaches outside the borders of the village (ibid). Since most information channels in Kenya are built on social networks, women's networks offer fewer opportunities for learning about, as well as engaging in, new productive opportunities and strategies, leading to underperformance of the sector, which is bad for the country and rural development at large (Manfree & Nordehn 2013). There lies both an instrumental and intrinsic value in enabling women to optimize their production to the same extent as men (FAO 2011a). When it comes to the former, research shows that women's agricultural productivity can increase around 20-30 percent, if women would get the same kind of access to productive resources that men have (ibid). Optimizing women's production should be equally important based on a gender equality perspective and rights-based approach. Since it is needed for both women's own sake, but also because they should have the same right to be as productive as men, which in the end would benefit the whole country at large by reducing poverty and hunger (ibid). Applying ICT solutions could be a way to "extend the reach of existing information channels thus overcoming barriers women farmers face in accessing information" (Manfree & Nordehn 2013: 1). A number of studies have shown that ICT can have a positive impact on rural livelihoods and farmers, whether it is by encompassing or by accessing vital market information on a mobile phone (Unwin 2009; Un Women 2015), or by generating thematic maps and online applications to monitor the spread of agricultural pests (Shaik et al. 2004).

Kenya's dairy sector accounts for a significant part of the nation's economy and make up one third of the agricultural share of GDP (ROK 2013). The milk producers in Kenya are typically consisting of family units and usually run by women. Typical for most of these small-scale farmers are that they get low yields and work with limited technical knowledge or support systems (FAO 2011b). To obtain successful dairy production, farmers need to be both cautious and reflexive in their decisions, since dairy farming is a knowledge intense sector that requires constant decision-making regarding many issues including feeding, new breeds, etc. (ibid). Due to diminishing land size, changes in weather patterns and changing markets for milk and dairy products in Kenya, zero grazing land systems are quickly emerging as an important economic activity (ROK 2014). Given seasonal differences and operation on small farmlands, dairy farmers require the right training and knowledge to ensure high yields of milk throughout the year (FAO 2013).

The integration and use of ICT in dairy farming may therefore provide alternative sources of information, and become a tool for women's empowerment, meaning by increasing their self-determination to make own choices when opportunities appears and take control over those decisions (ibid). But while ICTs may offer new opportunities for women farmers, the constraints coming from social and cultural constructed gender roles and relationships must be understood since it creates obstacles that limits "their access to, usage and larger benefits from ICTs" (Primo 2003: 5). Therefore it is not until the gendered dimensions of their social and cultural position in households, kin groups and society at large, in terms of user needs and the pre-conditions of access, are identified and addressed that ICT can become a powerful tool to advance women's rights, empowerment and gender equality in agriculture (Un Women 2015). In order to bridge the gender digital divide into a digital opportunity, improved understanding of these issues and challenges are needed (Primo 2003).

1.1 Aim and Research Questions

This study examines the influence of ICTs on the lives of women engaged in dairy farming in rural Nakuru, Kenya. The study aims to add to our understanding of how ICTs can be used as a tool for empowering women in agriculture, by charting the opportunities and challenges women face in accessing and using ICTs. The following research questions are posed:

- How are the respondents using ICTs for livelihoods enhancing activities within dairy? Which tools are used? For what purposes? If women are not using ICTs/these ICTs tools, why?
- What are the advantages and the disadvantages of ICTs according to the respondents? Are these the same for women and men?
- Does the use of (available) ICTs empower these women? If so, how and in relation to what? If not, why?

1.2 Justification

Given the research aim, I have chosen to limit the study to the Central Province of Kenya, and more specifically to the rural parts of Nakuru County. Kenya was chosen because of the high population coverage of ICTs and for being the regional leader of ICT innovations in Africa (ADB 2013). The specific area was chosen for mainly two reasons. First, I was inspired by a previous study by Manfree and Nordehn (2013) done in Nakuru County on how to extend the reach of extension services through the use of ICTs and mobile technology. Hence, with this

study I wanted to understand if the use of ICTs could help empower women in the agricultural sector and close gender gaps that have existed several decades in agriculture. The study by Manfree and Nordehn (2013) was used as a stepping-stone to give me a better understanding of the Kenyan context and where I intended to conduct the study, but differs by looking on the dimensions of women's empowerment. Second, the location was discussed with a research and extension specialist at the Agricultural Sector Development Support Programme (ASDSP), which is an implementation strategy for the national and county governments in Kenya of the overarching agricultural policy that are based in Nairobi, who recommended Nakuru, since dairy was one of their prioritized value-chains in that County. This also enabled this study to become more "demand driven", meaning something that were discussed with local partners who knew the context and that could be of value to them in the future, which also is an important factor to consider.

This research rests on the notion that there is a need to look beyond statistics on individuals' and households' access to and use of ICTs, and to further explore women's daily lived experiences of accessing and using ICT services, as the barriers are arguably higher for rural women (WWWF 2014). The relationship between gender and agriculture has been fairly studied over the years, but it is not until quite recently that the relationship between gender and ICT use in agriculture has appeared in the literature (World Bank 2015). Yet, comprehensive sex disaggregated data on ICT usage in low-income countries is still missing (ibid). Research ICT Africa (RIA 2012) suggest that without doing a gender analysis, the obtained descriptive data is incomplete in understanding how ICT is gendered. Even though that many ICTs have been developed for small-scale farmers in Kenya, there is no single ICT tool that have been specifically developed or designed for women farmers (ibid). This study will contribute to our understanding of how ICT solutions and innovations can help close gender gaps that have existed for decades in agriculture.

2 Literature Review and Guiding concepts

This section reviews existing literature on the researched topic, presents the theories that inform this study as well as the concepts used. The first section *2.1 ICT, Gender and Agriculture* reviews existing literature and previous research done in the field and the second section *2.2 Clarification on concepts* goes further into the three concepts of *Assets, Mobility and Empowerment* that were used to analyze this study.

2.1 ICT, Gender and Agriculture

Sorenson (2002) discusses how the digital revolution has transformed our lives by changing the way we work. How information is gathered and shared can be a game changer in improving the lives of poor people (ibid). But women are often left out of the digital revolution in low- and middle-income countries (ibid). Sorenson (2002) suggests that previous literature on gender and ICT only sought to establish and highlight if women were excluded or included from ICTs and thus ignored the social dynamics of gender and inequality in the society more generally. He argues that just focusing on increasing the physical access to, and the use of, ICTs does not enhance women's position and break the gender divide (ibid).

During the 90's, recognizing knowledge as key to development gained momentum, and was also highlighted in the World Development Report (WDR) 1998/1999 (World Bank 1998). The report puts a lot of emphasis on the necessity of exploiting knowledge, so that it can become a powerful tool in achieving societal and economic transformation (ibid). According to Shaik et al (2004), the development of the agricultural sector is fast emerging and transforming traditional societies into knowledge intense societies. This trend is not only emerging in developed countries but is happening even faster in developing countries (ibid). This paradigm shift is especially causing rural areas to change and adapt to new technologies since "old ways of delivering important services to citizens are being challenged" (ibid: 1). ICTs could have a significant role in achieving such a transformation as it can disseminate important agricultural knowledge and messages to farmers in rural areas of low-income countries (ibid).

Following the WDR 1998/1999, and through a series of reports and conferences, this gave rise to a new field called "ICT4D" (Information and Communication Technologies for Development). The goal of ICT4D is primarily to bridge the digital divide so that poor communities can make a difference to their lives (Unwin 2009). The theory behind ICT4D refers to the better use of ICTs to become a powerful tool for both economic and social development (ibid). The first component of ICT4D, namely "ICT" stands for an umbrella term, which includes any modern communication devices such as the radio; TV; phones; computers; the use of internet, etc. (ibid). As such, it is not really contested (ibid). The second component, "4D", has much wider theoretical, political and practical implications since there

may be different understandings of what development actually entails and how it can be achieved depending on the scholar, policymaker and practitioner (ibid).

Mainstream views on development in the 21th century are primarily in terms of economic growth, and how poor countries and communities can perform better and be more efficient (Unwin 2009). This spective ignores the broader socio-economic factors and level of societal development, such as standard of living, educational level etc. that may hinder poor people accessing information and how those with different backgrounds may communicate with each other (ibid). The question then is why should programs and projects give any priority to application of ICTs in low-income countries, when technology mainly has been used to enable the rich to maintain their economic position (ibid). In addition, a World Bank evaluation of projects aiming at promoting universal access of ICTs between 2003 and 2010 showed a failure rate between 40-70 per cent of the projects (IEG 2011). Unwin (2009) argues that too few ICT4D initiatives have proved successful or sustainable, especially in Africa. This may be caused by too little evaluation or monitoring and too much focus on a "one size fits all" model, which thereby ignores the contextual issues, local demands and the multi-dimensional livelihoods of poor rural people (Chapman & Slaymaker 2002). But Unwin (2009) also suggests that some scholars within the development practice rather prefer to emphasise the importance of participation and empowerment than development in strictly economic terms. The ICT component then, has the potential to play a key role in bringing the two contrasting perspectives on development together, according to Unwin (2009). This could make a fundamental difference to poor and marginalized people by both empowering them and provide economic growth (ibid).

Applying ICT in the context of agriculture could offer a lot of potential applications both for the farmers and for extension services in rural development (Chapman & Slaymaker 2002). A previous study in India showed that the 100,000 rural farmers that were provided with a phone line, which was used for asking specific agricultural questions, gained profit increases of between 25-150 per cent (Unwin 2009). Other studies in the context of agriculture have also shown positive impacts on rural livelihoods and farmers when applying ICT tools (Shaik et al. 2004; UN Women 2015).

2.1.1 Gendered Access and usage of ICT

Around the time of the millennium shift there was very little sex disaggregated data that existed and demonstrated the disparities of access and usage of ICTs between women and men (Deen-Swarry et al. 2012). Jensen and Mahan (2007) suggests that even a decade after the realization around the millennium shift, little progress has been done in the field, even though gendered indicators are being on the top of everyone's agenda. In addition, Huyer and Hafkin (2007) conclude that most of the existing gender equality indexes do not incorporate technology generally, nor ICTs specifically.

Findings from a study made by Milek et al. (2011) in 13 African countries, including Kenya, showed that when it comes to the usage of ICT, after controlling for income and education, a larger share of men uses ICT than women in 11 of the countries, which is in line with the conventional findings in the literature on gender differences in technology adoption (Doss 2011; IFAD 1998; Quisumbing 1995; Quisumbing & Pandolfelli 2010; World Bank, FAO & IFAD 2009). But, Hilbert's (2011) findings based on the same data showed that these gender differences disappeared in most of the countries after controlling for literacy, labour and those belonging to the top 25 per cent income group. Hilbert suggests that the implications from inequalities such as education, income and labour between women and men "throw their shadows on the ICT usage" (ibid: 20). Hence, the relationship between women and ICT may be positive, but due to the traditional discrimination women face within education, income and labour, this trend is turned into a negative one (ibid). Other global studies have shown that there exists a 21 per cent gap in ownership of mobile phones for women living in low and middle-income countries worldwide compared to men, and after controlling for Africa this gap is increased to 23 per cent (GSMA 2012). Ownership of mobile phones has skyrocketed globally during the last couple of years and is still increasing (ibid). It is estimated that over the next couple of years, two out of three potential new phone subscribers will probably be women (ibid). For those women not owning their own mobile phone, accessing through borrowing from either their husbands, children or a close relative is also seen as a convenient option, since they rarely have to pay for the services that they make use of (ibid).

The gender digital divide also exists when considering women's access to the web (Intel 2013). But here the gap is even greater as women in low and middle-income countries access the web to 25 per cent lesser extent than men, while this gap is increased to 40 per cent in the

case of sub-Saharan African countries (ibid). Deen-Swarry et al. (2012), who are connected to Research ICT Africa (RIA), a research network consisting of 20 African countries, suggest that most of the findings of these kinds of global reports are merely focusing on descriptive statistics, and therefore entirely incomplete in analyzing the underlying causes of access to ICTs. The most common factors that are hypothesized to affect equitable access and use of ICTs are caused by "income, education, age, material status, culture, ethnicity and country specific characteristics" (ibid). Deen-Swarry et al. (2012), note that this gives rise to methodological problems, as these descriptive statistics fail to capture and explain gender inequalities of usage. They therefore recommend that more qualitative research is carried out to analyze the descriptive data, and argue that this otherwise may exacerbate gender inequalities even further (ibid).

For example, a study made in Trans-Nzoia district in the western rural parts of Kenya on women's access to and use of ICTs showed that income and being educationally disadvantaged have a big share in explaining access to ICTs (Kituyi-Kwake & Adigun 2008). The top-impeding factors according to this study showed that ICT services are unaffordable and too expensive (ibid). Factors such as "time", "distance" and "cultural taboos" were also noted to affect women's access to ICTs to a larger extent than computer literacy and education (ibid). This shows that, if only income and education are targeted as an effective solution for breaking the gender digital divide, it may fail to recognize the social dimensions and the existing gender roles which may be the real causes of prevailing gender differences in use (Sorenson 2002). Another study, based on a desk review on access and use of ICT in Kenya undertaken by Ponge (2016) showed that factors which impact women's access to and use of ICTs (which expanded on what is in line with the traditional factors), were owning and controlling assets; responsibilities and time burden of taking care of the household; together with women being constrained by social norms that may confer the control of technologies to men.

Previous studies on the digital divide have only been successful in showing and explaining what the excluding and including factors of ICT access are. This is also something Sorensen (2002) points to. They have, however, not been able to explain the greater inequalities in the society and address the challenges that can ensure women sustained participation and usage of ICTs in the digital era (ibid).

2.1.2 Gender and Gender Constraints in Agriculture

The agricultural sector is still underperforming, meaning suffering tremendous lost in agricultural output that leads to food security and little economic growth, despite it being over three decades since the structural transformation [1] was launched in many low-income countries (FAO 2011a). It has been widely debated that this change caused a "feminization of agriculture", as many rural households changed roles as men started to engage in more nonfarm income generating activities (Quisumbing et al. 2014). Women make up 43 per cent of the total labor force in the agricultural sector in low-income countries (FAO 2011a). Despite making numerous contributions to the agricultural sector, a key message from a FAO report in 2011 is that the agriculture sector is severely underperforming due to the fact that almost half of its farmers, the women farmers, do not have access to the same kind of resources that men farmers use to become more productive (ibid). FAO means that the gap is found for many assets such as "inputs, services, land, livestock, labour, education, extension, financial services and technologies" (ibid: 5). Quisumbing et al. (2014) in turn, presents two arguments why it is important to close the gender gap in agriculture. One of the arguments concerns the aspect of improved productivity and increased efficiency, as women are severely underperforming due to gender gaps in asset ownership and control (ibid). By closing the existing gender gap in agriculture, this would not only cause an increase in women's average yields of 20-30 per cent, it would also lead to an increase in the total agricultural output of low-income countries by 2.5-4 per cent (FAO 2011a). This would in turn not only generate gains for the agricultural sector but also for the society as a whole as it can reduce the number of hungry people by 12-17 per cent in the world (ibid). But, as mentioned in the introduction, expanding women farmers' production opportunities must also be a duty of nation states since it is part of women's basic human rights (ADB 2013). This relates to the second argument by Quisumbing (2014), which addresses the aspect of equality. Since much of the previous agricultural development efforts have mainly been focusing on men, naturally this requires a "rebalancing" by paying more attention to women (ibid). A study made by Smith et al. (2003), showed that a woman who got empowered to make her own agricultural decisions, such as what to plant and how much as well as which inputs to apply, not only led to an

[1] "Structural transformation is defined as the transition of an economy from low productivity and labour-intensive economic activities to higher productivity and skill intensive activities" (UN Habitat 2016:1)

increase in productivity, but also to better care of her children in terms of nutrition and health. Gender differences may therefore change over time or vary depending on culture or norms, since they are socially, rather than biologically constructed, and therefore subjected to change (Quisumbing et al. 2014).

Quisumbing et al. (2014) concludes by stating that these two arguments should not be used mutually exclusive, instead they should be viewed as reinforcing each other, especially when conducting research to close the gender gap in agriculture. Due to previous lack in collecting sex-disaggregated data in agriculture, mainly because of treating the household as the unit of analysis and not individuals, this led to statistics showing women as "inactive" and an underestimation of women's contribution to the agricultural sector (ibid; Quisumbing & Maluccio 2000). Statistics show on the contrary that women who live in the least developed countries in Sub-Saharan Africa are more likely to be employed in the agricultural sector than men (FAO 2011a). For 70 per cent of these women, agriculture was their primary source of livelihood (ibid). In addition, when it comes to working conditions, African women tend to earn half of men's wages, and do not access off-farm activities to the same extent as men to compensate for their lesser earnings in agriculture (ibid).

A study made in Kenya showed that extension officers tended to favour approaching men farmers rather than female farmers, all because not seeing the woman as the "typical farmer" (FAO 2011a). This is not an isolated or unique example of seeing the household as one unit of analysis, and expecting the advice and knowledge to trickle down from the male-head to the rest of the household members (Due 1997; FAO 2011a; Meinzen-Dick et al. 2011; Ragasa et al. 2013). Saito (1994) suggests that women in female-headed households are even more disadvantaged than women in male-headed households, and notes that extension officers rather preferred to talk with women in male-headed households than those in female-headed households. Women are therefore disadvantaged and less likely to access information on new innovations and technologies, or other extension resources since they are bypassed by the service providers due to their gender (ibid).

Besides being bypassed due to their gender, household structures or other misperceptions, women may have other constraints when it comes to participating or reaching extension services such as field days and from trainings that uses lots of written material (FAO 2011a).

This is mainly due to the fact that women tend to have lower levels of education than men, facing time constraints due to their reproductive responsibility of taking care of the household and may face cultural barriers, for example when it comes to interaction with men outside of their family that are unknown (ibid). Manfree & Nordehn (2013) suggest that access to information and the ability to create knowledge from that are one of the most effective key drivers of both social and economic transformation. If women farmers are hindered from accessing information which may give rise to the adoption and adaptation of new innovations that could increase their productivity, then it could be said that they are not performing to their full potential and are disempowered instead (ibid).

Modern ICTs could therefore play a vital role in extending the reach of information channels, as it may enable farmers to access information faster together with providing educational opportunities (FAO 2011). These modern technologies may be particularly beneficial to women in rural areas, whose mobility to travel long distances may be restricted due to gender norms, roles and responsibilities (ibid).

2.2 Clarification of Concepts

2.2.1 The concept of (Women's) asset ownership

Accessing, controlling and owning assets are the backbone and one of the most critical components for rural livelihoods wellbeing (Meinzen-Dick et al. 2014). Assets can serve multiple functions as they can both generate products, facilitate access to other services such as financial and be transformed to resources that people use for building livelihoods and earn a living (ibid). Other than just function as resources that can be used, assets can also give meaning to people's lives (ibid). Assets can give people the capability to be, and the power to be, able to act (ibid). Standard agricultural assets often include the holding of land, agricultural equipment or different kinds of livestock, but can also include other kind of assets, which usually are not regarded as traditional inputs into agriculture (ibid). A broad definition of different kinds of tangible and intangible asset holdings are usually categorized in five major types of capital groups (Meinzen-Dick et al. 2014): natural- (land, water, trees, genetic resources, soil fertility), physical- (agricultural and business equipment, houses, consumer durables, vehicles and transportation, water supply and sanitation facilities, and communications infrastructure), human- (education, skills, knowledge, health, nutrition), financial- (savings, credit, and inflows), social- (membership in organizations and groups,

social and professional networks) and political capital (citizenship, enfranchisement, and effective participation in governance) (ibid: 94). According to Meinzen-Dick et al. (2014) the last two assets, social and political capital, are usually not viewed as typical agricultural assets and inputs.

Due to the fact that in much of previous established literature, households were seen as a united group that pooled all assets together, this has brought many negative results for agricultural development interventions (Meinzen-Dick et al. 2014). The reason is that these interventions have ignored to look at how gender affects the distribution of different kinds of assets (ibid). They have simply ignored the aspect that women and men both can access, control and own certain types of assets and dispose or accumulate them in different ways (ibid). Much of today's evidence shows that assets can both be held individually and to different degrees by both genders (ibid). However, a great body of empirical evidence shows that women in general, worldwide, both hold fewer and less valuable assets compared to men (ibid). Quisumbing et al. (2003) showed that when women's control over assets has increased, it is not only the woman's wellbeing that has increased, but also the wellbeing of the entire household. Examples of increased and positive household wellbeing, include but are not limited to, increased food security, better child nutrition and decrease in child malnutrition, sending more children into the educational systems and better health outcomes for girls (Meinzen-Dick et al. 2014). Any attempt on poverty reduction must therefore address the existing gender asset gaps between women and men, by focusing on strengthening women's control over resources (ibid).

2.2.2 The concept of Mobility - How Gender and Mobility are connected

"Mobility, i.e. the element of physical access to different facilities" (Uteng 2011: 1), is an issue that is highly gendered in both the developed and developing countries. The reason is that it can determine the daily mobility of women and men, which affects the degree of physical participation in society (ibid). But equally, women and men's daily mobility is determined by gender roles and inequalities in society (ibid). Mobility could therefore be said to be an issue that is gendered in two ways, but affects women's mobility to a greater extent than men due to complex hierarchies in society, and especially in developing countries (ibid). Mobility impacts people highly in their daily life as it can enable people to participate in different areas such as within the economic, social, cultural, and political arena (ibid). If people's mobility is hindered they will experience difficulties in accessing different arenas

such as the market (ibid). Rather than being one single element that influences the gendering of mobility, there are many elements that are highly influential in determining women's and men's mobility (ibid.)

The use of ICTs could have the potential in alleviating some of the barriers that women face in their daily mobility. The usage of mobile phones can for example include women and break constraints simply by a phone call or text message. ICT can offer many opportunities in remote and rural areas where mobility is restricted by breaking peoples way out of isolation and making it easier for them to access knowledge and productive resources (c.f. Sida 2015). Even though ICT can contribute to flexibility of time and space, it can "also contribute to discrimination and reinforcement of existing inequalities" (ibid: 1), due to the problem around gendered access and literacy for example.

2.2.3 The concept of Empowerment

The term empowerment represents a wide range of concepts, but common to most is that the terms option, choice, control and power are included when defining the term (Malhotra et al. 2002). Naila Kabeer (1999) defines empowerment as "the expansion in people's ability to make strategic life choices in a context where this ability was previously denied to them" (ibid: 437). She distinguishes the concept of empowerment from others, by defining it in terms of process, or change from a condition of disempowerment, meaning those who have been denied the ability to make strategic life choices (ibid). She further conceptualizes the term of empowerment by dividing the process of choice into three inter-related components: resources; agency; and achievements (ibid). Resources are explained as pre-conditions that serve people the ability to exercise life choices, and can range from material, economic, human to social resources (ibid). Agency is related to "the power within" meaning being able to act upon your own defined goals (ibid). "Agency is thus 'the heart' of the process through which choices are made" (Kabeer 1999: 438) and can take the form of decision-making, bargaining, negotiation, deception, manipulation, subversion and resistance (ibid). Achievements are the outcomes of the choices that enable people to reach their goals (ibid). The concept of empowerment in this sense is therefore strongly connected with the ability to choose, and hence central to the concept of power (ibid).

But what a woman wants and her ability to choose what she wants to make, could also be limited to other important factors or experiences from her life (Kabeer 1999). In her attempt to conceptualize empowerment, Kabeer also highlights that even though increasing women's agency is a necessity for their empowerment, structures play a big part in shaping women's agency. Women's agency cannot be separated from the relationship caused by structural issues, since they can and do define the limits to exercise their agency (ibid). Structures according to Kabber:

> […] also define the parameters within which different categories of actors are able to pursue their interests, promoting the voice and agency of some and inhibiting that of others. And finally, they help to shape individual interests so that how people define their goals and what they value will reflect their social positioning as well as their individual histories, tastes and preferences (ibid: 461).

Women are embedded in these structures and therefore those structures submit to the context or environment, which determines the conditions of women's choices. It is in these structures that they have their agency and also where they can expand on their ability to exercise strategic life choices (ibid). The environment and conditions then, are patterns of relationships, their fundamental interaction and social hierarchies such as kinship, religion or castes leads to different types of behaviour being accepted as normal, even though it may be both discriminating and take the form of supremacy (ibid). The actions women may take on their own may therefore be limited due to unequal relationships between women and men and also depending on the social structures within the household. Agency and structure are therefore both at the same time influencing relationship patterns, but also conveyed through relationships both amongst and in-between social actors (ibid).

This definition of empowerment is very commonly used as it captures the essence of many of the different definitions that exist (Malhotra et al. 2002) and will be used in this study.

3. Setting the Scene

In 2008 the government of Kenya adopted 'Vision 2030', a development program with the objective to transform Kenya into a middle-income country by 2030 (GOK 2007). This program has identified the agricultural sector as one of the key drivers for obtaining this objective, as national data shows that growth in agriculture is highly correlated with growth in

the national economy (ibid). The dairy sector in Kenya, a subsector of livestock agriculture, is one of Africa's biggest producers of milk (ROK 2013). Small-scale producers mainly dominate the milk production, and accounts for 80 per cent of the national milk production in Kenya, whereas large-scale producers provide the other 20 per cent. The sector plays a critical role in improving livelihoods and food security for many rural Kenyans (ibid). Increasing productivity and competitiveness are key drivers in fulfilling the goals of the Vision 2030 (ibid). Although contributing to a significant share of the GDP (10 per cent), the dairy sector faces many constraints, which leads to underperformance of the sector in terms of yields (FAO 2011b). Some of the main constraints that lowers productivity are seasonality differences, the quality and amount of feed, lack of animal husbandry, farming practices, animal health, information about breeds, access to credit services, poor infrastructure, and poor and inadequate marketing and milk collection systems (Wambugu et al. 2011).

Dairy producers have also faced poor interaction from extension services and a lack of access to trainings for many years, which have led to even lower involvement in the market and few incentives to increase the milk production (FAO 2011b). Since small-scale farmers in Kenya accounts for the major share of the milk production, it is critical to transform these smallholders into being more innovative and commercially oriented (ROK 2013). These farmers therefore need information about new kinds of practices in dairy farming as well as access to new inputs and technologies to succeed. The integration of ICTs may function as a key approach to use in Kenya's extension system, to better cover the farmers' information needs.

ICTs are recognized as a key component for economic development in the Vision 2030 (GOK 2007). The mission of Kenya's ICT Policy is "to improve the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable and affordable ICT services" (ROK 2016: 1). Kenya has a vibrant ICT community in its capital Nairobi, and is one of the leading nations in Africa when it comes to expanding mobile technology services (CCK 2012). One example is Kenya's hugely successful text message-based money transfer system M-Pesa, which has offered a ground breaking global mobile banking service (ibid). Mobile phones in Kenya are almost becoming as accessible as the radio (ibid). The coverage is roughly 77 per cent of the population with almost no gender gap, and they are the most rapidly increasing form of ICT (ibid). When it comes to the gender gap in ownership of mobile phones, Kenya

exhibits a very small gender gap of seven per cent for women (in relation to income level) (ibid). It is likely that the introduction of M-Pesa, led to increased mobile phone ownership for women in Kenya (GSMA 2015).

The small-scale dairy farmer in Kenya is usually a woman (FAO 2011b). As in most low-income countries, it is the women in Kenya who produce most of the agricultural output, milk being one of them, while they also dominate the ranks amongst the poor (ibid). There still exists a common perception that women are merely the assistants of the men farmers and not economic agents in their own right (FAO 2011a). This in turn makes the transformation of dairy farming from subsistence into a commercially oriented enterprise even harder (ibid). Even though Kenya has ratified the 'UN Convention on the Elimination of All Forms of Discrimination Against Women' (CEDAW), has national gender policies, and puts women's economic empowerment as a key component of the Vision 2030, no specific gender policy has been developed related to agriculture or in the field of ICT (World Bank 2015).

4 Methodology

This chapter will present the methodological choices made for this thesis, meaning how the data was collected and analysed. *4.1 Research Methodology and Design* will introduce the reader to the chosen study design. *4.2 Research Procedure and Data collection* will present the method for data collection and its advantages and disadvantages. *4.3 Data analysis process* describes how the data has been analysed, and lastly *4.4 Assessing the quality of qualitative research* will discuss the limitation and quality of the study.

4.1 Research Methodology and Design

Already in an early stage of selecting research design I knew that I wanted to conduct semi-structured interviews as the main data collection method. This means that the study did not adopt an objective approach, but instead intends to interpret meanings other people have about the world (Creswell 2009). According to Kvale and Brinkman (2011), interviews can especially give voice to the most marginalized people in the society that do not usually participate within the public debates. Qualitative interview studies may therefore function as a stepping-stone for bringing their living conditions to a broader audience, since it allows them to speak freely about their life situations, in their own words (ibid). This may then allow for a better understanding and capturing of the many dimensions of if and why women and men

tend to have different access and usages of ICT assets, in the context of dairy farming. Or as cited in Behrman et al. (2014) “what it means to ‘use’ or ’control’ a given asset may be entirely different from what it means to ‘own’ said asset and differences in categories of asset ownership may fall along gender lines in important dimensions” (ibid: 38). In addition, gender relations in agriculture are complex and may vary from time to time, since they are very much context and culture specific and are rather products of social than biological factors (ibid). Simple statistics using quantitative measurements may therefore not allow us to understand how gender relations determine and affect outcomes related to the use of ICTs in agriculture (WWWF 2014). Understanding the differences in asset ownership when it comes to technologies such as ICTs may therefore only emerge from in-depth interviews and discussions with the respondents, rather than with a standard survey-based questionnaire. In addition, it may reveal something about why women and men tend to prefer using different types of ICTs.

4.2 Research Procedure and Data collection

4.2.1 Methods for data collection

The qualitative tools used for this study were based on eleven one-on-one interviews and two focus group discussions (FGDs). But, before the actual data collection was made, a pilot study was undertaken in the end of February 2017. This pilot functioned as a pre-test and evaluation of the interview guides to see if the questions were understood or in need of adjustments, and if additional questions needed to be posed or if some should be removed. Due to limitations in access to participants and assistance from the ASDSP team, only the one-on-one interview guide was pre-tested. Three women farmers were included. The interviews went well and the questions were understood. The main lesson learnt from the pilot was the discovery that the flow of conversation benefited from sometimes changing the order of the questions, as the participants did not always note the difference between different themes. The three interviews were also done in a peri-urban area in Nakuru, which of course also affected how the participants answered. For example, most of them owned a smart phone, had access to the Internet and therefore were not in much need of using the radio as a source of information. The result of the pre-testing led to some small adjustments of the interview guide by adding a couple of follow-up questions and to the removal of some others.

The actual data collection was conducted during the beginning of March 2017, beginning with the individual interviews and followed by the FGDs. Due to the fact that English is a second language to all of the participants, an interpreter was present during all of the interviews. Seven of the individual interviews and one of the FGDs could be held solely in English, however during four of the individual interviews and during one of the FGDs the interpreter was needed. The languages that were interpreted were Kikoyo and Kalengin. All of the men that were interviewed spoke very good English, except some in the FGD with men. For me personally it was a pleasant surprise that so many of the farmers were fairly comfortable expressing themselves in English. The women had more trouble in expressing themselves in English. One reason may be due to difference in educational level between women and men. Knowing English may also imply that these respondents are better off than the average farmer. The fact that they are dairy farmers also supports this, since worse off farmers usually cannot afford entry to this sector given the high value of dairy.

My experience from the interviews held in English was that they went well, but however sometimes it felt like the respondents gave very short answers and had problems in expressing themselves. The language barriers in turn may have affected the study results, since the respondents may have misinterpreted the questions and answered something else or used wrong words (See section *4.4 Assessing the quality of qualitative research* for further discussion on this). English is a second language to me as well so this could also have affected how I responded back, when trying to clarify a question or so. Other than that the positive aspect was that I could conduct the interview by myself. Since I know my work the best, I was also in a position to quickly ask follow up questions which an interpreter may miss, if interviews are not interpret word by word. Also sometimes during the interviews in Kikoyo and Kalengin, when the interpreter posed the question, it felt like the flow in the interview got interrupted since that person had to stop and translate for me what had been said. This was not the case for the FGD consisting of women, since it was only held in Kikoyo. The interpreter, who was a woman, therefore also functioned as the facilitator for this group discussion with women. This may of course cause biases, since I could not follow the discussion. I took a long time before the interview to really brief the person on my study. Since this person had been with me during all of the interviews I felt comfortable letting her facilitate the group discussion, but there is always a risk that something may have been left out from the discussion since I did not facilitate it.

Two different types of interview guides were set up before the actual interviews took place, meaning the interviews started off with guided questions around five different themes that were determined beforehand (Bryman 2012). The specific themes for the one-on-one interviews were: background on farming profile; sources of information and access to those; benefits and opportunities of ICTs; problems and challenges of ICTs; and asset ownership and control. The specific themes for the FGDs were: background on farming profile (specific focus on division of work and responsibilities of domestic tasks between women and men); extension system; perception around information channels; role of different ICTs; advantages and disadvantages of different ICTs. This was then followed up with additional questions on relevant topics that emerged during the interviews and the course of discussion. The guiding questions in both of the guides were based on the literature review and the guiding concepts for this study for each specific theme (see Appendix A & B).

The advantage of the individual interviews was that it allowed the respondents to move in different directions during the interview to grasp what was important to that person. This is in line with what is described in methodology books (Bryman 2009; Creswell 2009; Silverman 2014; Kvale & Brimkamn 2011). In contrast to the individual interviews, FGDs can function as a tool in understanding how norms look like, rather than individual practices, as it allows groups to elicit both collective experiences and opinions (Bryman 2012). I felt that the FGDs, as Behrman et al. puts it, "allowed the permitting of different views, experiences, or perceptions of group members to be expressed, discussed, and understood in a group context" (2014: 40). For example, during one of the FGDs, when one of the participants did not understand a question or found the right words to speak, the rest of the group helped that person to elaborate on her response. Another example was that the group discussions allowed me to notice when participants agreed or disagreed with common perceptions or experiences. Therefore one advantage that this method had, compared to the former was that it included a larger number of participants. This in turn gave richer understandings, explanations and touched upon areas that were not touched upon during the individual interviews. According to Morgan & Kruger (1997), the reason for this is that FGDs may give rise to a synergy of ideas and the generation of theories that may rise from social interactions.

Including a large number of participants (six in one of the groups and seven in the other) however also showed to have some drawbacks to it. Even though that the FGDs only covered five major themes, it was however noticed that this was maybe too much since the interviews tended to go on too long sometimes, resulting in that the discussion deviated from the issues that were supposed to be studied. For example, the first two themes on background and extension systems in the FGD interview guide got more attention than intended. These two themes sought to explore experiences from their everyday lives, and were part of the background theme. Although being important, the three other themes covered what was the essence of the study and I therefore tried to ask many follow up questions when these were discussed. I also experienced that some persons claimed more space and the views of more dominant participants sometimes overruled the opinions of the less powerful participants. Kvale & Brinkman (2011) suggests that because FGDs are not an ordinary independent dialogue between two equal parts, a group naturally "entails a hierarchal relationship with asymmetric power distribution" (2011: 48). In the FGD with men I therefore tried to "go around the table" and invite the ones that did not speak that much into the discussion. Sometimes I felt that if I had not done this, some important views would not have been captured.

4.2.2 Sampling and Approaching the Field

The primary informants or "target group", which I chose to use for this study were farmers in the dairy value chain in Nakuru county. More women than men famers were interviewed in this study, since, as mentioned in previous chapters and in the aim, this study examines the influence of ICTs, and therefore more women were included in the sample. According to Maynard & Purvis (1994: 15ff), when studying gender relations and research on women, the study should try to search for a mix of respondents. This means it should include both women in female-headed households and women in couple headed households to understand women's experience in a "male" dominated structure. This says something about how important also the inclusion of men is in a gender study, and this is the main reason men are also included in the study.

Collecting qualitative data is however both time consuming and very expensive, since it requires going to the field, and the time spent in collecting the data through interviews takes much longer than for example a household survey. In addition since I am a foreign student and not familiar with the area or context, this added an additional barrier of accessing

respondents and the field. These barriers were overcome through different means, which in the end all enabled the study. Through the financial contribution from the Minor Field Study (MFS) scholarship, most expenditures were covered. To overcome the barrier of dealing with a foreign environment and finding respondents, the field study was assisted through the help of the team of the Agricultural Sector Development Support Programme (ASDSP) in the office of Nakuru County. The ASDSP is an implementation strategy of the agricultural policy for Kenya's national and county governments, which is co-funded by the Swedish government and the Kenyan government. The Nakuru office of ASDSP has a long track record of working with agricultural issues, and dairy farming is one of the three value chains that they work with in the county. The team consisted of six persons and they helped me find suitable respondents, venues and one of them functioned as an interpreter for the interviews, since some of the respondents could only communicate a few words in English. The team at the ASDSP in Nakuru County mainly works with partners and stakeholders, and these are also the main implementers of the program. It was through these partners that the respondents were identified, based on a set of sampling criteria that I had given them.

As a result from conducting a qualitative interview study, a smaller sample size had to be chosen compared to for example when doing a survey. In total 24 respondents were covered, of whom eleven were interviewed on an individual basis (seven women farmers, three men farmers and one woman who is an extension officer and agricultural expert at ASDSP), and 13 were divided into two focus groups (seven women farmers in one group and six men farmers in the other). The individual interviews tended to be around one hour and the FGDs were around two hours. The reason why women and men were separated into two groups is based on the recommendation from Behrman et al. (2014), when doing research containing a gender dimension. This is because it allows both women and men to "share their thoughts and opinions freely without external pressure" (ibid: 40). The two FGDs consisted of farmers connected to a dairy cooperative called "Mango Tomatoes". The reason why they were chosen was because of difficulties to get farmers together that otherwise needed to travel long distances for a group discussion. These farmers met on a regular basis, and therefore the timing of the group discussion also matched with their meetings, so that they did not have to travel extra.

The number of respondents was supposed to be 25, but one of the extension officers that were supposed to be interviewed cancelled the meeting just one hour before it was supposed to take place, for personal reasons. However I felt that the interview with the other extension officer gave me a lot of information and I felt that this would be enough to cover the information needs. Besides that, all of the other respondents that were asked to participate did so.

4.2.3 Ethical Considerations and Anticipated issues

According to Kvale & Brinkmann (2011), the researcher's awareness about the ethical dilemmas and decisions should always be present during the research process because the personal views of the informants will be presented in a public arena. During the research and during the meeting with the participants, I therefore monitored the four ethical guidelines set up by the Swedish Research Council (Vetenskapsrådet 2002), that is; information about the study; agreement of consent; assuring the respondent's confidentiality and the usage of their answer. Before each interview started I had an oral presentation explaining the aim of the study and a description of the project. The presentation also included how I would use the material being collected, the expected benefits of the study and how I would guarantee their anonymity and confidentiality. I also notified them that if they did not want to participate in the study, they could do so both before the interview had started but also at any time during the interview. I did not proceed to the first question until I got an oral agreement to do so. None of the participants did however choose to decline participating in the study. To ensure their anonymity, the names of the respondents is simply referred to as "one of the respondents". I have also tried to have too many details about the respondents, to not reveal who they are.

The last checklist from the Swedish Research Council, concerns the issue of what the research value is of a study and what improvements it can bring, meaning what the value is for the respondents participating in the interviews. In the introduction of the interviews I therefore tried to explain my position as a student coming from Sweden, doing the interviews as part of my university studies. I tried to explain that although this study may not influence the respondents' lives immediately, my wish with this thesis is to create knowledge that hopefully will inform future interventions for others that are found in the same kind of context. Lastly, I choose not to compensate the farmers in gifts or payment based on the recommendation from the ASDSP team.

4.3 Data analysis process

A digital recording device was used during each interview to record the discussions and secure that nothing would be misunderstood in comparison when only taking notes. The transcriptions of the interviews were made both by myself and another person, since some of the interviews were done in other languages than English. After the transcriptions were finished and I began working with the material, I tried to read the material several times, always with a focus on the research questions, aim and problem in my mind. I mainly looked at meaningful sentences (concentrators), to be able to break down the material so that I could find key themes, then took help from the guiding concepts and analysed all the themes and subjects, which interacted with each other. This is accordingly to Creswell (2009) one of the most basic approaches of doing qualitative analysis. But as Creswell also points out, analysis of data is an on-going process, which includes continued reflection on the data and constantly asking analytic questions to the material (ibid: 184). The informants' dictums and statements were therefore analysed with the application and through the perspective of the chosen conceptual framework for this study. This analysis method is based on Creswell's "three step" analysis model for data interpretation (2009: 185f). The first step was to structure the material and connect themes corresponding to the research questions. Furthermore I identified categories corresponding to the three concepts from the conceptual framework based on findings in the previous research.

4.4 Assessing the quality of qualitative research

To asses the quality of qualitative research, I will discuss the issues of reliability and validity of the thesis in this section, based on criteria from the literature (Bryman 2012: Creswell 2009: Silverman 2014). As mentioned in the introduction of the method chapter, this study had a clear focus on individual subjects' "inner" worldviews and their lived experiences. Since the sample size was very small, composing of the testimonies of 24 farmers, it cannot be said to be representative for the whole county, nor the target population, which are farmers found in the same kind of context. In addition, the process on how the respondents were chosen might also be a reason why they may not be representative and the possibilities of generalization may not be as self-evident as for studies based on statistical quantitative results (Bryman 2012). This raises the question of what possibility exists to generalize the findings beyond the specific people being interviewed and the specific villages being visited. According to Kvake & Brinkman (2011), in the qualitative doctrine, it is more interesting to ask the question whether the knowledge produced in a given interview could be ascribed to

people found in the same context elsewhere, rather than trying to generalize it to the bigger population. If patterns are found in the results, it therefore could be possible to discuss if or whether the same patters could be found for others from the same kind of context. The results may therefore be equally significant and guiding as quantitative studies.

Reliability, according to Kvale & Brinkman (2011), has to do with the trustworthiness of the study and the accuracy of the respondents' answers. The reliability of this study will therefore be subjected to limitations due to the respondents' memory and knowledge. The answers of the respondents may also differ depending on who the interview person is and if the questions for example may be leading or not, ultimately leading to influence the "research product". My position, coming as a foreign student to Kenya as a young woman with a different ethnic background, may have affected the interview situation and how people responded to different questions. The interpreter may also have played a role in affecting the atmosphere and how the respondents understood and answered the questions. Especially if sensitive issues were raised, since the interpreter was a governmental officer this may have caused tensions and made the respondents more cautious in their answers. In addition since some of the interviews were not held in English this may also have caused "margin of errors" in the answers, since I could not follow the interview and ask follow-up questions or the flow in the interview. But it was hard to avoid these kinds of deficits, since I was a foreign student in a foreign context. I therefore tried to use the resources I had to my disposal as much as possible to diminish the biases that may have emerge from the language barriers, my position and the usage of an interpreter. I believe that the assistance of the woman interpreter gave me much more than just translation, since she knew much of the issues concerning the dairy farmers in Nakuru County, and especially issues around dairy women farmers. She also functioned as an icebreaker before each interview, and she could also guide me on practical issues such as how I should greet people etc. I believe that even though there exist deficits with the collection of the data the aim of the study have been accomplished. I have therefore in every step of the study tried to describe and declare all of the parts in this thesis, so that the results can be reconstructed by other researchers and at a different time.

Lastly to enhance the (internal) validity of the study I always tried to have the literature review in mind both during the preparations and construction of the interview guide. During the interviews I also tried to collect as much relevant data as possible by asking follow-up

questions that sought to answer the research questions and fulfil the research aim, which was done to fulfil the external validity.

5 Empirical Findings and Analysis

This chapter will present both the empirical results from the fieldwork and the analysis of the results. The aim of the first section *5.1 Results*, is to present, categorize and recap the overall answers from the respondents. This section will try to answer the two first research questions regarding how the respondents are using ICTs for livelihoods enhancing activities within dairy, as well as the perceived advantages and disadvantages of ICTs. The second section, *5.2 Analysis of Results*, aims to analyse the results by interpreting, comparing and explaining the results with point of departure from to the guiding concepts of *Asset Ownership, Mobility and Empowerment.* This section will also discuss how the use of ICTs empowers these women or not.

5.1 Results

5.1.1 Meet the dairy farmers in Nakuru

Background information of the farmers

The farmers interviewed in this study came from three different districts in Nakuru County; Rongai, Njoro and Mau Narouk. The age span of the women farmers ranged from 36-66 years and 44-61 years for the men farmers, whereas most were fulltime dairy farmers expect two of the women respondents. These also had additional jobs, working as part-time teachers. They both lived closer to the “city centre” and they also hired labour.

Each of the respondents had around one to four cows and operated on small lands, roughly one half to three hectares. Two of the women respondents produced on land, which they held the title for, and they were both widows, but had been married before. For the married women, it was their husbands that held the formal title of the land. All men farmers were married and they also held the formal titles of their land.

The husbands to the women engaged in dairy farming mostly held jobs in Nakuru town, but also helped with some of the farming practices and maintenance of the cows. But when it came to household responsibilities it was clear that it was dedicated to the role of women, explained both by the women and men.

Common for both the women and men farmers were that they were both oriented towards subsistence and commercial production of mainly raw milk. This milk was first consumed by the family, and the surplus was sold off locally. It was explained that both children and the adults in the family required and consumed the milk equally. Many of the older farmers, especially the women, also provided milk for their grandchildren, which were depending on their production. The yield varied a lot between the farmers and ranged from 8-40 litres per day, depending on how many cows they had and the productivity of individual cows. One of the respondents, mentioned that one of her cows used to produce 40 litres per day, but since school fees had to be paid, she had to sell it and the remaining cows never came up to those yields.

16 of the respondents said that they were linked to a specific dairy cooperative. Both the women and men in the FGDs where linked to the dairy cooperative “Mangos Tomatoes”, and three of the respondents (two of the men farmers and one of the women farmers) from the individual interviews were connected to the cooperative “Mau Narouk”. For the farmers connected to Mango Tomatoes, they both had a cooling and a pasteurization system in place, and therefore also processed some of the milk into for example yoghurt. These farmers therefore used these channels to access the market and sell their milk. For those connected to Mango Tomatoes, they pooled the milk together coming from their farms, but also bought from neighbouring farmer if they needed more. The rest, which were not connected to any cooperative, sold their milk to the nearest neighbours or to others in the nearby community or village. Only four of the respondents, two women (the same women living closer to the city centre and Nakuru town) and two of the men, from the individual interviews had access to vehicles, such as a car or a motorbike, but none of the women respondents had the formal title for any of these vehicles. Two of the women respondents however drove the car occasionally, but common for all of the women, who did not belong to a farmer cooperative, were that they had to access the market by using other means of transportation. This meant that they walked or had to use the local transportation system offered by the market, which meant calling a motorbike (“BODABODA”), since it was the cheapest, and also because they drove up to your door opposed to the “MATATUS” (small buses), which drove along the main roads. For the women connected to the cooperatives, they just needed to stand along the road and their milk would get picked up. Two of the three men from the individual interview had access to

either a motorbike or a car and therefore did not have much trouble in accessing the market. The third however, did not own any vehicle, but was connected to a farming cooperative and therefore also used the local transportation system to get his product to the cooperative.

The farmers' type of information and seasonal differences in information needs

When it came to sources of information, the farmers mentioned that they required different kinds of information depending on the season. In Kenya, there exists two rainy seasons, and it is mainly between these two periods that information needs are most critical. This was explained due to the fact that during rainy seasons, the supply of feed is very high, but in contrast during dryer periods it is much harder to feed the cows, since both the supply is lower and the knowledge on what different breeds require is not that high or known. Other critical information needs amongst the farmers than information and knowledge on food ration for the cows were, information on zoonotic disease outbreaks, opportunities for vaccination, new breeds, whether conditions and general animal health issues such as how to make sure that the cows are healthy, disease-free and well looked after. Besides issues concerning the livestock, many of the farmers also mentioned that information regarding the market, prices and values of certain products was important to be able to sustain a successful dairy farming. None of the women farmers in the individual interviews and the FGDs mentioned that they wanted more information and knowledge on how to expand or reach a bigger market, or even extend the production for export. This was however expressed by one of the men during the individual interviews as well as in the FGD group with the men.

5.1.2 Usage of ICTs in relation to Dairy farming

ICT Ownership, Usage and Relevance to the farmers' dairy farming

All the respondents, both women and men, mentioned having access to a mobile phone, radio, and TV in the household, expect one man who did not have access to a TV since he did not have electricity connected to his home. However, it was not the same when it came to Internet access. Only four of the respondents form the individual interviews and a few from the FGDs had access to the Internet, mainly the men farmers and younger women farmers, and even though they had access they did not use it to a great extent. None of the respondents had a computer so the ones using Internet had to have a smartphone. The main reasons for not owning a smartphone were that they are too expensive and the farmers lack the knowledge on how to use it, what applications that were available and for what purpose. Another reason explained by the elderly women farmers was that, they had a common perception that Internet

was something only for the younger generation who just used it for social media sites such as Facebook etc. The women also expressed that they did not have the time for learning how to use the Internet, “who will take care of my cows”? (Woman 50 years old, Njoro). Common for those not having Internet at home, but still used it from time to time, were those women having an additional job besides dairy farming. But for their information needs, Internet did not at all play a significant role in their farming activities. Although the few women that had access to Internet on their smart phones mentioned that they used “WHATSAPP”, which is an Internet mobile application platform for texting and sending messages or calling, to engage in farming groups.

On the other hand, mobile phones (not necessarily a smartphone), the radio and TV played a much greater role in the farmers farming activities than using the Internet. Mobile phones were primarily used for either calling or texting, both for personal activities and social interaction but also for getting in touch with veterinaries, extension officers and transportation services. But they all explained that the mobile phone also played an important role for their farming after the introduction of M-pesa in 2007. Most of these farmers did not have a bank account and they also lacked assets, which could function as collateral at the bank, and therefore money transactions were very hard to conduct. But with the M-pesa, the farmers could easily transfer money and pay others using text message, since it was not connected to any bank, but to your SIM card. For the farmers, this meant that transactions became easier as they could for example call for a delivery and pay for it via the phone instead of travelling long distances to pay someone in person and in cash. From the FGDs, it was also stated that M-pesa provided much safety, and especially for the women since they became less exposed and could stay nearer their farms and simultaneously take care of the family needs.

The radio was cited as almost only being used for receiving agricultural information or messages. This was the case for both the women and men in both the individual and FGD interviews. Both the women and men farmers said that they accessed a radio in their homes, but however it was mainly shared among the household members and therefore not belonging to a certain person. Many of the farmers that were interviewed mentioned that they preferred and liked to listen to various specific radio programs, often those being broadcasted locally since the programs were in the local languages known in that specific area. They also mentioned that they preferred some programs since they were broadcasted during convenient

times during the day, meaning either early in the morning or in the evenings. The women mentioned that the radio played a significant role in accessing information for their agricultural practices.

The Most Important and Preferred ICT source for the farmers

From the three ICT sources phones, radios and TVs, the radio was cited by the women as the primarily preferred way of getting agricultural information regarding dairy. For the men farmers' radio came on the third place of the most preferred way of acquiring information. Internet is not included since it was not at all used in much or any extent. This was however not the case for the men farmers, they cited the phone to be the most preferred ICT source to acquire agricultural messages and information, mainly through text message or phone calls.

The farmers also cited the TV to be a popular source or channel used to obtain information. Both women and men cited that they watched the TV for acquiring agricultural information. The men however also cited that they watched the TV in larger extent to watch other kinds of programs that did not have anything with agriculture to do. The men also stated that they watched more hours of TV and often during the evenings. Compared to the women who either watched the TV in the mornings, or sometimes during the evenings when they did not have any chores or household responsibilities to take care off. The TV was however perceived as being the secondary provider of agricultural information, coming from an ICT source by both women and men. But however, women and men ranked it differently when it came to the most preferred way of acquiring information. Women ranked it as number three, and men ranked it as number two.

Even though phones, radios and the TV were all used to gain information and increase their knowledge on farming practices, the farmers also cited that they used or complemented these ICTs with "non-ICT" sources. These non-ICT sources were cited as neighbouring farmers, or local extension officers, veterinaries, input dealers and for the women sometimes even their spouses, if married. Men farmers also cited that they sometimes attended field days or seminars, which were in Nukuru town. During these, they therefore interacted with different kinds of vendors or received written materials such as magazines or brochures on agricultural practices related to dairy farming. The two women farmers living closer to a peri-urban area, also lived closer to one extension officer and therefore had developed close relationship with

this officer who became a reliable source of information to the farmers compared to those living in more remote areas.

5.1.3 Benefits and advantages of ICTs

Overall Benefits and Advantages of ICTs in relation to dairy farming

The most obvious benefits of ICTs, as explained by the farmers, were that they had improved their farming by lowering the overall costs and increased their income. The usage of mobile phones, the radio and TV had for example helped the farmers to decrease their expenditures on accessing information and services, by making it less expensive to obtain. Extension officers were only a phone call away now, and the same also for veterinary services etc. They explained that they could now contact and seek information whenever they wanted, had the need or the time, compared to before when they had to actively seek up these people in person. The farmers also explained that the usage of mobile phones had helped them all to reduce transportation costs, in terms of both money and time burden. With just a phone call, they could now reach whomever, such as the persons they knew had access to a vehicle that performed “taxi services”, to pick up their products and take it to the market where it would be sold. They explained that this had lowered their transportation costs enormously compared to before, when they had to rely on middlemen who took a much higher price. The usage of mobile phones had also helped to save a lot of time for the farmers. Since dairy farming was labour-intense as explained by the farmers, the usage of mobile phones had helped them to substitute traveling long distances with phone calls, leading them to take better care of their farms and saving more time, not at least for the women. The women explained that since they had the responsibility of taking care of the household and the children, there existed little time for traveling outside the household and the farm work, because if they did, there would not be anyone taking care of the children. The women explained that nowadays they did not have to interrupt any of their daily activities, since a text message or a call could simply substitute the time it took for traveling. Other benefits and opportunities explained by the farmers were that the use of ICTs, especially when it came to the radio and the TV, helped them to obtain accurate and timely information such as the weather forecast, as well as better and spontaneous information on agricultural practices in dairy farming.

Some of the specific benefits of mobile phones, the radio and the TV

The specific benefits of the mobile phone were explained as making communication and connection to other actors much easier, faster and in a timelier manner, using a phone call or a text message. This was especially used for getting in touch or being connected to buyers, gaining knowledge at specific times or obtaining other kinds of agricultural services. The phone could also function as a "record keeping", since the text messages would not be erased, and therefore important messages containing information could be kept. But one of the best benefits of phones according to all the farmers was that it could facilitate transactions, without them needing a bank account. With the phone-based money transfer service, M-pesa, they can receive and deposit money and make payments with an account that is stored on their phones.

The benefits of the radio were that it was more easily accessible than phones, it was cheaper to buy and repair, it did not require any electricity besides batteries and it was portable. One of the major benefits was the quality of the information itself as there were a great variety of programs, some focused specifically on dairy farming and practices related to it. The programs were being broadcasted during convenient times, in the morning and during evenings, and the information was easy to attain as it was in local languages depending on which area one lived in. The women farmers also explained that since they were always occupied with some kind of tasks, either farming or household chores, they could always just leave the radio on and listen, without interrupting their on-going activities.

The best advantage on the TV was that it could provide you with pictures from programs which were specifically tailored to share agricultural information, for example about dairy farming. "The TV enables me to implement the practices since it is being demonstrated exactly how you should do it on the TV" (Woman 53 years Mau Narouk). The farmers perceived the TV as being beneficial in different ways, as it could provide them with both educational programs as well as entertainment programs. Also, some of the farmers pointed out, that watching the TV, and listening to the radio, did not require reading, which was beneficial for many of those who are illiterate. The main benefit of the TV was its ability to provide educational information, through pictures, showing all kinds of practices, which enhanced the farmers' knowledge. But as with the radio, a benefit with the TV was also that programs were in local languages, which made them easy to understand. The farmers also knew exactly when the shows were broadcasted.

5.1.4 Disadvantages and Challenges of ICTs

Despite the benefits and advantages explained by the farmers, ICTs and the usage of some of them had drawbacks and specific disadvantages, which created challenges amongst the farmers. Or as one of the women farmer explained “it is the other way around for the challenges, even if for example I know when a program is being broadcasted, I still do not have the time to watch it” (Woman 47 years Njoro). The women explained that watching the TV was extremely difficult sometimes due to lack of time and requiring one’s fullest attention. In addition most agricultural programs were broadcasted during the evenings. This was explained as one of the most hectic times during the days for the women, since it meant that supper had to be taken care of, and this was the time, which the men could sit down, and watch TV. The issue of electricity was also raised during several of the interviews. The TV needed constant electricity and the phone needed it for being charged, but that was not the case for the radio. They explained that they suffered from many power cut offs, and therefore the dependency of electricity could hinder using these devices. The cost associated with phones was also raised as a big issue. Buying credit for the phones was extremely expensive for the farmers and this was one reason why they preferred making calls instead of sending a text message, since they could call and hang up quickly, thereby letting the other person call them back and making the phone call free. Another reason why calling was more used by the farmers was the problems and the limitations associated with texting. To begin with it requires reading and writing skills, skills that everyone do not have. Another disadvantage was that if the text message did not come from a known source, they were not seen as trusted. Many of the farmers, both women and men, said that they considered these messages unsafe so they did not act upon them. It was the same case when a call was made from an unknown or untrusted source. Arguments regarding trust were raised for the radio as well. Without seeing the information put in practice and the person behind the microphone, the trustworthiness of the information coming from the radio was something the farmers raised as a big issue, especially when information was presented by a person belonging to another tribal group. Some of the farmers mentioned that they always validated the information they had received with another trusted source, before they implemented something new. The issue of trustworthiness was not recognized by all women farmers. All the men farmers, though, said that the information should be treated with caution before applying it.

5.2 Analysis of Results

5.2.1 Exploring and understanding the use of ICTs

What became clear from the interviews was that all the respondents mentioned both owning and controlling their own phone or phones. But this was not the case for other kinds of assets such as the radio or the TV. For the respondents who were married, it was true that they pooled their assets together, enjoyed them together, and even made decisions regarding them together, as previous literature have indicated (Meinzen-Dick et al. 2014). But even though both the woman and the man could access different kind of assets such as the radio, TV, the land, the house, vehicles and etc., and enjoy the usage of those, it was always the man in the joint household who had control over it and stood as the rightful owner over the more valuable assets. This is in line with what is found in previous research and literature (Meinzen-Dick et al. 2014). This in turn affected the women farmers in a negative way. For example, a simple thing as watching the TV was often hindered, due to their gender role of constantly also having to take care of household responsibilities. Men also cited the TV as mainly being associated with something that is for entertainment, and therefore controlled the TV time during the evenings and what programs that should be watched. Hence, married women often found themselves in a position where they could not choose what to watch, compared to those women in female headed households. This was however not the case for the radio. The radio was mostly seen by both genders as educational, and as a provider of agricultural information, but it was ranked differently by the women and men when it came to information obtained through an ICT source. The women ranked it as number one which differed from the men who ranked it as the number three ICT.

Men on the other hand preferred and ranked the mobile phone as the number one provider of agricultural information. What became clear from the interviews were that women's and men's sources or channels of information differed in the dimensions of size, structure and composition. Men's existing information channels were often more built on non ICT-sources such as social or commercial networks and were also bigger and broader than the women counterpart, which also was confirmed by the extension officer experience, and it agreed with findings in previous literature (FAO 2011a; Manfree & Norhehn 2013). The usage of the phones helped the men farmers to regularly keep contact with the people in their networks, and to obtain different kinds of information. In addition, the men farmers also relied and trusted more heavenly on their networks than information coming from for example the radio

and validated it more often, as mentioned in the result section. Women also validated some of the information coming from the radio or TV, but rather consulted and discussed it more often with their spouses, expect the ones living close to the extension officer. However, the women farmers who were unmarried did not have this option. In addition, the women in contrast to the men, mentioned that their husbands and other persons known by the households were important sources of information. Based on the women farmers' testimony they interacted more with persons that were located closer to their homes, engaged in networks that overlapped with their husbands' and within their kin rather than outside it. Similar patterns are found in Manfree & Nordehn (2013) regarding if ICT can help women overcome women farmer's current information barriers. They found that women farmers' networks were smaller than men's, and that they were more likely to engage and develop trustworthy relationships with actors located close to their homes, due to the fact that they were more accessible and in places which the women often visited. Manfree & Nordehn (2013) suggest that this in turn lead to fewer opportunities for women in learning about new productive practices that could lead to new commercial opportunities. One reason why women were more likely to develop and engage stronger relationships to actors located closer to their home may be due to restrictions in their daily mobility. Almost all farmers mentioned that owning a phone in today's society was rather a necessity to be able to survive, than a privilege amongst rich and more educated people, as more and more of the services in Kenya were becoming digitalized. In a way, the usage of the phone had helped the women farmers to overcome some of their physical mobility constraints, all with the comfort of doing it from their homes. But on the other hand, as pointed out by Sida (c.f. 2015), the usage of phones may rather reflect the existing inequalities between women and men in society, and it might even contribute to reinforce them. For the women farmers, the phone was mostly used for getting in touch or connecting to persons familiar to them and in their "inner circles", and they did not take any or few advantages of applications or text message services. It became clear during the interviews that the women farmers relied more heavily on persons coming from social networks close to them. This may also be a reason why the women and men respondents ranked the importance of the phone differently, when it came to information coming from an ICT source.

All the men had a higher level of education than the women farmers, regardless of which social status they belonged to. They also pointed out that this might be a reason why women

use technologies, such as the mobile phone, to a lesser extent than men. They are simply not exposed to the technology and do not learn about it, or at least not until their husband or someone else close to them has. In addition both women and men expressed that owning and using a phone is associated with very high costs since it requires to buy airtime. Women emphasized this matter to a larger extent than the men farmers. Previous research has shown that both education and income are top factors influencing access and usage of different kinds of technologies, such as the mobile phone (Deen-Swarry et al. 2012; Hilbert 2011; and Milek et al. 2011). Education and owning money are both human and financial assets, which as explained by Meinzen-Dick et al. (2014), can give people capabilities to act or improve livelihoods. The women in this study had both less human and financial capital than the men farmers, which may also explain why women did not use the phone to the same extent as the men did. This is also in line with the traditional findings of factors affecting technology access and usage (Deen-Swarry et al. 2012; Hilbert 2011; and Milek et al. 2011). For this study, the other top factors such as marital status, culture and ethnicity did not seem to affect the access and the usage of ICTs, and especially the phone based on the respondents testimonies.

The aspect of "time" seemed to be a recurring theme for the women respondents when it came to identifying reasons for not having engaged in learning about add on features and applications on the phone for example, even though they knew about the benefits of some of them and especially the Internet. They suggested that due to their responsibility and heavy time burden of taking care of the household, there existed little time in engaging in learning how to use and apply these. This was also their main argument for why they did not learn about add on features on the mobile phone, rather than because usage of the phone was too expensive. Since no one had shown them any examples on how mobile technology could benefit them specifically, they could not imagine how it could relate to their daily activities. One of the respondents mentioned "who will look after my cows if I learn about these things" (Woman 57 years Mau Narouk). These findings are however more in line with those studies that go beyond the traditional factors and look more into the social dimensions, gender roles and the greater inequalities that exist in the society, that prevent women from enjoying new technologies, including ICTs, to the same extent as men (Doss 2001; Kituyi-Kwake and Adigun 2008; Ponge 2006).

Both the women respondents and the men mentioned that women could own a phone as easily as men without it being a cultural taboo. But, they did not see the gendered division of labour and their gendered roles or responsibilities as "cultural factors" or "social norms" that influenced negatively on women's access and usage of ICTs. For example, while the woman took care of the household responsibilities, the man usually watched the TV. Once again this had to do with the time aspect, and with not having that extra time for engaging in other activities as mentioned above. But, the respondents did not see this as a result from cultural factors or social norms in the society, this was simply how things were and nobody questioned it.

5.2.2 Opportunities for Women's Empowerment

The role of the radio in empowering women

A comparison of the answers, even though each of the respondents' descriptions were unique, showed that the usage of radio brought many opportunities for these women, in the context of rural Nakuru. The radio was certainly the far most used ICT when it came to obtaining agricultural information for all of the women being interviewed. The explained benefits with the radio were that it was free, that it did not depend on any electricity, it could be listened to everywhere and at the same time as the women carried out their other tasks, and that listening was neither being affected by ownership nor control of the radio. Besides only being a provider of agricultural information, radio programs were extremely important for the women, because this was how they would find out about what was new and about what was going on in the sector, in the country, and even in the world. For those women being illiterate, learning by listening were sometimes their only means of obtaining information. Having access to a radio was explained as both being the most powerful and affordable way of obtaining valuable information coming from the ICT sources available, and it also responded to the women's needs. There existed a number of different programs, which often were broadcasted in their own local languages. Listening to programs in local languages gave the women increased agency by developing a sense of autonomy and self-confidence, which they had not possessed before. They explained that this had really helped them in enabling and increasing their capacity to obtain and act upon the information being broadcasted, that previous were often difficult to obtain.

The skills they learned from the radio furthermore provided opportunities for the women to "self-educate" themselves and increase their resources in terms of human capital, meaning

more farming skills and increased knowledge and try out ideas for solving problems related to their dairy farming, which in the end could lead to positive economic opportunities. It allowed them to in some extent think beyond their immediate day-to-day survival and exercise greater choices that could entail income benefits. However, based on experiences from the extension officer being interviewed it is more common that the married women always asked their husbands first, before implementing and trying out new ideas. This was also something that was confirmed during the FGD with the men farmers. They mentioned several times that they did not perceive women as being capable of undertaking good economic decisions for their dairy farming. In addition they also mentioned that they felt obliged to "check upon" the woman's work, especially when it came to the safety of the cattle. "She may have left the gate for the cattle open" (Man 55 years Rongai) was mentioned by one of the men respondents, while everybody else was nodding. So on the other hand, and not due to the use of the radio per se, but when it came to act upon information coming from the radio, they could to some extent been disempowered, meaning not following "the path or process of empowerment". Without the individual action, they are simply not able to act on their knowledge or the information they possess. This was especially the case for the women being married. The testimony of the extension officer and the men from both the individual interviews and FGDs, gave the impression that women do not perceive themselves as being the ones undertaking final decisions, or even being able to making choices at all, in the presence of a male head. This is also in line with the research findings of Smith et al. (2003), who showed that women are often not left to make their own agricultural decisions, such as which input to use. But when they got the confidence to make their own decisions, the productivity increased as compared to when the man took all the decisions. This could also give the impression that women in single headed households are more empowered of this device than married ones.

The role of the mobile in empowering women

The phone helped to accumulated assets, such as social and financial assets, for both individual and for group members, but to different degrees. First of all, the women perceived the phone to be beneficial because of its flexibility and mobility (c.f. Sida 2015), and this made them save a lot of time. They could use the phone without having to forsake their workplaces in the home and in the farm. The phone then helped to alleviate some of the barriers women face in their physical mobility. The extension officer mentioned that since most of the women do the manual work, it is also up to them to facilitate the tasks around the

work. For example when it came to feed, women had to carry it on their back before there existed any mobile phones. After the introduction of mobile phones and when women also accessed them, things changed and women could simply call a person to bring her the feed, for a small fee. Before the introduction of M-pesa, no women or very few women owned their own bank accounts and this also applied for many men. If households had a bank account (before M-pesa) it belonged to the head of the household, which usually was a man. But now, by owning a phone, the women could open their own accounts, buy products by using their phone and also both save and send money, leading to greater economic autonomy for the women. This has of course also affected the men farmers' positive in similar ways. An increase in economic autonomy (ownership of assets) is however not sufficient in explaining if women have become economically empowered or not, since it mainly refers to control or command over financial and material resources (Kabeer 1999). The term only reflects the aspects of, if financial assets are obtained in one's own name and how they choose to use or dispose them, and are therefore strongly connected with the individual persons' ability and decision power on how they should be used (ibid). Kabeers (1999) conceptualization of empowerment refers to something broader, since it deals with the process of change. How women exercise and increase their agency is thus the central aspect of the path to women's economic empowerment and strengthening women's ownership of assets (economic autonomy), is a critical and important factor of the process (ibid). Thus, through the mobile phone, most of the women have enhanced their agency and capacity to financial assets, which helped them to facilitate and resolve some of the barriers in their daily mobility. The use of the phone has increased their autonomy, access to opportunities and resources, but also strengthened their power to take control over their life both when it came to inside and outside their home. Through the phone they now could make strategic life choices that reflected their preferences and gain the ability to effect a change, as compared to before the mobile phone existed, when this option was denied to them. Since M-pesa is based on private accounts, it has enabled women to access, control and own more financial assets, which they could transform to other resources or help them to strengthen their capability to act and make their own decisions for improved livelihoods (Meinzen-Dick et al. 2014).

Socially, the usage of the phone was beneficial in terms of mobility and flexibility, since it could provide the women with capabilities to keep contact and reach out to persons regardless of the distance between them. As a result, from this their social networks were strengthened.

The extension officer mentioned that women like to share a lot in groups who consist of women, but that they only had time to meet on Sundays when attending the church service in the nearest community area. But using the phone has now enabled them to communicate more often and as a result reinforced their social networks. For the group of women connected to "Mango Tomato", the phone enabled this group to come together, share their revenue and enable future collective financial opportunities.

The role of the TV in empowering women

For the women respondents in this study, the TV did not play any major role in providing beneficial opportunities for the women. The main reason TV should not be considered an ICT tool that has increased women's agency is due to the fact that women did not have the time to watch the TV to any greater extent, and in that they lacked any real influence or control when choosing which program to watch. This privilege was mainly the men's, for those women with husbands. The women without husbands mentioned that even though not having a man present in the home, little time was left to watch the TV due to their double burden of being the breadwinner and taking care of domestic work entirely alone. All of the women had the alternative to watch TV since it existed in their home, but none seemed to have the ability to choose to watch the TV for agricultural education purposes. Kabeer means that there lies "a logical association between poverty and disempowerment because an insufficiency of the means for meeting one's basic needs often rules out the ability to exercise meaningful choice" (1999: 437). These women were denied of a choice, watching the TV, which they could have chosen differently. But due to mainly taking care of household responsibilities, they felt that choosing that before watching TV had a greater significance and positive affect for the people in their households.

The role of the Internet in empowering women

For the women respondents in this study, the usage of Internet could be said to not play any major role in providing opportunities in similar ways as the example with the TV. The Internet was not even used amongst the women. Firstly, most of them could not access it due to not having a smartphone or a computer, but also because of associated with high costs. Secondly, those that could access the Internet, mainly the two women farmers that also worked as teachers and the few women who owned a smartphone, gave many reasons for not using the Internet, including one woman saying "they are not for old people like us, they are

for the young generation" (Woman in the FGD Rongai). It seemed that there existed a common perception that they did not see the relevance of using the Internet for their dairy production and the potential benefits it could provide them with, in terms of accessing agricultural information and learning new skills. This could mainly be deduced back to the fact that they had simply not been taught nor shown examples of any practical advantages of how the Internet could be used to benefit them. Once again, as with the TV, those that had access to Internet in some way (and not taking those who did not afford it in considerations due to high cost), had an alternative whereas they could have chosen to use the Internet, but did not. Strategic life choices always came before, what Kabeer calls "second-order" or "less consequential choices", which of course "may be important for the quality of one's life but do not constitute its defining parameters" (1999: 437). Since they did not see the relevance of Internet, they could not think what difference it could make in their everyday life, which in turn also affects their scope of action. Based on the women's experience from life, the given structures may inhibit them to shape interest in learning new skills. The context then that they are embedded in may therefore shape the women's individual interests, which in the end condition women's choices (Kabeer 1999).

6 Concluding Discussion

This research study began as an attempt to investigate if the use of ICTs, such as radios, TV and mobile phones can be a tool for breaking the gender gap that has existed in agriculture during several decades (FAO 2011a). Even though there exists development programs that have integrated and used ICTs in their projects, no ICT tool has specifically been developed or designed for the particular needs of women, which may in turn have led to that these tools in the end do not benefit women in full potential (World Bank 2015). The method chosen to investigate the impact of ICTs on the lives of women was based on qualitative interviews with individuals and groups. Even though each respondent shared different experiences, some common patters in their answers were found. The main findings from this study shows that the women and men respondents in this study mainly used three ICT sources for livelihood enchanting activities within their dairy agriculture: the mobile phone, the radio and the TV. But they used them to different degrees and not always for the same purposes. The results have been further interpreted by applying the concepts of asset ownership of ICT devices, ownership of means of production, capacity to extend social networks both horizontally and vertically and increased agency. Seen with these concepts in mind, the results show that there

are some factors that influence how women may use or not use different ICTs, and that some played a significantly more role in increasing women's agency than others. This chapter will therefore try to interpret what the main findings mean on a general level in section *6.1 Discussion of the Results,* and then end with a short section on conclusions in section *6.2 Conclusions*.

6.1 Discussion of the Results

This study showed that although both the women and men respondents used ICTs to improve their dairy farming, they were not used to their fullest potential. Especially not by the women respondents, since they spent much more time on their children's well-being and general household needs, than trying to learn and take advantage of mobile add on features, such as text message service and mobile technology enabled services (applications). Each of the three mainly cited ICTs discussed with the respondents had drawbacks to them. But the aspect that was maybe most surprising during the interviews, was that most of the farmers relied more heavily on information coming from their social networks, than from an ICT source, except for the radio. Using the phone for example was not seen as a strictly being a source of information but rather means of communication and a tool to get in touch with persons that could provide valuable information. Therefore, if the usage of ICT is to become a successful strategy in the Kenyan 'Vision 2030' and improve livelihoods of Kenyans, the features and information of those technologies must become more reliable. One strategy of making this happen is more likely to include services that contain and combine both human interactions together with some kind of technology-enabled features. All of the respondents were in possession and ownership of a phone, which maybe is not so surprisingly, given how important and pervasive mobile phone services have become lately in the Kenyan society. But even though there is a small gender gap in ownership of phones in Kenya, previous research has estimated that around 21 per cent of the women living in other middle- and low-income countries still lack access to a mobile phone (GSMA 2012). With the new paradigm shift, which Shaiek et al. (2004) implies is transforming rural areas and challenges how basic service is delivered, and based on how important the mobile phones were for the women respondents in this study, reducing the gap between women's and men's access to mobile phones should be a priority for every country with agriculture standing for a big share of the GDP. Women's ownership of phones should therefore be a global priority, as agricultural information services are becoming more and more integrated by using mobile technology as

the disseminating tool rather than physical contact from an extension officer. But the interview with the extension officer revealed that reaching out to and having longer conversations with farmers through the phone was a real challenge, due to high airtime cost for the farmers and no budget to make calls for the extension workers. In addition most of the information, programs etc. coming from an ICT source were mainly run by the private sector and not by the public. The officer mentioned once having been invited to participate in a TV program on agriculture, but other than that she did not have any further knowledge about any ICT initiatives and did not use any features on the phone to reach out to farmers, which otherwise could play a role in complementing their ordinary work and reach-out to farmers. For the farmers in this study, extension officers were seen as trusted persons and a bridge for knowledge and information. In relation to what was said in the section above, if for example ownership of phones should be a strategy, a similar strategy should be made with the extension officers. They should be equipped with ICT tools including a generous budget on airtime together with knowledge on how they can use them to reach out to farmers. Given the trust they are perceived to have amongst the farmers, this may also lead to an increase in trust of information coming from different ICT sources and services. This could also be a way of going around women being bypassed by service providers due to misperceptions of gender roles within farming (FAO 2011). Women farmers could really be benefitting from virtual ICT spaces created specifically for them and their needs. In these spaces they can learn to network for example, but it would also enable them to enjoy new types of supportive and learning environments.

Lastly, according to me, women farmers' use of ICTs in this study could be said to be a mixed blessing, affecting them positively in a "passive way" to some extent. It is true that some technologies, such as M-pesa, have increased women's autonomy by easing the financial and mobility constrains in their dairy farming. But sometime their access and usage of certain technologies are hindered due to factors that are completely gender related. One example of these technologies is the TV, which they could not use due to prevailing gender roles. The women respondents' use of ICTs, especially the use of the mobile phone and the radio, increased their control and let them decide over their personal time and space. The women have become more independent and these ICTs have made it easier to multitask and handle their different roles better, as compared to before when they did not use ICTs, and thus aided them in creating many socio-economic benefits for themselves.

6.2 Conclusions

When it comes to understanding the relationship between women farmers' access and usage of ICTs and their contribution to women's increased ability to exercise strategic life choices, this study has shown that it cannot be separated and understood in isolation from their gender roles and responsibilities in society. ICTs alone do not contribute towards this process, it is rather the usage that determines if they are contribution to the process of empowerment or not. Findings in this study shows that when women are not in control and charge of their agency, women are disempowered due to that they do not have any decision-making power over more valuable assets, which instead are belonging to the man. Changes need to be done on a societal level where women are fighting on a day to day basis for their and their families' survival, otherwise the gender digital divide will likely increase. ICTs may offer many opportunities, such as help to increase income, reduce transaction costs and new ways of delivering services. They can especially be both socially and economically benefitting for farmers. But most importantly, the context does matter and these technologies cannot just be thrown in a development project and then expected to have positive results. They must firstly be affordable for the population and secondly they must have content, which reflects the need of the farmers, the simple reasoning being that if something is responding to the actual needs of people they will probably adopt it. If not, then it is probably not adopted and used, as with the case of Internet. The women did not see how the usage of Internet could give them beneficial information nor provide solutions for their problems, therefore they did not want to invest their limited time learning to use it. The step towards learning what the Internet has to offer is simply too big to take, which may be due to illiteracy, the older generations technophobia and the opportunity costs associated with the time it takes to learn more about it.

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Appendix A

Opening

Hello and thank you for giving me the opportunity to talk with you today. My name is Tania Braimok and this is part of my studies at the university of Agricultural Sciences in Sweden. I'm interested in learning more about experiences of using communication tools such as mobile phones, the radio, TV and the Internet, when it comes to the dairy value chain in Nakuru. Although I am writing down your answers to my questions your name and identity will not be connected to this information, your answers will be kept confidential. The answers you provide will be viewed and analyzed by me. I want you to know that there are no wrong answers! I just want you to feel comfortable and answer honestly. Would you like to continue with the interview?
Note: If no, close the interview.

Definition of ICT: According to this thesis ICT is defined as an umbrella term for as mobile phones, radios, TV and the Internet.

Background data

Name:	
Contact details (phone number):	
Age:	Gender :
Educational level:	Primary, secondary, university, non
Marital Status/Polygamy:	No of Children :
Religion :	Ethnic Group :
Name of location :	Years in farming :
Ownership of mobile phones, Radio , TV	

Module 1 - Background about farming profile

1. Are you a full time farmer?
2. How come you are in dairy farming? How long have you been in dairy farming?
3. What is the size of land that you use for your dairy production? a) Is it your own private land? b) How many cattle do you have? c) How many cattle do you own?
4. Can you tell me more about your dairy production? a) Is it subsistence or commercially oriented? b) How do you access the markets? c) Is the milk consumed by your household first and the surplus is sold off? d) Who in the household need to drink milk? e) Who sells it? f) Are you allowed to go to the market and sell it? g) Do you only sell it at the local market or are you linked to a specific dairy cooperative/company? h) Do you use a middleman to gain access to the market? i) How is the market demand? j) Is there a cold chain in place?
5. Do you have any support system in your area (for example veterinary services/information)? a) Can you access them? b) Do you belong to a farmers group/ association? If yes, can you tell me more about it?

6. What are the activities you undertake during a typical day from morning to evening (both domestic and dairy)? a) How long time does each take and how heavy are they? b) Which activities do women and men undertake? c) Do your husband help you with any domestic chores? d) Does it differ throughout the year?
7. Do you receive help or support in any of the farm activities? a) From who? b) If not married: Do you receive help for either domestic or dairy agricultural tasks?
8. Do you have ready market for your dairy production?
9. How do you go/get to the market.
10. What products do you sell in the market?
11. How do you access farming inputs?
12. How far is the market? In km.

Module 2 - Sources of Information

13. What information needs do you require for your dairy farming activities? a) Does the information you require differ throughout the year? How so?
14. Do you own a mobile phone or do you have access to one? a) If yes, what role does this phone play in your farming activities? b) What do you use it for?

c) Do you use mobile phone applications on the phone such as m-pesa or other? If yes, which one? Why and for what purpose?
15. Do you own a radio or have access to it? a) If yes, what role does this radio play in your farming activities? b) Do you listen to a particular radio programme? c) Do you listen to the radio every day? Or every week? d) In that case how many hours do you listen to it in average? If no, why is that?
16. Do you own a TV or have access to it? a) If yes, do you watch any TV programme related to you dairy farming? b) Has it helped you or contributed your farming practices in some way?
17. Do you have access to Internet? a) If yes, do you use it? b) If no why?
18. What is your main source of information?
19. During last month, which source(s) did you use?
20. In which languages is the information you receive? I know there are many languages spoken in Kenya. Do you face any language problems when listening to e.g. the radio or watching the TV, due to that the program is broadcasted in the language you do not speak?
21. Do you think you get adequate or enough information for your agricultural production? If no, what improvements can be made?
22. How has lack of information affected your farming activities in the past?

Module 3 – Access to information

23. How do you access information in your agricultural activities?
24. What factors do you think affects your access to information when it comes to for example mobile phones, radios, TV or Internet? (Income, age, neighbourhood, education, cultural barriers).
25. Do you trust the information you access from mobile phones, radio and the TV? Or do you validate it with information from others?

Module 4 – Benefits and opportunities

26. What are the benefits of using mobile phones, the radio, TV or the Internet in agriculture? a) Has the use of e.g. the mobile phone, listening to the radio, watching TV etc. changed your life in any way, and if so, can you please tell me a bit about that? b) Has it helped you to make more informed decisions as a farmer? c) To what extent has it been enabling you to act upon these decisions?
27. How has the use of mobile phones, the radio, and the TV helped you in your farming? a) Has it helped you to make more independent decisions regarding sales? If yes, how, why and when? b) Has it made you become more independent? If yes, how, when and when? c) Has it given you an alternative information channel? If yes how?
28. What (other?) opportunities do mobile phones the radio and TV provide to you as a farmer?

a) Can it provide other things?
29. Can you give some examples of the opportunities?
30. Do you think it is the same for men/women? a) Why if yes. b) Why if no.

Module 5 - Problems and challenges

31. What problems do you face when it comes to accessing and using ICTs such as mobile phones, the radio, TV or the Internet? a) Is it the same problem for men? b) If not, are there any other differences?
32. Are there any disadvantages with the use of mobile phones, the radio and the TV as a source of information and a channel of communication?
33. Do the access to ICTs such as mobile phones; the radio; TV or Internet differs for women and men? a) If yes, why?
34. Are you able to act/use the information you are given through ICT? Or are there hindrances to utilisation of information accessed through ICT?
35. Are there any issues in terms of timing when it comes to the broadcasting of relevant radio programmes or TV programmes on agriculture? (For instance, do they clash with the time of the day when you cannot listen to/watch them?)
36. How do you choose the channel to listen to when it comes to the radio and the TV? a) Which is the most popular channel? b) Why?

Module 6 – Asset ownership and control

Asset	Who owns it?	Who can decide about it? (e.g. to sell it)	Who can use it?
Land			
Livestock/Cattle			
Tools and Equipment's			
House			
Vehicles and transportation			
Technologies and communication infrastructure (mobile, phones, radio, TV)			
Credit			
Revenue from dairy			

Inflow of input			
Jewellery			

Do you have any other questions or comments?

Appendix B

Welcome to this focus group! Thank you all for coming, my name is Tania Braimok and I am going to be with you for the next hour to start some discussions about women and men in this community and about your dairy farming. I am interested in learning what you think about the topics we will discuss! This is part of my studies at the university of Agricultural Sciences in Sweden. I'm interested in learning more about experiences of using communication tools such as mobile phones, the radio, TV and the Internet, when it comes to the dairy value chain in Nakuru.

We want to hear from all of you today because everyone has something important to share. Let's agree to be respectful, listen to each other and wait until someone is finished talking before giving our own opinion.

We are going to record everything we say today and then I will listen to the recording and then type everything up for me so that I do not miss anything that is said. I will also be taking notes, so we can keep track of who said what in the recording. Therefore before you say something please state your name so that it will be easier for the transcription. However your name and identity will not be connected to this information, your answers will be kept confidential.

We want you to be comfortable so if you need to use the bathroom you can go ahead and do that, whatever makes you feel comfortable. I do however want to ask that you turn your cellphones off, or put them on silent so we aren't interrupted.

Also, I want you to know that there are no right or wrong answers. We are just sharing ideas with each other! I want you to feel free and to be able to say anything that comes to mind so I want everyone to agree that whatever we talk about [in this room] stays [in this room].
Would you like to continue with the interview?
Note: If no, close the interview.

Any more questions before we start?

Icebreaker:
So let's start by going around the room and getting to know each other a little bit.

When it's your turn, tell us your name and your favorite food to eat/colour.

1. What is the division of work and responsibilities between women and men, respectively, when it comes to dairy farming?
   - *Are there specific task for women and men in the production, processing and selling dairy products? Why so?*
   - *Are children involved in any tasks? If yes, which ones and do they help the women or men?*
   - *What does it mean to you to be engaged in dairy farming?*
   - *Can you tell me about how women and men in households engaged in dairy farming usually reach decisions about the management of the cattle?*
   - *Is there any particular persons in the household that usually are in charge of decisions regarding the amount of milk to be marked?*
   - *Can you tell me about who in the household receives, are in control and decide what the milk money should be used for?*
   - *Can you tell me how women and men spend the money from the revenue?*

2. What about domestic tasks? How is the division of work and what responsibilities do women and men have?

3. How is the extension service functioning in this area?
   - *What does these entail?*
   - *Is something missing?*
   - *When it comes to access of extension services, does it differ for women and men? Do you need to bee in a farming group to get access?*
   - Are they relevant for women/men?
   - *How do farmers access information for their agricultural activities?*
   - *Do you think that mobile phones, radios and the TV can affect agricultural extension systems?*

4. What is the most popular information channel used in this area in terms of technologies?
   - *Why is that?*
   - *Does it differ for women and men? (In terms of preferences) Why so?*

5. What specific role does mobile phones play in this area?
   - *Who uses it (men/women)? What do you mainly use it for?*
   - *What about radio, TV and the Internet?*

6. What are the advantage and disadvantages?:
   - *Of mobile phones, when it comes to using it for dairy agriculture*
   - *Of Radios*
   - *Of TV*
   - *Of the internet*

7. Do you think that the use of ICTs has made it easier for farmers to make more informed decisions in relation to for example sales?

- *To what extent has it done so? Why is that? Can you give some examples?*
- *Has it made you more independent? Does it enable you to take more independent decisions? If yes, how?*
- *Does it make you become less dependent from information coming from your spouses, when it comes to for example finding out about market prices?*
- *Has it given you an alternative information channel when extension services are not available?*

Do you have any other questions or comments?

Appendix C

Questions for extension officers:

- How do you operate?
- What information needs do the farmers need?
- What current information gap exists among the farmers? Does it differ for women and men?
- How do you reach out to farmers?
- What are the main challenges reaching out to farmers?
- Do you use any tools such as mobile phones, radio or TV Programme to reach out to the farmers? How do you use them if yes?
- What are the advantages and disadvantages of using mobile phones, the radio and the TV to reach out to farmers? Are there any problems with using these tools?
- What are the current challenges being faced by dairy farmers in Nakuru?
- How is the gender division when it comes to extension officers?
- What differences exist among men farmers and women farmers?

- Is rural dairy agriculture gender neutral? Do women have specific farming "preferences" or "choices" that differ from men? What is the basis of these differences (if any)?

- Is milk/dairy production predominant among men or women in Nakuru (or is it gender neutral?)?

- What information channels in terms of ICTs are most preferable among women and men?

- What recommendations would you make towards strengthening the use of ICTs in rural farming information access?