



## **Bridging gender gaps through innovations in agricultural value chains in Africa**

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*This paper examines innovations for bridging gender gaps in agricultural value chains in Africa. It focuses on innovative platforms for addressing gender gaps, considering women contribute up to 40 percent of labor in agricultural production. Women remain at the bottom of value chains and face gender-specific constraints attributable to gender and social norms, discriminatory beliefs and practices, gender-blind designs and delivery of technologies and innovations which impede women's participation in value chains. Consequently, women are unable to adjust to challenges and opportunities of technological progress, commercial orientation, and global integration. This paper suggests that gender-sensitive technological and institutional innovations is essential to promote women's participation in agricultural value chains and bridge the gender gap while upholding gender-specific outcomes. The study shows that women rely on alternative institutional innovations and arrangements such as group-based approaches in order to improve their participation in value chains which implies the call for policies that nurture and strengthen these kinds of institutions. Integrating research, designing value chain interventions and monitoring and evaluation with a gender lens is essential in order to accelerate women's participation in value chain development programmes, while allowing them to be role models and spearhead their own empowerment.*

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This paper examines innovations for bridging gender gaps in agricultural value chains in Africa. It focuses on innovative platforms for addressing gender gaps, considering women contribute up to 40 percent of labor in agricultural production. Women remain at the bottom of value chains and face gender-specific constraints attributable to gender and social norms, discriminatory beliefs and practices, gender-blind designs and delivery of technologies and innovations which impede women's participation in value chains. Consequently, women are unable to adjust to challenges and opportunities of technological progress, commercial orientation, and global integration. This paper suggests that gender-sensitive technological and institutional innovations is essential to promote women's participation in agricultural value chains and bridge the gender gap while upholding gender-specific outcomes. The study shows that women rely on alternative institutional innovations and arrangements such as group-based approaches in order to improve their participation in value chains which implies the call for policies that nurture and strengthen these kinds of institutions. Integrating research, designing value chain interventions and monitoring and evaluation with a gender lens is essential in order to accelerate women's participation in value chain development programmes, while allowing them to be role models and spearhead their own empowerment.

Key words: Gender gaps, gender-sensitive innovations, agricultural value chains, Africa

# 1 Introduction

Effective agricultural development and competitive agricultural value chain should focus on gender inequality and other disadvantaged actors in order to ensure sustainability of value chains. One of the major causes of underperforming African agricultural sector and value chains is a large gender gap in access to and control over productive assets and opportunities that weakens innovation in agricultural and value chain development and capacity to improve food and nutrition security for all (FAO, 2011; World Bank, 2014). Value chains are an important subject of interest as they help smallholder producers to move away from pure subsistence to farming as a business (Farnworth, Kristjanson, 2013). Additionally, they are a more holistic intervention focusing on an entire chain rather than a given node or some specific actors. Integrating African smallholder's producers who account for 75% of food production (FAO, 2013) in innovation and value chain is likely to improve food security outcomes (FAO, 2016). However, gender dimensions in many communities in African context inhibit value chain success and effectiveness.

Gender considerations is important because innovations are rooted in a social context, hence gender relations got a far-reaching effect on actors behaviors within value chains. This is especially where some roles and responsibilities in a chain node reflect social norms on gender roles and capacities (FAO, 2016; IFC, 2016). Gender inequalities in agribusiness and modern value chains are evident where men are concentrated in highly remunerative contract farming since they control household land and labor, while women dominate as wage laborers in production and post-harvest processing or are segregated in certain nodes in the chain that require unskilful labor such as packaging (FAO 2016; IFC 2016). Besides, gender equity, innovations and competitiveness of value chains are mutually supportive goals and gender inequalities are costly and inefficient (Rubin & Manfre, 2014). According to the Human Development Report, 2016, gender inequality is costing Sub-Saharan Africa (SSA) on average \$US95 billion a year, peaking at US\$105 billion in 2014 or six percent of the region's GDP thus jeopardizing the continent's efforts for inclusive human development and economic growth (World Bank, 2015). Still, little is known on the interaction of gender and innovation in agricultural value chains in Africa. The paper lays emphasis on innovations for promoting gender equity, with a special focus on the role of women as one of the categories of gender in value chains. We argue that women in Africa are major providers of labor in value chains yet tend to miss out on economic benefits and returns from value chains (IFC, 2016).

Amidst the challenges and changes in food systems, agricultural innovations in value chains is a pathway to sustainably increase productivity hence increase food security and reduce rural poverty in the face of limited productive resources (Devaux et al., 2016). Innovation also gives rise to enhancement in the wellbeing of individuals especially women in terms of health, nutrition and incomes. There is increasing evidence that empowering and investing in rural women significantly raises productivity, decreases hunger and malnutrition and improves rural livelihoods for entire populations (World Bank, 2015; UNDP, 2016 ). Researchers also recognize the need for uniquely designed innovations that make a difference and more importantly, the need for gender analysis of how these interventions are introduced and perform under different capacities of men and women (ActionAid, 2011; Beuchelt & Badstue, 2013). Additionally, while gender has been recognized and documented as important in many development interventions, there is paucity in literature on innovations along value chains that address the needs of poor female farmers.

From a literature review based approach, this study aims to fill in the identified gaps by first examining ways to ensure the inclusion of women as beneficiaries of productivity increase through technological and institutional innovations in agricultural value chains. Secondly, since, there are substantial literature reviews on gender differences in bottlenecks and opportunities in adoption of agricultural technologies and innovations (Peterman et al., 2014), this paper focuses on the

differential access to resources and their subsequent impacts on participating in value chain and innovation systems in an African context.

## 2 Gender and innovation in value chain development

The conceptual framework of this study builds on a framework developed by International Finance Corporation (IFC) on closing gaps between men and women in agribusiness (IFC, 2016). It identifies activities, actors and networks, and why a gender-lens is required in developing, assessing and scaling innovation in value chains (Figure 1). An institutional innovation is a process of changing norms or creating social change in order to improve a situation with a positive outcome while technological innovation presents solutions to low agricultural productivity through technology and research. We argue that the effectiveness of both technical and institutional innovations depends on consideration of social and gender disparities, hence to achieve social and gender transformation through innovations, it is essential to facilitate institutional innovations as component of technical interventions. The framework presents the needs for innovative gender-smart solutions along value chains.

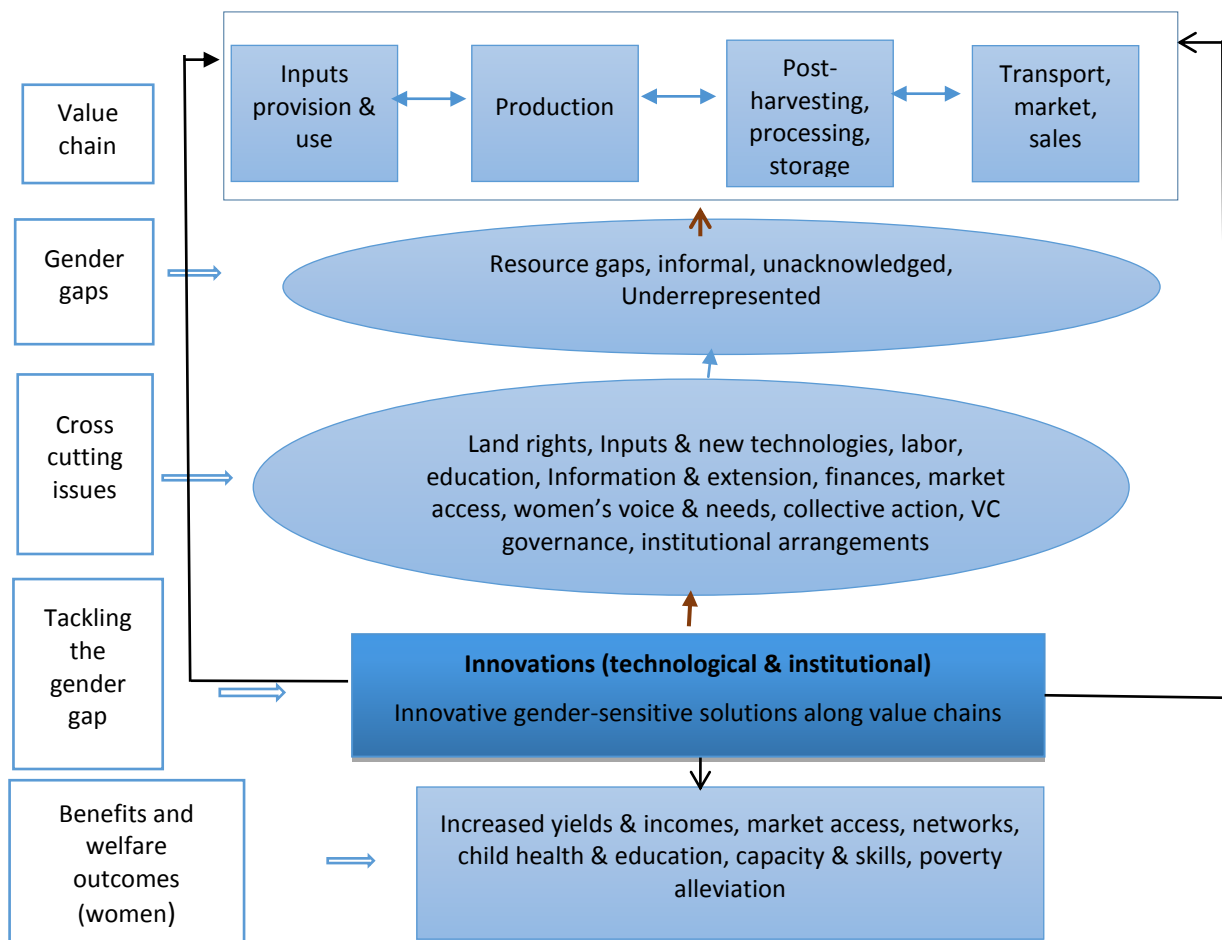


Figure 1: Conceptualization of Gender and innovation in agricultural value chains  
Source: Authors' elaboration based on IFC, (2016).

This paper, conceptualizes value chains on twofold, first as a set of actors by identifying gender-differentiated activities and the need to strengthen certain actors especially women and fostering relations between smallholders including men and women and other actors in the chain. Two, on the

network approach especially the need for innovations in institutional arrangements, specifically the role of group-based approaches in improving inclusiveness and business environment in the value chain. We argue that innovative institutional arrangements in dealing with access to institutions, property rights, tenure in upstream and downstream of the value chain and interaction of actors in vertical relationships or cooperatives enhanced by group-based approaches offer solutions to gender inequality, market failures, incomplete contracts and offer opportunities for upgrading. The socio-economic and institutional arrangements in which innovations are developed and introduced is vital for their uptake along value chains. Gender dimensions are often key for technical and institutional innovations because of gender and social relations in food systems and value chains (FAO, 2010; Beuchelt, 2016). Gender is a parameter that defines social relations and power dynamics of men and women. Gender refers to socially constructed norms, rights, roles and responsibilities and relations between men and women in social, economic, cultural and psychological contexts (Doss, 2002). Hence, innovations in value chains need to be studied in a gender-differentiated way.

### **3 Analytical framework**

In light of the conceptual framework, this section elaborates both qualitative and quantitative approaches of collecting gender-sensitive data and analysing gendered data at micro, meso and macro levels of food value chains. The analytical framework considers the integration of gender in value chain analysis. Value chain analysis shows how effective value chains function and the opportunity it presents to all actors (Bellù, 2013), while gender analysis is concerned with roles of men and women, the extent of equal access and control over resources, their needs and priorities, agency and power and their opportunities and capabilities to attain life outcomes (FAO, 2017). Hence, value chain analysis is positioned in a social context of gender relations.

To implement gendered value chain surveys the biggest strength is to collect appropriate gender-disaggregated data (collected and analysed separately for men and women). At micro level, household and individual-level analysis provides a strategic entry point for value chain interventions especially those that focus on eliminating barriers facing women at the same time involving men thus enhancing sustainability of interventions and innovations (FAO, 2016). Where both spouses are present, wife and husband within the same household should be interviewed in separate environment to encourage freedom of response to female members (Ngigi et al. 2017). In case of de jure and de facto female-headed households, target should be on male and female decision makers based on the roles and responsibilities or engagements within the value chain. This approach allows for comparison between male and female actors (Behrman et al., 2014) and identifies the root causes of gender-specific constraints, roles and responsibilities, gendered access to services and participation in group-based approaches at household and community levels. Quantitative analysis should as well include panel data for the same individuals or households that allow for dynamics of gender relations over time.

At meso level, focus is on institutions and governance structures and how differently men and women access institutions, participate in leadership and entrepreneurship and how institutions address the needs and priorities of men and women. The target is on the input and service providers, cooperatives, processors, transporters, traders and consumers while targeting both male and female actors along different nodes in the chain. At marketing node, market assessment should identify the needs, preferences and expectations of male and female customers that provide a crucial point of entry for new product development and upgrading in the chain. At consumption level, gender disparities in knowledge and nutritional practices and behaviours and identification of institutions that provides essential information on food and nutrition should be assessed (WFP, 2016) thus surveys should again target both female and male consumers. Further, a mixed methods approach

provides a more convincing analysis, improves understanding of findings, hence, quantitative and qualitative approaches should effectively supplement each other to analyse gender and innovation issues in value chains. Hence, *gender-disaggregated individual, group focus discussions, gender-differentiated key informant discussions, gendered-stakeholder analysis* could aid to identify and address institutional-based constraints or benefits that influence both men and women decisions in participation in value chains and their potential for upgrading.

At macro level of the food value chains, the focus is on identifying national and regional policies and programs and how they affect men and women. At this level a review of key policy blue prints and key informant interviews with policy makers and enforcers on gender equity in order to identify gendered gaps in policy and propose potential point of entry for interventions in value chain development. Use of a gender grid can assist to identify and deliberate with stakeholders on major gender issues in cultural context, institutional and regulatory frameworks that innovation systems and value chains operate. After collecting *gender-disaggregated data* in different nodes of value chains, a *gender-responsive approach* is required to analyse the data. A major analytical strength of intra-household data analysis is to apply a gender lens “within” households and consider the interplay of male and female members of the household.

## **4 Gaps in technological and institutional innovations**

Access to productive resources and institutions in addition to social beliefs and norms determine women’s uptake of innovations and participation in value chains, and overall agricultural productivity and welfare outcomes.

### **4.1 Social norms**

There is increasing policy interest on the important role that social norms play in influencing development outcomes and human behaviors. But there is limited understanding of how social norms influence participation of men and women in innovation along the agricultural value chains. Social norms are informal rules that dictate interaction between individual and collective behaviors that shape how people behave and how people expect others to behave (Markel et al., 2016). These interactions influence how women engage in innovation systems and value chains. While economic factors are hindrances to innovation and participation in value chains, facing both men and women, gendered social norms are strong restrictive factors specific to women.

There are several categories of norms that constrain women in innovation in value chains. This includes gender segregation of sectors and tasks, traditional division of labor and time-use, gender restrictions on mobility or migration and constraints on women’s ownership of assets and restrictive inheritance (Markel et al., 2016). In Sierra Leone, female farmers perceive that they are respected by community or by family for being ‘good housewives’. However, the trend is gradually changing with women participation in agricultural trade enterprises, hence attracting pay from relatives for any assistance they offer in term of unpaid care tasks (USAID, 2017) or are able to hire extra household help. Limited mobility is often linked to gendered social norms to care responsibilities, gender-based violence in access to market and value chains which limit women accessibility to far markets and engagement in innovative institutions as producer and marketing organizations that are essential in market linkages and dialogue necessary to challenge social norms that obstruct women’s access to markets. As elaborated in 4.2 even with formal legal systems in Africa, social norms lead to allocation of smaller and less fertile land to women in Ethiopia (Tura, 2014), the sons inherit land instead of widows in case of demise of husbands in Kenya (Ngigi et al., 2017), while in Zambia, land is seized by relatives leaving the woman landless (Markel et al., 2016). Social norms also dictate that men generally get an upper hand on decision making over the use of resources in the household (ibid).

Innovations in term of institutions especially through participatory approaches could address social norms and identify new openings for gender transformation in innovation processes. Although technological innovation could lessen labor burdens to women by developing labour-saving technologies, they need to consider culturally or socially acceptable gender roles in respect to adoption of labour-saving technologies. Institutional innovations that engage communities in common forums could help understand and challenge restrictive social norms and stereotypes that hinder capacity of women (Ngigi et al., 2017). Platforms that bring couples together or men and women to learn about new technologies and innovations changes men's mind sets and perceptions on ability of women to innovate and participate in value chains. Men would be part of identifying problems and solutions to existing social norms especially through public dialogue (Markel et al., 2016; Ngigi et al., 2017). Women can also form a strong force to challenge and disrupt norms that are against them through collective voice and by increasing their presentation across different levels of the chain (leadership), employment and improving their skills and capabilities. Evidence from Zambia illustrates that early adopters of enterprises who are women can be recognized as leaders and influence their families and women in taking up innovations (Markel et al., 2016).

## **4.2 Land rights**

In Sub-Saharan Africa, women have limited rights to land or access rights over land through men (Farnworth et al. 2013). In Ghana smaller land sizes limit women from engaging in cash crop production, due to the need for economies of scale (Hill & Vigneri 2014). Although formal legal system in Ethiopia recognizes the equal rights of women, customary practices and social norms lead to allocation of smaller and less fertile land to female-headed households while women in polygamous marriages are not protected by law on how to get their share from matrimonial property (Tura, 2014). In Oromia coffee region in Ethiopia, women can only own land if they are the household heads. This implies that married women are disadvantaged and can only access land through their husband's tenures.

Land legislation has increasingly focused on fostering women's land, but women often lack legal knowledge to claim their rights or are hindered by weak enforcement of law or by customary norms. In Kenya it is estimated that only three percent of women own title deeds with only five percent held jointly with men (GoK, 2008). Customary norms impede women in Siaya, Kenya from owning or inheriting land after the demise of the husbands, as this is an entitlement to sons (Ngigi et al., 2017). This leads to productivity differentials between men and women (FAO, 2011) due to the risk of losing land in the event of separation or death of the husband. Institutional rearrangements that offered low cost, speedy, and transparent community land registration process in Tigray Ethiopia enabled female headed households to rent out their land as they were more tenure secure (Quisumbing & Kumar, 2014).

Women in Uganda were less aware of land rights that could foster tenure security and legal protection especially for the case of customary land owners who in turn were able to embark on soil conservation measures thus increased productivity (Deininger et al., 2008). In Rwanda, women with land rights had a 19% probability of engaging in soil conservation. Indeed investing in land cultivated by women is a potential innovative path to increase agricultural productivity in a changing climate (Kondylis et al. 2014). In Mozambique, women messengers from two hundred communities were trained as extension providers of sustainable land management (SLM) practices. This was found to increase women's awareness of the micro catchment farming technique by 9% points in 2012 and adoption of the technology by 5% points in 2013 in the said communities thus increasing food security (ibid). Land distribution in Africa is also gender-biased that worsens women access to land. Land deals in SSA fail to consider gendered impacts of land grabs or effects of agribusiness initiatives on women's land rights or their livelihood solutions. This could worsen their rights to land and ability

to support their families (Lastarria-Cornhiel et al., 2014). Institutional innovations such as women groups are recommended to enable women to lease land or buy hence addressing gendered constraints to land access that lead to women empowerment.

### **4.3 Innovation and technological resources**

Peterman et al. (2014) observes a consistent finding in SSA that across different types of inputs and technologies, male farmers have higher input use than female farmers. In dairy value chain in Kenya and Ethiopia women are less likely to take up innovations and technologies in planting, storing, processing of forage and animal health practices (FAO, 2017; Katothya, 2017). Storing of forage in terms of silage in turn has far-reaching labour implications in the sense that it could lessen labour requirements for women especially during dry spells. In Malawi, gender behaviour and preferences hinder uptake of high-yielding varieties of pigeon peas, where women prefer varieties that meets their consumption needs (taste, colour, low cooking time) whereas men look at marketability of a variety (Me-Nsope & Larkins, 2015). Bourdillon et al., (2007) found that in Zimbabwe men were in a better position to adopt new maize varieties due to their financial stability and access to marketing institutions compared to the female farmers who opted for open pollinated varieties in their plots. A similar observation was made in Ghana whereby, the differences in planting of new maize varieties between men and women was due to their dissimilar access to complementary inputs, particularly land and extension services (Green & Baden, 1994).

Innovative post-harvest technologies are essential in enabling sustainable value chain and reducing post-harvest waste and loss that in turn improve food security for all. However, in East Africa, men adopt high-cost metal silos that require heavy investment while women adopt low-cost hermetic bags (super grain bags) in post-harvest management of cereals (Nzioki & Kandiwa, 2015). In addition, women lead innovation along traditional high value crops such as cassava, indigenous vegetables, sorghum and sweet potatoes through value addition and packaging that require low capital investment.

### **4.4 Access to financial services**

Value chain finance could aid the chains to be more inclusive, foster uptake of innovations and technologies (FAO, 2011) and greater economic participation for women (GSMA 2016). Evidence from Africa shows that women are often excluded from formal financial services. Using quantitative data of 9 countries in Sub-Saharan Africa, (Aterido et al., 2013) study suggests that women are less likely to access formal financial banking services in Botswana, Kenya, Malawi, Namibia, Rwanda, Tanzania, South Africa and Uganda. Gender gap in financial inclusion persists where in Kenya the gap is 11%, 9% for Tanzania, 15% for Uganda and 13% for Nigeria. In Ghana, only 50% of women have formal bank accounts, with limited borrowing for farming as compared to men (Sebstad and Manfre 2011). Hence, female-owned firms and entrepreneurs in SSA are more credit constrained and rely on inter-chain funding or informal financial mechanisms such as group-based approaches that impede them from investing in technologies and innovation or upgrading in value chains that require heavy investment (Aterido et al., 2013).

Women are also left out of payment systems with gendered preferences on payment mode (Sebstad & Manfre, 2011). Female farmers in citrus value chain in Ghana prefer 'cash payments in full at pick up' since this approach reduces non-payment and fosters their autonomy of income. In Kenya, payment through M-pesa (Mobile money) allows women to increase their control over earnings as they participate in value chains. However, recent studies in Africa show that gender gap persists in mobile money in terms of account ownership and usage for example in Rwanda, Côte d'Ivoire, Kenya, Tanzania, Uganda, and Nigeria (GSMA, 2015).



Further, many rural women lack financial education and money management skills, saving and access to insurance. Clara (2015) using a randomized field experiment in Senegal and Burkina Faso shows that female farm managers were less likely to buy agricultural insurance, but instead invest in saving for emergency purposes because of additional lifecycle risks associated with childcare and fertility that women face as compared to men. There are several reasons explaining the gender gap in financial inclusion including supply-side barriers, regulatory and institutional barriers, lack of gender-differentiated data and societal barriers (GSMA, 2015; AFI, 2017). Lack of gender-differentiated data that is credible and objective makes financial institutions fail to understand the needs of poor and female financial needs and financial behaviours.

#### **4.5 Education, Information and extension service**

The flow of information to and/or through a value chain is crucial for meeting expectations of the market and consumer's demands. In Kenya, Tanzania, Ghana and Malawi men dominate in ownership of agro-related businesses and practitioners in seed supply, agro-vet outlets and artificial insemination (Tagutanazv, 2015; Katothya, 2017). According to the FAO, only 15% of extension personnel were women in a 97 countries study of extension organizations using gender disaggregated data. Moreover, only 5 percent of the extension services were targeted directly at women. Male extension agents target mostly men in the household on the assumption that information will be shared with the female folk which is rarely the case. Extension services are observed to bypass women as they lack the complementary resources such as land and finances required to stimulate the technology adoption processes.

Having less education compared to men also puts women in a disadvantaged position to receive extension information especially where a lot of reading and writing are involved, hence take up the lower skilled roles in the value chains. For the same reasons of illiteracy, women tend to be neglected by formal and informal technical vocational education training (TVET) programmes (Farnworth, 2012). Innovative approaches in TVET would therefore have to be inclusive, equitable, and considerate of local contexts (capacities and knowledge, culture, household dynamics and gender differences) in order to benefit women (Hartl, 2009). Extension services should also consider women's long working hours in the farms and homes, as is likely to inhibit them from participation especially where it involves travelling outside their homes and villages (ibid). It should focus on alternative and innovative communication strategies such as social gatherings and market places where women can easily access market and production information. Experiences from Ethiopian livestock and irrigation value chains targeting small holders in male and female headed households showed that a combination of spouses training, mentoring at the household level and field days and tours for women improved women's access to extension services (Lemma, et al., 2016) ..

Participatory extension approaches such as Farmer field schools (FFS) can act as a great pathway for agricultural extension to reach small scale farmers especially women of lower education levels. FFS in Kenya, Tanzania, and Uganda increased per capita agricultural (crop and livestock) income of female headed households by about 187%, as a result of productivity increases (Davis et al., 2012). The probability of participating in FFS was linked to both male and female headed households that had lower education levels and poorer.

#### **4.6 Market access**

Market failure is a serious constraint to small holder farmers in Sub Saharan Africa and it is worse for the marginalized groups such as the very poor and women (Oduol & Mithöfer, 2014). Women experience higher entry barriers to value chains especially due to their lack of control on productive resources which are essential for up-scaling from subsistence to marketed output. For example, culturally unsuitable modes of transport, lack of physical strength to load goods, harassment by

market officials due to lack of permits which they cannot afford, time constraints which inhibit women from identifying best prices, marital conflicts due to price changes, and spouses taking over women's enterprises as they become more profitable (FAO, 2011; UNDP, 2016). These and many more are in addition to normal market challenges of insufficient market information and infrastructure.

High value export oriented agriculture also creates new market opportunities for women especially in horticulture and organic agriculture. In a study of the avocado value chain in Kenya that is well developed for both export and domestic market, Oduol & Mithöfer, (2014) found that at higher levels of the value chain (export) where returns are much higher, men dominate and are the owners of avocado fields, are the decision makers on sales and they tend to control the revenues while women remain at the lower levels of production. However, the women in the female headed households seemed to fully participate in the value chain though they faced challenges when it came to some physically demanding tasks such as harvesting, spraying and grading.

#### **4.7 Women employment in food value chains**

Gender inequalities in agricultural employment persist in Africa, however, the growth and scaling of agricultural value chains offer a pathway to remunerative and self-employment opportunities for women. Women participation in agricultural value chains also enhance their self-confidence (power-within), ability to engage in group-based approaches (cooperatives, trade unions, women groups), acquire financial independence and power to invest in assets (Said-Allsopp & Tallontire, 2014). Evidence in SSA suggests that agricultural labor force is largely provided by women. A recent study by World Bank in SSA shows that women contribute up to 40% of labour in crop production, 56% in Uganda, 52% in Tanzania and Malawi, 37% in Nigeria, 29% in Ethiopia and 24% in Niger (Palacios-Lopez et al., 2017) and 34% in South Africa (FAO, 2010). Women are however less involved in cash production in Malawi and Uganda and women's share of labour force in the household increases in female-headed households, when they own land and are more educated and decreases with mechanization (Palacios-Lopez et al., 2017). There is also gendered employment opportunities where 68% of women in SSA work in agriculture, while only 33% in North Africa (ILO, 2009). In Zimbabwe, women constitute 79% of labor force in floriculture and 91% of horticultural employees (Dolan and Sorby, 2003; cited in FAO, 2010). The literature suggests that women employment in food chain is concentrated upstream in the chain. Women are often left out in agro-dealership (IFC, 2016) that offers both formal and self-employment opportunities. In Kenya evidence shows that female-owned stores constitute only 11% out of the 73 agro-vet stores, while women and girls are employed as sales assistants (Katothya, 2017) that do not attract a good salary. Agricultural training and extension employment is also gender blind in most countries in Africa that could explain inequalities in access to extension services and productivity. Women's working conditions are unfavorable, work for longer hours than man with unequal rewards for their efforts (Rubin & Manfre, 2014). Women work under seasonal contracts, with no well laid social protection, 69% of women in South Africa are temporary workers, while in Tanzania women are mostly casual workers in flower farms. This creates an avenue for abuse such as violence and sexual harassment, see case of cut flower industry in Kenya (GFRAS, 2017).

4.8 Women's voice, collective action and leadership.

Women's voice and representation is important to bring in power balances in agricultural value chains. However, traditionally, research in agriculture and development has failed to consult end users and more so the women farmers (Bourdillon et al., 2007). Consequently, many improved varieties do not consider women's needs, preferences, and resources, including their unique nutritional needs that call for micronutrient fortified crops (ibid). In Burkina Faso for example, nutrition sensitive agriculture programmes targeted at women improved women's decision making

power, control over home gardens, produce and income though the men remained owners and controllers over majority of assets.

Cooperatives and other group-based approaches play a crucial role in establishing bargaining power, creating avenue for assets sharing and acquisition, avenue for capacity building and encouraging access to markets (IFC, 2016). Women's social capital and cooperative membership in Africa is underdeveloped and informal based on families and neighbours, while men's networks are formal with bigger vicinity including co-workers and business contacts. Participation in producer cooperatives and business associations could enable women to scale up the enterprises and have bigger influence in leadership of agricultural value chains (FAO, 2016). There is gender disparity in access to cooperatives, leadership and participation in group-based approaches that are essential in linking women to value chains. In Kenya, women are rare in leadership or in board membership in dairy cooperatives (Katothya, 2017). In Ethiopia women consist around 20% of cooperative membership, in spite of them making up to 50% of farmers in the county (IFC, 2016). Self-help groups also connect women to financial markets, improve their savings and access to credit for agricultural purposes as explained in 5.3.

## **5 Innovative measures for bridging the gender gaps in value chain development**

The study argue that there is not a strategy that would be suitable for all African countries and missed opportunities from previous development interventions and innovations present new entry points to address existing gender gaps and pathways for women empowerment Based on critical assessment of the literature, the study identifies several gender-sensitive innovations and measures to bridge the gender gaps and scale up agricultural value chains in Africa.

### **5.1 Gender-sensitive value chain analysis**

As discussed in analytical framework, analysing the value chain in a gender-sensitive way is a vital first stage towards understanding gender-specific constraints and identifying effective interventions designed to promote economic gain and gender equality (Rubin & Manfre, 2014) at the same time promote participation of both men and women in agricultural value chains (FAO, 2016). By understanding how different members engage in and are affected by development interventions, who stands to gain and who stands to lose in value chains, gender-sensitive value chain analysis helps planners to avoid costly errors of the past and design interventions that are effective, efficient and equitable (Carr, 2008; FAO, 2011). For example, where gender analysis shows an activity such as weeding being considered as a 'female task', implies that an innovation to increase crop production may result in undesired outcomes to women by adding onto their work burden and less benefits. Therefore, a different form of intervention such as easier access to water would be more desirable to free up women's time and give room for more income activities. Hence, gender-differentiated data within the chain is essential to promote program design, targeting and investments. For example, banking institutions bar women from accessing financial services because of lack of reliable sex-differentiated data, hence failure to understand gendered financial needs and behaviors (GSMA 2016).

## **5.2 Enhancing gender-sensitive delivery of innovation and technological resources**

Given the importance of extension to agricultural development, and the important role of women in agriculture, there is need to tailor extension services to the specific and diverse needs of women farmers and in consideration of their multiple roles. Extension service needs to set gender targets whereby clear goals are put in place in terms of female representation in value chain interventions at the household level, service provision, processors and marketers for each value chain. Since spouses could have different preferences to information and channel of delivery (Ngigi et al., 2017) the concept of spouses training as suggested by Lemma et al., (2016) based on experiences from Ethiopia should be explored in other regions that helps to craft equal opportunities for male and female smallholders. It is beneficial for extension and training sessions to adopt women mobility and their level of education and language skills, employ culturally acceptable methods, and delivered by female trainers (Rubin & Manfre, 2014; IFC, 2016). Women oriented study tours and field days where women can socially learn through observation could be effective techniques to apply knowledge and skills in their natural environments (Lemma et al., 2016).

Secondly, institutional and technological innovations are necessary to bring women at par with men in terms of financial access. Giving women equal and independent rights to enter into financial contracts on their own would be a great milestone in societies where culture and social norms has previously weakened women's economic engagements. There is also a need to ensure that women retain control over their incomes through use of direct payment, prepaid cards, mobile phones transfers and that institutions understand the women financial needs and behaviours (Sebstad & Manfre, 2011 ). Thirdly, group-based approaches in form of women's group and group savings in Ghana and Kenya were reported to boost women's savings and collateral for loan repayments and a risk sharing mechanism to address economic and social risks facing women (Sebstad & Manfre, 2011). Fourth, based on women mobility challenges, bringing financial services closer to villages and towns could facilitate financial inclusion for women. In Kenya, nearness to rural banking agents and the mobile money transfer service enabled women to save while cutting down on transaction costs (ibid).

Lastly, gendered innovative solutions on diffusion of technological resources could encourage uptake of innovations and technologies for both men and women. For example, in order to reach out and benefit more women in other African countries, experiences from Malawi indicate that fertilizer subsidies should target all small scale farmers rather than just maize growers like in the Malawian case. Care should be taken note to worsen women's economic position because of innovations or engagement in value chains. Women tend to spend their earnings on new technologies such as new tools to ease labor burdens instead of on health, nutrition, education and household wellbeing (Knaepen et al. 2017) or are disfavoured by labor-reducing technologies that fail to consider social norms on socially acceptable roles of women as seen in the case of a pedal operated bicycle to thresh rice in Nigeria.. Women also participate in value chains through labor provision with less rewards, for example in Kenya where women provided 72% of labor, and received only 38% of income from their labor input (cited in Coles and Mitchel, 2011). Women employment in commercialized system also leads to a reduction in labour available for family farms (Said-Allsopp & Tallontire, 2014).

## **5.3 Institutional innovations for scaling up men and women participation in value chains**

Institutional innovation provides a pathway to address barriers facing women and presents an opportunity to encourage participation in both traditional and modern value chains. Group-based approaches can address the issue of mobility of women at the same time empower women by

developing a vertical link in value chains. Hence, institutional innovations help women access markets and transform their traditional value chains into modern value chains. For example, women in traditional value chains (sorghum, cassava, indigenous vegetables) in Kenya participate in several activities in the chain at village level and are able to supply their value-added products to retail outlets. Women of COOPPAVI in Rwanda through training programs in governance, financial skills, fishery regulation and handling hygiene were able to contract with retail outlets, schools and expanded their outlets to other potential buyers (FAO, 2011).

To promote women positions in the chain, horizontal linkages for upgrading facilitated through institutional innovations as group-based approaches among chain actors and smallholder producers should be encouraged. Sebstad & Manfre, (2011) study suggests that women than men often have stronger horizontal linkages than vertical linkages. Apart from placing women at a strategic position in the chain, horizontal relationships also promote their performance in the value chain by facilitating access to input, innovations and technologies, market information and fostering management skills and self-confidence (Meinzen-Dick *et al.*, 2014). Group-based approaches also provide avenues for creating strategic alliances and contracting creating a link between intermediary-driven and buyer-driven value chains and smallholder producers who are men and women.

Institutional innovations that encourage interactions of public, private and collective interventions through group-based approaches are vital to encourage sustainable innovations that enhance efficiency of activities, increase farmer's income and address equity concerns within value chains (NGI, 2009). Non-governmental Organizations (NGOs) also play a crucial role by linking farmers groups with markets, through value addition and promoting gendered update of new technologies and innovation. For instance, Land O'Lakes in East Africa assists women to acquire technical skills in artificial insemination that offer opportunities for self-employment in provision of support services in dairy value chains.

Alternative and innovative strategies as women's groups in Ethiopia facilitate group-based land acquisition and group-based land leasing as shown in Kenya (Ngigi et al. 2017) could bridge the gap in access to land and control over land or other resources by women. In Burkina Faso, community meetings discussed the rationale for providing vegetable production program support through women, hence addressed challenges of access to land for women (Meinzen-Dick *et al.*, 2014). Hill and Vigneri (2014) study found that in Uganda strengthening women groups through training in leadership and financial management and strategies on how to find buyers, allowed women to attain scale in marketing and reduce transaction costs.

#### **5.4 Promoting gender-sensitive innovative design, and implementation**

Understanding socio-cultural, organization, institutional, infrastructural and political factors is essential to ascertain the root causes of gender differentiated participation and benefit of chain actors and hence design effective strategies to bridge gaps in access to productive resources and influence of agency and power (FAO, 2016). In areas and sectors where women are side-lined due to the existing gender norms, explicit targeting is important to hasten the process of change to end gender discrimination and ensure women have equal access to resources. For example, making explicit reservations that should be filled by women along the entire value chains in meetings, user organisations, and extension. However, targeting women individually without internal and external support networks especially in male-dominated societies is likely to fail because of gender relations and social norms that require interactions between men and women. Innovative project designs also need to consider gender and social roles and responsibilities of men and women to enhance opportunities and minimise negative trade-offs. For example, a machine used to smoke fish would reduce women's workload and also reduce their exposure to indoor smoke and pollution. Value chain programs should also work on women's incentives to ensure continued production, enhanced

productivity and cooperation between actors, see case of chilli processing in Kenya where women abandoned production because their spouses collected the payments (Barrett et al., 2009).

### **5.5 Promoting gender-sensitive monitoring and evaluation of value chain interventions**

Monitoring and evaluation at the value chain level enables implementers and project organizers to comprehend and measure impacts of gender relations in relation to interventions, and the disparities in access to productive resources by men and women in communities (Mutua, et al., 2014). Country specific gender assessments are important especially when they are significant for policy making and translate into implementable recommendations (Ashby et al., 2008). In order to inform programs and activities it's good to conduct sex-disaggregated baseline and set targets and use gender-sensitive research approaches to assess changes of interventions in value chains and enable to diagnose policy.

### **5.6 Fostering gender-responsive policies and programmes in innovation in value chains**

Guided by gender-sensitive value chain analysis, policy makers and governments should engage with and consult different groups of stakeholders, work to strengthen gender analytical expertise, improve training and capacity building, leverage women's voices during the policy making process, and support women's advocacy platforms. Governments should also start allocating a portion of their budgets towards gender equality and women's empowerment. The policy framework should address the gender-based constraints through redistributive interventions that could increase women's agency and power. At market level, policy should focus on making environment conducive for women and encouraging stakeholders in employment node to have gender-sensitive act of conduct to address gender-specific barriers and hardship that women face.

## **6 Conclusions and policy recommendations**

This paper explores women's potential to make important contributions to agriculture and the rural economies of Africa through technological and institutional innovations in agricultural value chains. Our literature review points out the need for gendered policy that could address the constraints that both poor women and men face while laying more emphasis on constraints specifically facing women. Innovative value chain technological and institutional interventions should therefore be mindful of discrimination and social norms against women to ensure they overcome the constraints they face. Evidence from many countries in Africa shows that women are often left out or under-represented in governance of key institutions within value chains and in employment because of discriminatory policies and gender norms. This calls for the need to mainstream and institutionalize gender in all decision-making levels of innovation system and across value chains. The African union has established gender policy; while numerous governments have attempted to institutionalize gender through gender-mainstreaming processes i.e. one-third gender rule in Kenya and pro-women constitution in Rwanda. The challenge, however, remains how to address stiff informal institutions namely social norms, cultures and traditions that hinder women's full potential in participation in decision-making processes and access to resources. This points the need to consider the crucial role of informal institutions through gender-transformative institutional approaches that address gender inequality and conundrum of informal institutions.

The existing gender gap in innovations and technological resources, financial services, entrepreneurship, agricultural and marketing information point out the need for public and private sector to engage gender-sensitive training and delivery approaches. Gender equality can be promoted through policies and interventions that consider men and women in capacity building programs that address mobility challenges and gender norms facing women. Scaling gender-sensitive training programs through couple training, women-oriented study tours, farmer business schools, women groups, use of 'female lead- farmer' or involving women in 'training of trainers' could promote uptake of innovations and technologies by women. Encouraging private sector to institutionalize gender in their operations especially developing gender policy or gender rule can address gender discrimination, promote women involvement in governance of value chains and improve their working conditions for women. Reliance on alternative institutional innovations and arrangements by women to enable them access to resources, markets, employment and participate in governance of value chains call for policies that nurture and strengthen these kinds of institutions.

The evidence in this paper suggests that lack of gender lenses while targeting innovation policies and programs in value chain development or interventions can worsen prevailing gender inequalities or side-line one gender category. Hence, policies and programs that strive to benefit women through increased productivity and improved participation in value chains ought to involve them to implement development planning at all levels and nodes of value chains, bridge gender gaps and consider multiple roles and responsibilities of women and socio-cultural context in which innovations and value chains operate.

Future research would highly benefit from more empirical assessments on gender-responsive innovations in the agricultural sector, their constraints, benefits and possibilities of sustainable up-scaling. While there is substantial evidence on gender gap in access to resources in agriculture, most of the existing evidence compares male- headed and female-headed households. More research is hence needed using intra-household data and intersectional perspectives that consider socio-economic, institutional arrangements and norms and how these cut across gender and agency.

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