



Infrastructure for the participation of smallholders in modern value chains

Lessons from the development of warehouse certification and receipting systems for maize in Kenya

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Abbreviations

Abbreviation	Description
AGRA	Alliance for a Green Revolution in Africa
BFA	Bankable Frontier Associates
CBO	Community-based Organisation
CIDP	County Integrated Development Programme
DFID	Department for International Development
EAC	East African Community
EAGC	Eastern African Grain Council
FAO	Food and Agricultural Organization
FSD	Financial Sector Deepening
GDP	Gross Domestic Product
GoK	Government of Kenya
ICT	Information and Communication Technology
IFC	International Finance Corporation
KACE	Kenya Agricultural Commodity Exchange
KEBS	Kenya Bureau of Standards
KENFAP	Kenya National Federation of Agricultural Producers
KEPHIS	Kenya Plant Health Inspectorate Services
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KMDP	Kenya Maize Development Program
MLND	Maize Lethal Necrosis Disease
NCPB	National Cereals and Produce Board
NGO	Non-governmental Organisation
NTB	Non-tariff Barrier

PCPB	Pest Control Products Board
PG-HGSF	Procurement Governance for Home-Grown School Feeding
RATIN	Regional Agricultural Trade Intelligence Network
Sida	Swedish International Development Cooperation Agency
SPS	Sanitary and Phytosanitary Measures
SQMT	Standardisation, Quality Assurance, Metrology and Test
ODI	Overseas Development Institute
UK	United Kingdom
UNECA	UN Economic Commission for Africa
US	United States
USAID	US Agency for International Development
WFP	World Food Programme
WRS	Warehouse Receipt System

1 Introduction

In East Africa, as in the rest of the continent, highly arbitrary political boundaries cut across agro-ecological zones and natural market sheds, with the country's patchwork of inherited colonial boundaries impeding formal trade flows and separating regions that experience regular food surpluses from those that commonly experience deficits (Haggblade, 2013).¹ Improving connections between population centres and food production areas would benefit both producers and consumers, and support food security. The recent development of local and regional agro-processing value chains in Africa demonstrates the potential for significant gains in terms of accelerating these processes (UNECA, 2015; World Bank, 2012). Improving trade in food staples – whether cross-border or domestic – can connect deficit and surplus areas and reduce price volatility. It can also be positive for consumers and producers, in particular smallholders, and can drive inclusive poverty reduction and increased food security.

The literature examining causes of differential abilities to capture food staples market integration in Africa reflects the high level of trade costs both within and between countries on the continent. This echoes well-documented constraints in transport infrastructure, access to credit and the broader business climate.² Facilitating the integration of food staples regional value chains through the development of infrastructure, addressing public and private non-tariff barriers (such as standards) and enabling smaller producers' participation in the value chain could therefore provide a further opportunity for inclusive growth and poverty reduction in the region.

Investing in the right infrastructure and supporting appropriate complementary regulations can assist in processes of economic transformation. Such regulations can address market failures in the value chain, reduce risk and in turn increase investments in the sector by stakeholders. Paired with sufficient training and support to enable farmers to access these warehouses, they can allow smallholders to participate in the value chain. This can not only increase employment but also allow farmers to capture greater value within supply chains. This case study examines the role of grain warehouses in the East African region, and in particular in Kenya, in relation to the functioning of the maize value chain, and argues that the evolving system of certification and receipting demonstrates an important complementarity between hard (physical) and 'soft' infrastructure for the development and greater inclusiveness of the grain value chain.

Globalisation and liberalisation of markets have led to the emergence of new players in the value chains for agricultural products. Demographic factors, particularly urbanisation, have influenced consumer preferences, which in turn have affected

¹ Haggblade (2013) sees these problems as caused in large part by Africa's 'small-country problem', which results in technology spillovers being dissipated as each country must invest individually in new technology development. The high transaction costs resulting from political borders and low perimeter infrastructure reduce farmer incentives to expand food production (p.159).

² This last point is important in interpreting border effect estimates. While price-based estimates of border effects are limited, there is overwhelming anecdotal evidence that regional trade, even when taking into account informal trade, is well below potential, and this is in part because of high trade costs (Porteous, 2015).

domestic markets and supply chains. Supermarkets and large-scale retailers have become increasingly important. The Kenyan value chain for maize – the country’s most important food staple crop – provides an important case in this regard. In Kenya, despite the country’s diversification, agriculture has continued to be the backbone of the national economy; as such the national development plan, *Vision 2030* (GoK, 2008), identifies it as one of the key sectors to deliver the 10% annual economic growth rate envisaged. However, barriers to participation in markets remain particularly high for smallholders, and a multitude of policy efforts have aimed to address high transport costs, poor infrastructure, limited connectivity and numerous other bottlenecks. The significant negative impacts of rising and highly volatile food prices, particularly of maize, during the 2008/09 crisis demonstrated the central importance of ensuring both that consumers can access maize and other staple goods at affordable prices and that producers have a greater degree of price stability. They further demonstrated the potential risks of beggar-thy-neighbour policies that restrict intra-regional and global trade and further exacerbate price shocks. Since this time, government intervention in the maize market to support domestic production and manage imports has remained common.

Through an analysis of the changing organisation of the maize value chain, this case study provides an overview of barriers to its greater inclusiveness. We focus on i) the role and relative market power of different actors; ii) policy changes at the national and regional level; and iii) ongoing investments in hard and soft infrastructure. Given the complexity of this issue, we examine one intervention in particular: the evolving infrastructure of Kenyan warehouse certification and receipting systems. In East Africa, and in particular in Kenya where the case study was conducted, warehouse development is not new, and they have not always benefited smallholders (Onumah, 2012). By providing an overview of two dimensions – i) the evolution of the Kenyan maize value chain and its governance in recent years and ii) the role of warehouse receipt systems in facilitating poverty reduction for smallholders – we hope to contribute to answering the overarching project research aims.³ The advantage of focusing on this specific issue relates to its role as entry-point linking recent investments in both hard and soft infrastructure. As such, it facilitates understanding of many of the economic and political barriers faced at a larger scale. Thus, drawing on existing analyses of the Kenyan maize value chain (including Kirimi et al., 2011; USAID, 2014), as well as stakeholder interviews conducted by the research team, this case study examines whether, and if so how, these favour a decrease in the cost of trading maize and an increase in smallholder participation in the value chain. To do so, and in the absence of a rigorous evaluation, it identifies how actors within the food staples value chain have been taking and could further take advantage of new opportunities enabled by improvements in trade facilitation infrastructure, trends in changes to regional and domestic policies and the broader institutional environment. This meso-scale of analysis provides an understanding of how value chain stakeholders, including service providers and processors, are organised, and identifies potential political and economic coordination failures influencing the incentives of producers to participate in the market.

We find evidence that in order to reap the benefits of infrastructure investments, it is essential to develop a complementary regulatory framework that addresses coordination failures in the value chain and allows smallholders to integrate into local and regional trade networks. This case study highlights how the provision of various services through certified warehouses can help increase both the volumes and the

³ These are to assess i) the evidence base on whether improvements in regional infrastructure designed to increase cross-border trade in Sub-Saharan Africa (through reducing the costs of trade, including costs caused principally by transport delays) result in poverty reduction; ii) the potential risks to the poor created by trade growth resulting from improvements in regional infrastructure; and iii) what policy interventions have the capacity to increase benefits for, and mitigate potential harm to, the poor.

quality of traded food staples by allowing for the market integration of smallholders. However, it also acknowledges that various preconditions need to be in place for the success of this kind of infrastructure, including trust between actors along the value chain, as well as improvements in the relationship between public and non-governmental actors and increased transparency of agricultural and trade policies.

Further, we argue that the provision of warehouses combined with various services (including certification, quality assurance, training and linkages to input markets) could allow smallholders to participate in markets, receive a better price for their products and benefit from a reduction in post-harvest losses. In addition, third-body certification of warehouses from a mutually trusted source can increase transparency on product quality by ensuring the storage facility meets specific quality and insurance requirements. As a result, it becomes possible to use stored grains as collateral for loans. This is the basis for the development of warehouse receipt systems (WRS). Such systems can provide loans to smallholders at a time when these are needed, ensuring they are not forced to sell their crops right after harvest when markets are flooded and can thus take advantage of better prices later in the season. It can also be used by traders or aggregators. For these intermediaries, such systems provide access to capital and increase their purchasing capacity.

We conclude that there have been substantial changes to the maize value chain in recent years, with an evolving role of government and the opportunities and risks entailed in the East African Community (EAC) regional integration process. More recently, while the private sector has been able to promote what appears to be a successful warehouse certification scheme, the scaling-up of the initiative still requires additional investments as well as a clear regulatory framework. A central feature of this has been the greater reliance on developing public–private partnerships, of which the emerging certified warehousing system is a central example, demonstrating the importance of combining hard infrastructure with services to make value chain participation and integration more inclusive and to maximise linkages to domestic economies. Further, an operational EAC-wide WRS could also function as a precursor for a regional commodity exchange. However, this entails many ifs: at this stage, accessibility and ability for farmers to either deposit smaller amounts or aggregate at the local level remains limited, and primarily traders and larger producers are benefiting in the absence of increased financing.

Furthermore, trust is central here: the current dual system of warehouse provision between the government parastatal National Cereals and Produce Board (NCPB) and the Eastern African Grain Council (EAGC), which have highly different certification systems, highlights that trust and a legitimised certification process are central to address market failures and facilitate other benefits from a functional warehousing system, beyond the financial gains from time arbitrage enabled through storage. Finally, the substantial levels of state intervention in maize price management complicate the ability of banks and warehouse operators to engage in the system with sufficient medium-term certainty about market conditions.

This report draws on a comprehensive review of the existing literature, approximately 40 interviews with key actors along the value chain and primary data on production, prices, trade and use of the receipt system. It proceeds as follows. Section 2 focuses on the evolution of the maize value chain in Kenya, looking at structural characteristics and main actors, recent changes for actors along the value chain and the primary policy efforts to reduce risks for smallholders. Section 3 in turn describes the evolving Kenyan system of warehouse certification and receipting, including the function of this tool, its history, its poverty impact and the political economy of ongoing efforts to develop a regulatory framework. Section 4 concludes.

2 Overview of the Kenyan maize value chain

2.1 Overview of demand, supply and price dynamics

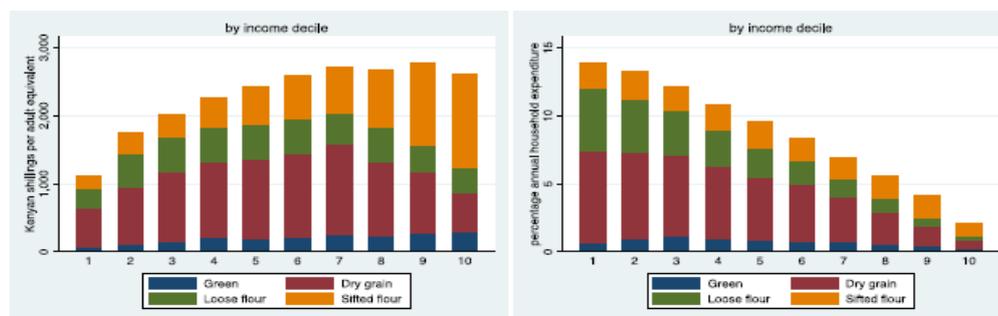
Despite increased diversification in recent years, agriculture has continued to be the backbone of the Kenyan national economy. The sector accounts for 24% of Kenyan gross domestic product (GDP) and smallholders for 75% of agricultural output (KENFAP, 2011). Smallholders are vulnerable to economic and climatic shocks and spread their risk by diversifying their sources of livelihood, often including significant off-farm income (BFA and FSD, 2015). The manifold risks faced particularly by smallholders have a strong impact on their wellbeing and cause losses of assets and lasting drops in consumption. Furthermore, the threat of shocks results in underinvestment in economic activities that may yield higher returns. Various types of smallholders are integrated in different ways with outside markets, whether national or international, and this influences the way they are affected by changes in demand and supply dynamics within agricultural markets as well as through policy changes.

Participation in markets remains particularly difficult for smallholders, and numerous policy measures have aimed to address the most substantial barriers, including high transport costs, poor infrastructure and limited connectivity. The significant negative impacts of rising and highly volatile food prices, particularly of maize, during the 2008/09 crisis demonstrated the central importance of ensuring both that consumers can access maize and other staple goods at affordable prices and that producers have a greater degree of price stability. It further demonstrated the potential risks of protectionist policies that restrict intraregional and global trade and further exacerbate price shocks.

Kenya's Vision 2030 identifies agriculture as one of the key sectors and envisages the transformation of smallholder agriculture from being based on subsistence to being innovative, commercially oriented and modern. This will be accomplished by improving market access for smallholders through better supply chain management and value addition of crops and livestock products before they reach local and international markets. In terms of both consumption and production, maize is by far the most significant staple crop. Although maize is primarily produced domestically, the country has an increasing maize deficit and imports maize from Uganda, Tanzania and the rest of the world (Kiriti et al., 2011). More than 3.4 million smallholder farmers plant maize but less than a quarter actually sell it. The majority of farmers are net buyers, with many lacking the knowledge or capital to effectively use fertiliser or certified seeds of improved varieties (USAID, 2014). Driven by urbanisation, increasing average incomes and consumers' substitution of other products for maize, as well as government efforts to promote diversification in light of frequent diseases, per capita maize consumption has decreased in recent years from 90 kg in 2003 to 67.5 kg in 2012, and is projected to fall further to 56.3 kg in 2022 (ibid.). While maize yields in Kenya are better than in many other African

countries, they have declined in the past two decades by over 20% and remain below potential.⁴ Maize is a staple in the Kenyan diet, and is especially important for the rural poor, with lower-income households on average much larger net buyers of maize relative to their incomes (Argent and Begeza, 2015; see Figure 1).

Figure 1: Maize consumption household expenditure per adult equivalent, and household expenditure share



Source: Argent and Begeza (2015).

In terms of supply, production in recent years has been highly variable owing to variations in weather, outbreaks of Maize Lethal Necrosis Disease (MLND) and widespread violence following the 2008 elections, with increases primarily because of increased production areas rather than improved efficiency.⁵ Overall cereal production has been decreasing in recent years and is exceeded by demand, but output is expected to increase from 2016 onwards (Table 1). Production is further dominated by a minority of households, with the majority producing solely for subsistence purposes. Prices tend to follow a seasonal cycle (Figure 2).⁶

Table 1: Kenya maize production, consumption and estimated imports (million tons)

	2013	2014e	2015f	2016f	2017f	2018f
Production	3.6	2.9	3.0	3.2	3.4	3.5
Consumption	3.8	3.8	3.9	4.0	4.1	4.2
Est. imports	0.2	0.9	0.9	1.0	0.7	0.7

Note: e = estimate; f = forecast; estimated imports = authors' calculations.

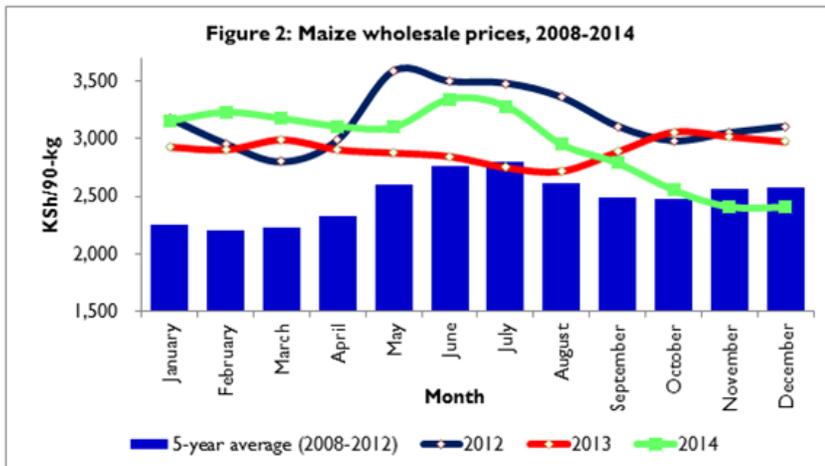
Source: Grain SA (2015).

⁴ The decline in maize yield could be attributed to several factors beyond urbanisation, including changes in the division of land and land tenure and declining soil fertility in major maize-growing regions (especially because of the overuse of DAP), the outbreak of diseases and trends towards dietary diversification.

⁵ Kenya is unique in that cropping goes on throughout the year. There are two main seasons: i) the long rains (planting in March/April) – depending on the region, harvesting of maize planted in March begins in July (South Rift, Western and Nyanza) and goes up to December (parts of Central, North Rift). Harvesting and purchase runs from July to December; and ii) the short rains (planting in September/October) – crops are harvested in February and March. The period of major maize shortage is May, June and July just before the start of harvest of the long rain crops in parts of the country.

⁶ Olwande et al. (2015) find that – unlike for the two other commodities examined in their study, kale and milk, market entry in maize for smallholder farmers decreased between 1997 and 2010. The authors point out that the relatively lower market entry in 2010 resulted from insufficient rainfall, which affected the 2009/10 agricultural season

Figure 2: Maize wholesale prices, 2008-2014

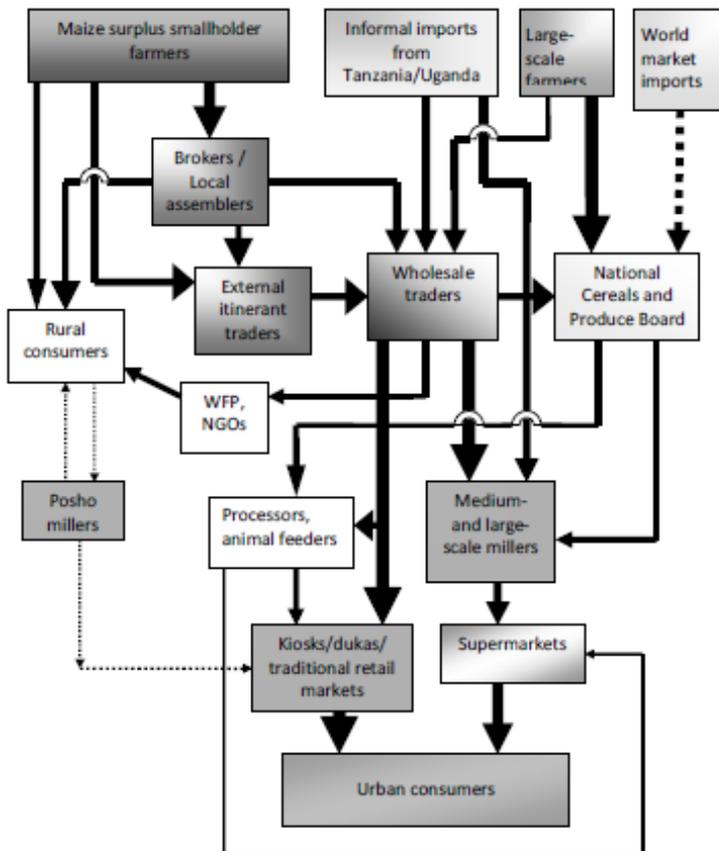


Source: MOALF; WFP; RATIN

2.2 Structure of the value chain

The maize value chain is ‘a complex and unorganized system’ (USAID, 2014). There are seven major categories of actors: farmers; primary assemblers or brokers, who connect buyers and wholesalers to local farmers; wholesalers; the NCPB; posho millers; large-scale millers; and retailers (Kirimi et al., 2011; Nyoro et al., 1999; Figure 3). Brokers negotiate prices with farmers and assemble sufficient maize to purchase for buyers. Most farmers generally sell their maize to smaller assembly traders within a relatively competitive market structure. While there is some concern about exploitation of farmers through these assembly traders, Sitko and Jayne (2015) argue that farmers tend to prefer these traders because they buy maize directly in villages, pay farmers cash at the time of the sale and enter villages just after harvest. The price farmers receive tends to be the lowest available price, but this also takes into account transport costs and the need to store grain until prices increase.

Figure 3: Maize marketing channel diagram



Note: the shaded boxes signify the main channels in terms of volume during this phase of the marketing season. The thickness of the arrow signifies the volume of flow. Dashed lines represent minor flows.

Source: Kirimi et al. (2011).

The number of millers is estimated to range from 43 to 105, including 20 to 30 medium- to large-scale millers and a larger number of smaller, ‘posho’ millers. Five groups dominate this industry: the two leading companies control 50% of the installed capacity and number of milling plants and the top four groups combine for 70%. This provides them with significant market power (USAID, 2014).⁷ A gross margin analysis (ibid.) provides an overview of the value added by each actor in the chain (Table 2). The margin for traders, assemblers, millers, transporters and retailers appears to be declining, with less extracted by middlemen within the value chain and more value being captured by farmers over time (Kirimi et al., 2011).

Using farm-gate prices reported by farmers through the Tegemeo rural household survey and farmer focus group discussions, Kirimi et al. (2011) find these prices are not considerably different from rural wholesale prices. Similarly, prices in rural wholesale markets and Nairobi markets move together and with relatively small margins. Finally, in urban Nairobi, differences between wholesale maize grain and retail maize flour prices have been declining with time.

⁷ Despite this, small and medium-sized milling companies manage to survive and even thrive. One medium-sized miller interviewed for this study argued with respect to the five large groups, ‘They are big elephants and squirrels can still eat the grass under their feet.’

Large-scale buyers and traders also – in the case of Kenya – include the multinational trader Cargill, which buys Kenyan maize and grains from smallholder farmer groups, brokers and traders, while also buying maize from Tanzania and Uganda from large traders. However, the problem of price manipulation through oligopolistic market structures influences many areas. According to one informant, ‘We can see cartels throughout the chain’ including in the input and seed market, where only three major importers control the market and it is estimated prices increase three-fold between what importers pay at the port and what farmers pay at the gate.

Table 2: Illustrative gross margins of milling value chain actors, KSh per 90 kg bag

Value chain actor	Selling price	Gross margin	Gross margin (%)
Maize producer	2,179	480	22%
Maize assembler	2,656	291	11%
Maize wholesaler	3,170	233	7%
Maize miller	3,570*	612	17%
Maize flour retailer	4,249*	601	12%
Total	4,249	2,217	52%

Note: * calculated as maize grain equivalent from price of flour and by-products.

Source: USAID (2014).

The NCPB, another key actor in the value chain, is a government parastatal involved in grain marketing and management; the following section explores this actor in greater depth. The NCPB mostly procures, manages and distributes the country's Strategic Grain Reserve and Famine Relief Stocks on behalf of the government and undertakes market stabilisation of grain prices through various interventions. It trades commercially in various grains and related products. It has in the recent past been involved in the distribution of farm inputs (fertilisers) at subsidised prices to enhance productivity. The NCPB usually purchases maize at a price higher than the prevailing market price and stores maize for a long time, after which the maize is offloaded to the market through millers or through other channels for relief purposes, usually lower than the purchase price.

2.3 Government interventions and external changes to maize value chain governance

2.3.1 The role of the NCPB

Throughout Sub-Saharan Africa, the role of governments in agriculture has undergone profound changes over the past few years. Governments are moving away from the direct management of agricultural markets and focus more on indirect regulation (World Bank, 2008). These policy initiatives define the context within which farming business is carried out as well as the framework within which smallholder farmers' economic organisations and institutions can be developed. Kenya's maize market was liberalised in the late 1980s and 1990s, with reforms expected to improve intraregional trade between surplus and deficit areas, reduce transaction costs and make maize more readily available for purchase across the country (Kirimi et al., 2011). Government intervention to support domestic

production and manage imports is common. In 2008, Kenya followed other African countries, such as Ghana, Malawi, Nigeria, Tanzania and Zambia, to introduce new production subsidy programmes. These actions have influenced maize prices and changed market dynamics, specifically the conduct of the various actors along the value chain.

In Kenya, government interventions remain common as a means to support producers, manage imports and influence prices, including through market-based interventions, consumption subsidies, safety nets and stimulation of food supply. While policies have aimed to reduce state presence in the agriculture sector (see Box 1), Poulton and Kanyinga (2014) argue that, despite this common goal, policies have been implemented unevenly, varying depending on the government in power and favouring large producers in surplus regions.

Particularly maize production and marketing remains a highly sensitive sector, with the dual imperative of ensuring farmers receive high prices and maize remains available and affordable to consumers. As such, maize remains highly politicised, leading to attempts to support, suppress or stabilise prices, creating uncertainty within the sector. The government's role in the procurement of both domestically produced and imported maize, and its subsequent release at a predetermined price, Nzumu (2013) argues, is hindering rapid international price transmission, with approximately 30% of changes in world prices being transmitted to Kenya and the adjustment process functioning slowly.

On many occasions, the government has used the NCPB to influence producer prices. The price the NCPB buys and sells maize at is determined through the Ministry of Agriculture, Livestock and Fisheries, which usually announces maize prices above the market prices without consultation. This often results in criticism from the private sector that the government is interfering with prices. This price is used by the NCPB to buy the maize from farmers and benefits mainly large-scale farmers and traders.⁸

While producer price support programmes are seen as effective in reducing the costs of production and boosting producer prices, they benefit only a few well-connected traders and large-scale farmers while raising prices for maize consumers, including a majority of smallholder maize farmers, who themselves are net buyers of maize. It is important to note that the NCPB engages in the maize market only on instruction and with funding from the government, and there is conflict between its social and commercial responsibilities. The NCPB's market operations are obligatory policy decisions beyond its control, but these have elicited debate and strong protests from millers and large traders.

But the NCPB is also intervening upstream in the value chain, with initiatives intended to increase the use of inputs in maize production. Since 2008, the government has been importing over 60,000 MT of fertiliser annually through the NCPB in a bid to boost food security in Kenya. The fertiliser is sold to farmers in major producing regions at subsidised prices between 30% and 41% lower than commercial fertiliser. Through this policy, the Kenyan government controls approximately 20% of the maize fertiliser market and about 8% of the total 1.2 million MT for all agriculture. In 2008, after the food security crisis, the Ministry of Finance was asked to allocate more funds to increase the Strategic Grain Reserve from the 4 million bags (or 1.5 months of the national requirement) to 8 million bags

⁸ For example, for the 2010 harvest, the NCPB increased its buying price from KSh 1,600 (in July) to KSh 2,300 (in August/September) and later reduced it to KSh 1,850 for the October-December period (Kamau et al., 2012). These prices were 33% to 49% higher than prevailing wholesale prices in Eldoret. For 2011, the NCPB raised the buying price by 62% to KSh 3,000 between August and December. Analysis by Tegemeo found this action reversed the decline in wholesale prices and only stopped in January 2012 when wholesale prices decreased markedly after the NCPB stopped buying maize.

(or three months of the national requirement). The reserve has, however, never surpassed 3 million bags.

Within this context, the role of the NCPB has been controversial and the government has made efforts to assess its mandate, structure and influence. The NCPB and comparable organisations are, to quote Poulton and Kanyinga (2014), ‘not intrinsically bad, but often implement their policies in uneven ways, focusing on surplus producing areas and distributing to favoured groups’. Similarly, Argent and Begazo (2015) argue that reduced government support would allow for a reduction in grain prices by 20%, enabling a real income increase of 1.2% on average, with greater gains falling on the poor and an associated 1.8% reduction in poverty. This view is beginning to become more accepted within the Kenyan Ministry of Agriculture. According to a government official interviewed for this study, the system is not tenable in the long run:

‘One day there will be a conflict. The government is not interested in profit and the private sector seeks profits. So these two levels of pricing are already contested. Especially the millers want to buy at even lower prices. The pricing issue will bring conflict and in the long run the government will need to pull out. In 2008 the government had to come in following the drought, but in the long run the subsidy programme will have to be [removed].’

2.3.2 Devolution

The ongoing devolution process has added an additional layer of complexity to policy decisions relating to the maize value chain. In the recently devolved Kenyan government system, county government policies and regulations are significantly changing the organisation of local agricultural production, particularly in the areas of extension and education, input marketing policies, production support strategies and produce marketing. Of specific importance is production and marketing legislation proposed across the country. The nature and impact of these policies depend on whether a county is a net producer, a net consumer or a net processor of the target value chains. County government policies and strategies, institutions, levies and taxes, priority value chains and facilitation of value chain actors must be understood within the broad legal framework established to support county governments. These are elaborated in the County Integrated Development Programmes (CIDPs). Five acts and bills on devolution related to agriculture are either operational or pending in parliament.

There is a widespread feeling that, since devolution, most county governments have not prioritised agriculture, with most budget resources invested in infrastructure (roads, hospitals and schools). Similarly, a Ministry of Agriculture official argued that,

‘[...] in the past few years, devolution has brought a dip in our agricultural growth with many of the functions of value chain issues devolved and each county prioritising agriculture differently. [...] This will recover, but many county studies show negative impacts. They have not yet internalised the benefits of agriculture and there is too much focus on the visible hardware rather than on capacity-building. Originally, we provided backstopping to make sure technologies are being spread – mechanisation is required for meaningful agriculture. But this has stalled and so agriculture has suffered so we can have devolution.’

Other informants alleged the process of fiscal devolution was highly politicised, with vote-rich districts benefiting disproportionately.

2.3.3 The EAC regional integration process

The bulky nature of staple grains and the distances that must be covered to deliver them to storage or warehouses and final markets makes the value chain highly dependent on transport and communication infrastructure. The infrastructure needed for resilient and sustainable staple food value chains includes transport, energy, irrigation and drainage, milling facilities, collection and storage centres and information and communication technology (ICT). Storage and transport infrastructure, including roads, rail, depots and storage facilities, are major price and quality determinants along the value chains. This is particularly the case for regional cross-border trade, which is increasing rapidly in significance. The EAC Customs Union was officially launched in July 2009 to increase competition, expand markets, ease cross-border trade through harmonisation of national trade policies and enhance trade through the removal of tariff and non-tariff barriers. Imports from the EAC are free of duty and subject only to regulatory fees and levies according to the respective trade protocols.

With the steady elimination of tariffs, technical requirements are increasingly becoming the biggest impediment to trade in agricultural products. This includes sanitary and phytosanitary measures (SPS) and standards. To address these emerging concerns, under Article 81 of the EAC Treaty, Partner States recognise the importance of standardisation, quality assurance, metrology and testing for the promotion of trade and investment and consumer protection. Partner States enacted the East African Standardisation, Quality Assurance, Metrology and Test Act 2006 (SQMT Act) to harmonise requirements on quality of products and services and reduce trade barriers. The SQMT Act regulates trade in products produced or originating in a third country to facilitate industrial development and trade as well as promote health and safety and environmental protection.

Non-tariff barriers (NTBs) also comprise a wide range of trade policy practices applied by governments whose main aim is usually to restrict trade flows in order to achieve specific objectives, such as the protection of infant industry, a reduction in domestic supply of a staple foodstuff such as maize or consumer protection. NTBs can arise from unofficial actions of public officials (owing to inefficiency or corruption in the administration of customs duties), from the state of technology (e.g. inability to innovate in terms of telecommunication and management and information systems) or simply from poor roads and marketing infrastructure.

- To address NTBs, EAC Partner States have agreed on the following:
- Facilitation of trade by simplifying, standardising and harmonising trade information/documentation;
- Establishment of anti-dumping measures elaborated in the EAC Customs Union Protocol;
- Implementation of competition law and policy to deter trade-distorting practices;
- Exemption of re-exports from the payment of import or export duties;
- Agreement to remove all existing NTBs and limit the introduction of new NTBs under Article 13 of the EAC Customs Union.

It is notable that the common market will be pursued from a working Customs Union that also incorporates important elements of advanced integration stages, including already working cross-border movement instruments like the East African passport, harmonised macroeconomic policies, convertible currencies and a working capital market with cross-listing of stocks, among others. Informal cross-border trade has been a costly alternative to NTBs, but with the elimination of NTBs Kenya stands to

gain, especially on the cereals front. The regional bloc also stands to benefit from the elimination of NTBs and the enactment of the common market, as a larger combined population of about 140 million people offers a more economically viable market for local products.

2.3.4 Standards and moves towards regional harmonisation

With the maize market being predominantly informal in structure, grades and standards are rarely followed, as quality does not seem to be a major concern for wholesale and retail traders. Grain quality in Kenya is determined by moisture content, percent of broken grains, aflatoxin levels, foreign matter, pest infestation and uniformity. While traders and aggregators receive maize of varied quality from farmers and village assemblers, millers receive only maize that has been cleaned and appropriately dried. According to large-scale traders interviewed for this study, there is a big variance in the quality of maize from the various sources. Quality of grains from the large traders is better compared with that of grains from smaller traders and intermediaries. Quality also tends to be better for grains from large-scale farmers. Kenyan maize is generally of better quality than that from Tanzania and Uganda. However, there is rarely a market premium for quality maize.

Several different agencies have formal jurisdiction over the setting and enforcement of standards. The Kenya Bureau of Standards (KEBS) has the regulatory mandate to ensure compliance with the standards but lacks capacity to undertake this mandate. The Kenya Plant Health Inspectorate Services (KEPHIS) was established to undertake quality control services of agricultural inputs, plant variety protection and plant health. The Pest Control Products Board (PCPB) was established to regulate the importation, exportation, manufacturing, distribution and use of pesticides. Broadly, PCPB derives its strength from internal resources and capabilities that enable it to accomplish its mandate and achieve its strategic objectives.

The limited ability of regulatory agencies to govern agricultural value chains is evident in numerous complaints by farmers of industry malpractices, including sub-standard goods from suppliers, underweighting, under-invoicing and adulteration of goods. This is particularly prevalent in the inputs market, specifically in agrochemicals and fertiliser supplies. Most of these complaints fall under the gambit of KEBS and PCPB. The inability of PCPB to regulate the pesticides industry has left farmers at the mercy of all kinds of dealers in agrochemicals, making them expensive, ineffective and damaging to crops and farmer returns. Although Kenya has grades and standards for maize grain and flour, these are applied mainly for formally imported maize and large-scale millers. Maize traders and aggregators are generally of the feeling that the government is not doing enough to ensure maize produced in the country is of higher quality.

Overall, there has been only limited acceptance of standards so far. Policymakers hope that, with regional harmonisation of standards, this might change, although it is unclear whether this is likely to be the case. Keyser (2012) argues that, while harmonisation may help exporters, it will have some cost implications, including potential new inspection and certification requirements that will add to the total costs of trade and undermine competitiveness in food staples for the certifying capacities of different countries; also, standards may be too high for smallholder farmers to meet. The EAC has recently set strict upper limits and testing requirements for maize and other food staples with respect to aflatoxin and other quality variables. While a great deal of time and effort goes into standard harmonisation between countries (as opposed to, for example, mutual recognition), often domestic standards are neglected and the home market suffers from a lack of quality inspection.

Notwithstanding these criticisms, there remain – according to interviewees – major barriers in the adoption of standards, including limited awareness among small and medium-sized farmers. On the other hand, large-scale farmers, major traders and processors are generally aware of and easily adopt the standards. Furthermore, regulatory institutions such as KEPHIS and KEBS are located at border points to ensure standards and food safety. However, the staff of these institutions often lack awareness, ability and capacity to enforce the standards and food safety regulations. In most cases, there are no laboratories at border posts, resulting in only qualitative (visual examination) as opposed to laboratory tests. Finally, in most countries in the region, interpretation of grades varies. This is attributed primarily to different sampling and testing procedures; different sources of equipment; lack of a reference laboratory in the region; missing terminology definitions; and lack of price premiums for those who meet the standards. As such, many informants felt there was a need for training on standards.

2.4 Supply-side constraints to the functioning of the maize value chain

Before turning to the specific case study analysis of warehousing, it is worth summarising some of the main constraints to the proper functioning of the maize value chain as it currently exists. These include not only issues of insufficient transparency and price uncertainty linked to government interventions outlined above, but also broader supply-side constraints, including a lack of reliable market information, escalating input costs, unpredictability of income for farmers, inadequate institutions to support the grain market and unavailability of grains for small millers (Ogives, 2015).

However, beyond this, infrastructure constraints remain a large problem. The maize value chain is heavily dependent on rural accessibility through transport infrastructure, from the distribution of bulky inputs like fertilisers and seed and the provision of mechanical services to moving outputs to markets. The availability and condition of access roads and transportation systems are key factors influencing the structure and performance of the maize value chain. Poor roads, for example, increase transportation costs and lead to higher inputs and services prices, lower producer returns and higher consumer prices. Banful (2011), for example, estimates around 50% of market fertiliser prices across Sub-Saharan Africa can be attributed to transaction costs (including transportation) compared with only 20% in Thailand. In Kenya, Short et al. (2012) estimated transport costs constituted up to 50% of the market access costs to Nairobi and approximately 15% of the wholesale price of maize produced and shipped from western Kenya.

Kenya's ports and rail are considered of lower quality and more expensive than the average for Sub-Saharan Africa and low-income countries. Kenya's logistics problems are, however, less about the gauge or state of the railways than they are about inefficiencies related to mismanagement, inadequate investment in rolling stock and corruption. How the proposed new rail system will change these is unclear. Beyond the general transport situation, interviewees also voiced concerns about the quality of trucks. One non-governmental organisation (NGO)-operated warehouse official said,

'The roads are okay. It is the trucks that are the problem. [...] It is KSh 200 per bag transported for 100 km. The truckers collude to set the price at this level. For instance, the cost of fuel varies a lot but it is never reflected in the transport prices.'

This analysis also holds true for broader East African transport integration, as Hoffman and Kidenda (2014) find, where there remains little investment, and currently the region's road network has too much traffic, which has led to damage from overloading and high road maintenance costs. The EAC has taken major steps to improve transport, including the removal of roadblocks; weighbridges; more efficient administrative procedures; axle load limits standardised throughout the EAC; partial implementation of the Single Customs Territory; and increasing the power of trade associations to influence policy design and implementation, but there are still major gaps. While some improvements have been made – particularly in the removal of NTBs and reducing transit time and road quality – there remains limited financing for infrastructure needs, with congestion at ports and in major towns, under-resourced railways and an institutionally weak EAC that struggles to coordinate regional infrastructure plans.

Power also remains a significant problem. Kenya does not generate enough electricity to meet demand, nor does the national monopoly, Kenya Power and Lighting Co., distribute the available electricity efficiently. National grid coverage remains woefully low and most rural areas are hardly covered, although coverage has improved in recent years. In most rural areas, frequent power shortages and outages are the norm. Where electricity is available, it is too expensive for most households and businesses. The Kenya Rural Electrification Programme was supposed to alleviate some of these bottlenecks but financial constraints mean progress has been slow. Without adequate and reliable electric power, in most rural areas agro-processing and value addition will remain difficult and expensive.

Rural agricultural market facilities are predominantly open air or semi-permanent buildings. Approximately 67% of maize produced is stored on-farm either for home consumption or for sale at a later date. Because of insecurity and investment capital considerations, the temporary storage facility is oftentimes a room reserved in the main house or a separate house in the homestead. These structures tend to be humid and thus provide perfect conditions for mould growth and aflatoxin contamination. While improved granaries built from wooden walls and iron roofs are more cost-effective and efficient for short- and medium-term storage, less than 15% of smallholders use them or other improved storage technologies.

Only 103,000 ha of Kenya's land area (2% of total arable land and 5% of total maize area) is equipped with irrigation infrastructure, and irrigated maize production is uncommon. In the *Vision 2030* development plan, Kenya plans to expand the area under irrigation to 300,000 ha through rehabilitation of dysfunctional irrigation schemes and construction of dams and small-scale water pans. Although new funding toward this initiative has been included in annual fiscal budgets since 2008, historical experience gives little confidence that irrigated area, especially for maize, will expand significantly in the foreseeable future. Also, the availability and cost of water will significantly increase production costs. Demand for water especially by the population will hinder irrigation development.

Small intermediate traders and millers use various facilities but mostly for short-term storage. A preference for quick turnover among traders makes storage a temporary need. Sitko and Jayne (2014) suggest storage is not a major constraint among rural traders and assemblers. Existing purpose-built warehouse capacity for long-term storage is adequate. For example, most NCPB storage and warehousing facilities across the country are currently underutilised, besides being inaccessible to smallholders. Section 3 discusses these further.

Overall, the poor state of roads and other infrastructure contributes to high production costs, low yields, low sale prices, high post-harvest losses, poor-quality produce and low returns. The decline in investment in rural infrastructure, such as rural access

roads, has affected rural marketing and undermined the ability of smallholder farmers to receive better market prices, while increasing waste.

3 Reducing risks through warehouse certification and receipting systems

3.1 The function of a warehouse certification as a risk management tool

Warehouses are a core part of the infrastructure to facilitate the functioning of the food supply chain. They can be managed under various schemes; we focus here on two types of warehouses in Kenya: state-owned and state-operated warehouses and private warehouses that are certified by a non-governmental membership organisation, the EAGC. The benefits of developing access to certified warehouses and warehousing systems and services include access to financing; post-harvest loss mitigation; promotion of quality management, grading and certification services; price risk mitigation; trade facilitation; and public food reserve management.

State-owned warehouses are used primarily for grain storage in order to ensure access to staples in emergency situations. They are managed by the NCPB, with over 118 warehouses spread across 46 of Kenya's 47 counties, and are reported to have a capacity of about 2 million MT (21 million 90 kg bags) of grain at any given time. Of this capacity, 25% is bulk handling in silos, while 75% of the grains are stored in bags.⁹ The concentration of the facilities is linked to the major grain production areas. The NCPB currently uses only about 60% of its storage capacity. The remainder is leased to grain millers, traders and development partners and NGOs such as the World Food Programme (WFP). There is also a strong presence of storage facilities in food-deficit areas.¹⁰

Certification means warehouses must meet strict specifications related to their construction, operation, management and insurance. Certified warehouses will accept only grains meeting specific quality requirements, ensuring they can be stored for months and will not contaminate other grains. Certification is therefore a signal to stakeholders in the value chain of the quality of the stored goods in the warehouses, ensuring the option of using stored grains as collateral. This brings together the depositors (who can be both farmers and aggregators), warehouse operators and an insurance provider. The development of a functioning WRS also requires the involvement of banks and other financial institutions. The use of a warehouse operator helps prevent conflicts of interest and is a guarantee for banks that goods will not be sold to multiple actors and products will be stored under specific standards. Under certain schemes, warehouse operators are also the aggregator. This

⁹ This is based on information received from NCPB officials.

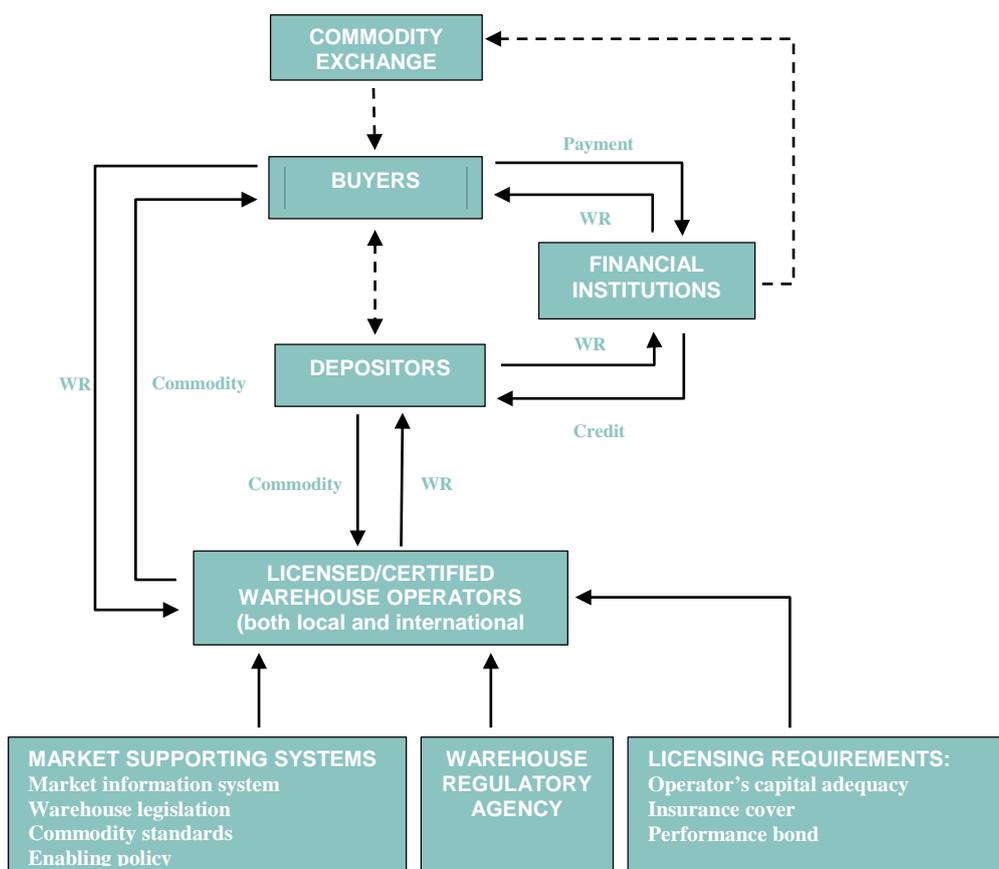
¹⁰ However, according to interviewee accounts, of the 2 million MT storage capacity, only about 1.7 million MT is currently in a usable condition, as many of the facilities are very old and cannot be used and some are located in remote areas and rarely receive grain.

is usually the case for farmer cooperatives, where aggregation is carried out among designated leaders within the group.

Within a WRS, warehousing facilities are provided to farmers for a period not exceeding 12 months. Within this time, they can fetch higher prices for their produce from diverse markets. Receipts can be used as collateral for credit from participating banks. Thus, the WRS is intended simultaneously to increase access to finance, reduce post-harvest losses and stabilise produce prices. Other studies claim warehousing shortens marketing chains by allowing producer groups to sell directly to processors, large traders, exporters and importers (Coulter and Onumah, 2002; Onumah, 2003).

The licensed/certified warehouse operator issues warehouse receipts representing goods weighed and graded (stating quality and quantity on the receipt). The depositor can sell directly to buyers or through the commodities exchange – with the warehouse operator guaranteeing delivery of specified quality and quantity against the receipts. Where finance is needed, the depositor pledges the receipt to a lender and later arranges sale either through the commodities exchange or directly with a buyer who makes direct payment to the lender to obtain the receipts that allows him to take possession of the underlying commodity. In case of default, the lender can sell the receipt through the exchange – the financing contract should allow the lender to liquidate the receipt without litigation (see Figure 4).

Figure 4: Schematic of regulated warehouse receipt system



Source: Onumah (2010).

If properly implemented, this would have the following benefits (Coulter and Onumah, 2002): i) less cheating on weights, benefiting smallholders; ii) reduced storage losses; iii) easier access to finance; iv) injection of needed liquidity; v)

reduced trade margins; vi) reduced price variability; and vii) producers able to mitigate price risks. There are three primary systems for WRS, including an unregulated commercial WRS, an NGO- or donor-funded inventory credit system and a regulated WRS (Onumah, 2012).¹¹

A functioning WRS, Giovannucci et al. (2000) argue, relies on a few key aspects for success:

1. Prices should increase after the harvest season in order to cover storage costs. This is generally not the case if government intervention protects the market through subsidies.
2. Good information must be available on prices and crop forecasting for sound decision-making. Forecasts help anticipate price fluctuations and supply and demand.
3. Legal infrastructure needs to recognise warehouse receipts as equivalent to stored commodities.
4. An adequate licensing and moderating system is necessary to ensure they meet basic physical and financial standards.
5. Adequate grades and quality standards must exist to assess the quality of the commodity.
6. The country must have a viable storage industry.
7. There needs to be system to guarantee the performance of warehouses.
8. Finally, it is essential that banks, which provide the finance, trust the system.

This results in a clear set of roles for the different players involved, with public authorities responsible for passing laws, setting up licensing systems, establishing a performance guarantee system and working with the private sector to establish quality standards. Farmers and processors should have ongoing feedback and know the ins and outs of the system. Local banks should have clear internal procedures, including a system for monitoring commodity prices. Finally, international institutions should support institutional development, train warehouse operators and inspectors, advise on draft legislation, help set up performance guarantee systems and draw on best practices from other countries.

In this context, there are significant gaps in the functioning of the WRS in African countries, because – as Coulter and Onumah (2002) argue – government institutions are not as well prepared and reliable, there are fewer effective farmer organisations, banks are sceptical, making access to finance even more difficult, and financial sustainability is harder to achieve in circumstances when outputs are low. Similarly, Lacroix and Varangis (2012) argue there is generally a lack of incentives for the development of a private storage industry owing to government intervention in agricultural markets – usually by setting prices that take insufficient account of price variations over time or in different regions to allow for profitable storage; lack of an appropriate legal, regulatory and institutional environment to support a system of warehouse receipts; and limited familiarity of the country's commercial, including banking, community with warehouse receipts. In order to work, warehouse receipts

¹¹ These are differentiated as follows: in an unregulated WRS, collateral management services tend to be offered by local subsidiaries of international inspection companies, with inspection companies setting up tripartite collateral management agreements involving a bank, the borrower and the collateral manager (i.e. the inspection company acting as warehouse operator). In most NGO-sponsored schemes, the warehouses, which have very small storage capacity (some as low as 20 tonnes), are located in villages and are managed by the farmer groups, sometimes in conjunction with microfinance institutions, which provide the inventory credit. The NGO involved in the programme usually provides training for the depositors and may finance construction of the warehouse. In a regulated WRS, the independent regulator is responsible for licensing/certifying warehouse operators as custodians of collateralised stocks (ensuring they comply with criteria set in relevant laws and regulations); regulating the issue of standardised warehouse receipts to minimise the risk of fraud; and overseeing the operations of warehouse operators (including carrying out unannounced stock and quality verifications). Licensed/certified warehouse operators may include international as well as local inspection companies, private warehousing companies and processing companies with adequate storage capacity (e.g. cotton ginneries and coffee-curing factories that process for a fee).

must be recognised by law, have performance guarantees, and come with warehouse inspection and crop quality determination. However, the fact that farmers are also warehouse operators creates a potential conflict of interest and banks are unwilling to support the creation of WRS with such warehouses.

Kenya is, thus far, not the only country that is in the process of establishing a WRS (see Coulter, 2009, for an overview). In Zambia, a regulated WRS was introduced in 2001 by the Common Fund for Commodities and the National Resources Institute. This project helped stakeholders establish a non-government regulatory institution (the Zambia Agricultural Commodities Agency) responsible for ensuring warehouses' compliance with regulations and enforcing commodity standards. In Tanzania, the licensing board in the Ministry of Industry, Trade and Marketing has registered 20 warehouses. The system has made a generally successful start with paddy rice, but has failed with maize, mainly because of higher government involvement in the market and farmers' difficulty in foreseeing price movements. Uganda, through the Ugandan Commodity Exchange (1998) and the WRS Act (2006) and Regulations (2007), has established grading standards and a system of electronic warehouse receipts for maize and beans.

3.2 The history, structure and impact of WRS in Kenya

3.2.1 The evolution of a dual WRS system through the NCPB and the EAGC

The Kenyan WRS was developed in response to cereal marketing difficulties, including inadequate on-farm storage facilities, post-harvest losses and limited capacity of farmers to gain access to alternative market outlets, leading to a loss of an estimated 21.1% of annual maize production through poor harvest handling techniques. These challenges often prompt farmers to offload all their produce in the market soon after harvests, and in many cases their produce has fetched low prices because of excess supply. It was in an effort to mitigate this that the government and other parastatals developed the grain WRS (Njehia et al., 2013).

Warehouse receipting was introduced in Kenya at a time when the main staple food, maize, was going from a period of excess supply to a period of shortages. The main commodity market at the time was the Kenya Agricultural Commodity Exchange (KACE). This was underutilised despite its huge potential in trading in cereals, maize, potatoes and horticultural produce. The East African region was considering opening up common markets under the EAC. The envisaged commodities exchange market would be operated by trading in warehouse receipts using the same principle as shareholders at the Nairobi Stock Exchange trading in shares. This would create a new investment opportunity for all Kenyans (RATIN, 2010). In Kenya, low producer prices had shifted to high consumer prices and impromptu government directives in some cases were distorting the maize market. Maize growers in most parts of Kenya were receiving bountiful harvests, helped in part by the government's National Accelerated Agriculture Inputs Access Programme and its maize marketing interventions to extend the gains of the programme (FAO, 2013).

Currently, the country functions with a dual warehousing system – one operated by the government through the NCPB and one through the EAGC. Most of the NCPB storage facilities, described above, do not meet the standards for WRS as set by the EAGC, the other primary WRS operator. Many warehouses still use chain elevators as opposed to modern conveyors, which results in high grain breakages. The NCPB mainly buys grains for the Strategic Grain Reserve and for price stabilisation. Since the NCPB also targets grains and maize for livestock feed and the maize may stay in storage for more than three years, there is a general feeling that the standards for such purchases are lower. According to interviewees, there are complaints that it is

primarily large-scale farmers and traders who benefit most from NCPB purchases, with little trust from smallholder farmers in the government system.

The EAGC's WRS was rolled out in April 2008 on a pilot basis for maize grains with one warehouse (Lesiolo) in Nakuru. The pilot was funded by the UK Department for International Development (DFID) through its Financial Sector Deepening (FSD) project, which supported the WRS system in partnership with the EAGC. The system was also supported by the Swedish International Development Cooperation Agency (Sida) and the US Agency for International Development (USAID) at different stages, with the EAGC in charge of ensuring warehouse quality and the honouring of warehouse receipts as collateral.

There were intentions to introduce other commodities at a later date, such as wheat, beans and fertiliser and other agricultural inputs. This would ensure more farmers access better prices and further sustain warehousing system operations throughout the year. Sida offered financial support from August 2008 to support the EAGC to develop, promote and influence structured grain trading systems in Eastern Africa. USAID's RATES and COMPETE programmes have supported capacity-building of farmers and traders with the intent of reducing barriers to grain trade and helping stakeholders adopt international quality standards that make them more competitive in regional and global markets. The aim of the project was to develop a sustainable WRS that will provide collateral to enable short-term lending to grain farmers. The Kenya Maize Development Program (KMDP) was also instrumental in supporting the EAGC and in linking small-scale maize producers directly through their organisations to markets.

The EAGC established a system for certifying warehouses to receive grain deposits and issue transferable warehouse receipts. A conventional set of certification criteria was developed covering capital adequacy; insurance cover with certification provided on the basis of documentary information and due diligence of inspection companies; and requirements set out online. In 2011, the Alliance for a Green Revolution in Africa (AGRA) also began to provide funding to support WRS. Between 2011 and 2014, the EAGC certified 12 warehouses with cumulative storage capacity of 17,000 MT valued at \$1.9 million as fit for use as WRS. AGRA support ended in July 2014, and, according to discussions with the EAGC team, it feels the system can be sustained through certification fees and fees for grains being stored. AGRA support was mainly to scale up the WRS, to widen its scope and to create the enabling environment for the WRS. AGRA funds were also used to build stakeholder capacity (especially that of producers/depositors and warehouse operators). In 2011, with AGRA support, 11 warehouses were certified as meeting the WRS criteria.

The EAGC's presence extends beyond Kenya. According to EAGC interviewees, the system works well in Uganda in the case of maize because maize is mainly grown as a cash crop. In Tanzania, the WRS has succeeded well on coffee and cashew nuts but failed for maize. The EAGC WRS is seen as a potentially effective platform to link regional trade, but this depends on the conditions, such as certification and standards adherence. With respect to the EAGC system, the organisation has been working on involving smallholder farmers in the WRS. The problems of bank support, often the bane of a nascent WRS, appear to have been largely overcome, as one bank has already committed to the product and a further four are interested.

The two types of warehouses have very different functions and impacts. For the EAGC warehouses, there tend to be very clear guidelines and standards, with post-harvest loss assumed to be in the area of 0.2% and significant income increases for farmers utilising these. For NCPB warehouses, post-harvest losses are approximately 30% and farmer incomes are significantly lower. As such, the government system is

primarily seen as a political tool, with banks currently unwilling to lend against receipts from NCPB warehouses, as no legal recourse is available.

3.2.3 Information service providers

For the WRS to enable farmers to decide when to sell, and in which market, there is a need to properly monitor market prices. In Kenya, prices are currently monitored by the Ministry of Agriculture, the Regional Agricultural Trade Intelligence Network (RATIN) and KACE. Price and market information is available through print and electronic media. For instance, the EAGC, through RATIN, provides timely and accurate regional grain trade information, including on wholesale prices, supply and demand projections and regional cross-border grain trade flows. However, optimal use of RATIN's trade information has been hampered by disparities in data collection, analysis and dissemination.

Locally, KACE provides daily prices for a variety of commodities from different parts of the country.¹² The prices are also available through mobile telephone for registered users. In addition, when growers need instant cash, they sell maize at the farm gate to middlemen at a throwaway price instead of marketing the produce through warehouse receipts. Similar observations (of rice, maize and wheat farmers) have been made in the recently introduced WRS by the government.

To overcome the stated challenges, KACE is supporting smallholder farmers to organise themselves into marketing associations in order to cost-effectively access market and information services provided by the exchange. This allows them to consolidate supplies of marketable quality commodities for offer through the exchange and to purchase inputs in volume to achieve economies of scale. In addition, KACE's electronic market information system, the Regional Commodity Trade and Information System, is providing market information throughout the East and Central Africa region to promote regional trade.

Grain hubs are collectives of supportive businesses and services owned by farmer organisations that help member farmers manage the collection, distribution and marketing of their products. While grain hubs can help farmers bring their products to competitive markets, they often do not have enough capital to provide an immediate payment for products on delivery – a necessity for small farmers, who generally sell crops when they are in need of cash. Currently, there are 15 grain hubs in Kenya. In order to incentivise more local farmers to sell their products to grain hubs, the Procurement Governance for Home-Grown School Feeding (PG-HGSF) project has partnered with the EAGC to pilot WRS. Six of the project's 15 grain hubs in Kenya are, at the moment, getting certified by the EAGC to participate in the WRS.

Through the WRS, smallholder farmers can access professional storage services from certified grain warehouses at minimum cost. The grain hub can then use collected products to participate in school feeding tenders. Certified warehouses also attract large volume buyers such as the WFP, which often offer better prices than buyers at local markets, given the quality and quantity of products certified warehouses guarantee. In Kenya, the resulting systems will resolve cash flow issues for farmers

¹² KACE is a private sector firm that has been in operation in Kenya since 1994. It has made significant contributions to agricultural marketing in the country and to smallholder farmers by i) linking producers and buyers of agricultural commodities and ii) providing market information for commercial actors within the sub-sector. However, KACE faces several challenges, including i) the poor quality of produce farmers deliver, combined with the fact that most small-scale farmers find it difficult to deliver in bulk, which is ideal for an exchange; and ii) the fact that most commodities in Kenya are heavily regulated by boards and are grown and marketed in an environment of struggling cooperatives, which are inefficient and mismanaged and have cumbersome internal bureaucracies. That said, in some cases information systems are more informal. One farmer interviewed asks for advice directly from the warehouse operator and sells based on whether he assumes prices will increase.

and hubs, enable smallholder farmers to access the business services of hubs and provide farmers with a reliable way to participate in competitive markets.

3.2.3 Financial service providers

Financial institutions are important actors in the maize value chain, funding a number of activities, including farm inputs, trading and processing, and are critical to ensuring the WRS can be operational. A number of factors affect smallholders' access to financial services. Some find the loan application process tedious; others fear the consequences of defaulting. Since most smallholder farmers can access loans only as a group, one farmer defaulting has consequences for all group members. Financial institutions are also reluctant to lend to agriculture in general, which they perceive to be risky, and to small farmers in particular, given the lack of collateral and the high cost of servicing small loan amounts. However, many farmers also remain reluctant to borrow against the warehouse receipt and feel the WRS is a risk. Many do not like loans as they believe they interfere with their financial status and are difficult to repay. This is not unreasonable, with many loans having annual rates of 18-20%. This, according to one interviewee, is a much larger national problem, with the government needing to address the credit market for smaller borrowers.

Financial institutions also fear the high risk of unsecured credit and the high unit cost of servicing small loans. This requires training bank staff and establishing clear internal procedures, including a system for weekly monitoring of prices of commodities used as collateral. Several banks, including Equity Bank, KREP FSA, UNITAS SACCO and Chase Bank, have shown interest and started participating in WRS. For one Chase official interviewed, this is becoming a flagship project, with the volume of warehouse finance increasing significantly year-on-year. Other financial institutions such as TNB and ABC are also becoming involved. Warehouses that already have an established relationship with financial institutions are most likely to be seen as credible participants at the outset, with acceptability widening once the scheme is shown to operate reliably.

As mentioned in the previous section, banks remain uncomfortable lending against NCPB warehouse receipts. While the NCPB had initial arrangements with Equity Bank to engage in the WRS, this was stopped. As many banks are reluctant to provide loans to individual smallholder farmers for production and farming, the government has recently begun to enter into agreements with some banks that give farmers loans in kind (input subsidies) as well as in cash. However, the farmers must be in groups and therefore do not require collaterals. Furthermore, banks are reluctant to finance farmer-owned warehouses, as they prefer a clear separation between the owner of the grain and the warehouse operator to mitigate risk.

3.2.4 Initial assessments of WRS impact

As discussed in Section 3.1., the WRS has the potential to provide an important service to mitigate risks, reduce post-harvest losses and ensure farmers receive more competitive prices. As such, it provides a key aspect of trade-related infrastructure that can benefit smallholders. The EAGC system has attempted to specifically integrate smallholder farmers, with substantial increases in participation seen year-on-year. However, the number of farmers participating is still only in the several thousand.

Detailed evaluations of the poverty impact of the warehousing system are still lacking, but some initial results are available. Njehia et al. (2013) looked at the socioeconomic factors influencing farmers' participation in grain warehouse, focusing on Nakuru district. They found six variables strongly influenced this. Specifically, utilisation is more likely for i) male smallholders; ii) smaller households; iii) those closer to warehouses; iv) larger land size; v) higher off-farm

incomes; and vi) participation in farmer groups. As a result, they recommend strengthening farmer-owned organisations, empowering women in agriculture, promoting diversification to enhance household income, making grain driers and collection points available closer to farmers and reducing storage costs and interest on loans.

Similarly, a study by the Kenya National Federation of Agricultural Producers (KENFAP) (2011) examined several banks and their attitudes towards the WRS, identifying constraints to smallholders when seeking finance and insurance. While banks and insurance companies have refocused their attention towards agriculture and have consequently developed products for the sector, services are largely not accessible to smallholder farmers. KENFAP estimates that 90% of beneficiaries of WRS in Kenya are large-scale farmers and only 10% of smallholder farmers in organised groups have access to storage. They advise that more capital investments are necessary to facilitate access, as well as pointing to the need for a regulatory agency to harmonise infrastructural development in rural areas through significant investments, in some cases involving rehabilitation or building of storage facilities.

Finally, based on information from an ongoing evaluation, which is in its final stages, it seems the minimum quantity required for deposits means smallholder farmers cannot access these individually. However, there have been more farmers willing to aggregate within cooperatives to ensure they reach the minimum tonnage to access warehouses. In the eyes of some interviewees, this trend should be further supported through a hubs-and-spoke model, with smallholders aggregating production and then delivering to warehouses (see Box 2). As such, one EAGC-certified warehouse visited claimed to have over 80% of its maize sourced from smallholder farmers that had organised themselves into groups. Indicative evaluation results also suggest farmers have been able to increase their productivity substantially as they can buy inputs at critical points during the season.

The evolution of a hubs-and-spokes model through farmer cooperatives and community-based organisations

While still in its nascent stages, there has been a push by several community-based organisations (CBOs) with the support of the EAGC to aggregate grain locally and then use certified warehouses collectively. In the words of one farmer near Eldoret who has begun operating one of these aggregation centres,

'It was very difficult to bring this to market – most farmers had five to 10 [90 kg] bags and transportation costs would take up two bags. So the farmers were always at the mercy of middlemen who exploited them. They know they cannot access markets and come right at the harvest with a very low price. For example, in 2014, the lowest prices paid by these middlemen were KSh 1,400, while millers were paying KSh 2,200-2,500 and the NCPB up to KSh 2,800. With a cost of production of KSh 1,200-1,800 (including ploughing, bags, seeds, etc.) this means the margin of profit is minimal. And most farmers could produce about 22 bags/acre.

'We allow them to borrow at interest rate of 10%, we help them bring in the maize, clean and repack. We also provide the fertiliser through the government support programme and we offer capacity-building. The CBO buys from members who want to sell, not deposit it. Generally, we look at the market price, the trader price and the NCPB price and come in somewhere in the middle. There were very few initially – we had problems of trust and fears about mismanagement. So they worried that, if it is deposited, how will it be taken care of, etc. But it has grown. In 2006 we had 600 bags, in 2013 it was 1,200 bags and in 2014 it was 3,000 bags.

The EAGC is a trustee of our CBO. We collect and aggregate here. Then we bring it to the warehouse operator to receive the maize, grade it, etc. There we get an EAGC-certified warehouse receipt, which we can take to the bank. The bank gives us 65% of the deposit based on current market prices. We deposit this as a CBO and have an elected board that makes resolutions on how to handle maize, makes payments to the clerk, etc. This has three benefits. First, we no longer have the problems with traders. Second, they don't spend money as irresponsibly, because they first get 65% in the harvest season but then they can also buy fertiliser and seeds or pay for their children's schooling. The remaining 35% comes later. Third, if the price of maize increases, they can improve their livelihoods. Fourth, they get the real weight from the digital scale – often the traders will use tampered scales.'

3.3 The political economy of WRS regulation

3.3.1 Developing a legal framework

The issues discussed in the previous section point to the fact that not just infrastructure investments will be necessary to enable greater smallholder benefits from the emerging WRS. Under the status quo, there are substantial barriers to scaling up the system and making it more inclusive, with the development of a clearer legal framework seen as the single most important need in the growth and acceptance of warehouse receipts in Kenya. In order for a WRS to be viable, the legal system must support the receipts as secure collateral (FAO, 2013).

This is linked to a broader dynamic – the 'credible commitment problem' – integral to the political economy of agricultural policy in many African countries (Tschirley and Jayne, 2010). Based on past experiences, there is a deficit of trust between government and private sector actors, with no third party to provide guarantees or predictability (see Engel and Jouanjean, 2013). Beyond this, in Kenya, as in many other countries, food staples have a strategic function and are central to the social contract. Agricultural policy tends to favour urban consumers over rural producers, with the latter often concentrated in cities, where political action, coordination and enforcement costs are more favourable than in the rural areas where farmers reside (Anderson et al., 2013). This credible commitment problem is thus central to the inadequacy of functional grain storage options, and, paired with private sector concerns over manipulation of national crop production estimates and food balance sheets, this exposes the private sector to risks of financial losses and leads to reluctance to invest.

In this context, the slow movement towards a clearer regulatory framework governing the WRS has been an important step forward. Legal experts have been reluctant to endorse this type of financing without a formal set of rules and regulations in place. This demonstrates the need for a law that clearly outlines the rights, liabilities and duties of each party to a warehouse receipt, including the farmer, the bank and the warehouse employee. Producers, traders and bankers also need maize pricing parameters in order to make appropriate credit decisions. The existence of a law that defines the parameters of warehouse receipt financing would give banks more latitude in adopting the appropriate policies and procedures for the development of lending and collateral management strategies. In addition to ensuring warehouse receipts are freely transferable by delivery and endorsement, the warehouse receipting law should clearly define collateral security issues and be made complementary to other statutes governing financing and the security interests of creditors.

At this stage, this political process has moved forward, albeit slowly, as it intricately relates to the future government role within grain markets (and specifically that of the NCPB). There have been proposals to split the agency into three entities – a commercial arm, a strategic body and one that manages the WRS – since under the current model the WRS will not work owing to the price disruption frequent and unpredictable government interventions cause. In this regard, the cabinet (represented through the Ministry of Agriculture) may be seeking a more liberalised system than the NCPB may be willing to cede.¹³

The regulatory process has been supported by the International Finance Corporation (IFC) and other donors, and it is hoped that, despite these obstacles, a new WRS will be passed by parliament by late 2015 or early 2016. While in the view of the EAGC the bill was developed with insufficient consultation and ignored stakeholder views, it is – in the eyes of observers – sufficient to address the overarching problem of legal uncertainty.¹⁴ However, this will also have to in some form provide a framework for the future of the parastatal NCPB and, more importantly, for the role of the Kenyan government within grain markets.

3.3.2 Moving towards a regional commodity exchange?

One initiative that has been repeatedly put forward to address the lack of transparency in grain markets (and commodities writ large) is the establishment of a regional commodity exchange. Such an exchange requires the implementation of harmonised standards (or at least mutual recognition) within the region as well as adequate storage capacity. The standards harmonisation that occurred in the EAC as well as the development of certified warehouses is a first step towards the introduction of a commodity exchange in the region.

The introduction of the commodity exchange, through the Kenyan Capital Market Authority, is seen by banks and traders as a way of limiting government involvement in price formation and allowing traders and producers to trade freely on a daily basis.¹⁵ The commodity exchange platform would work directly with traders and farmers, in a complementary process to the WRS.¹⁶ As such, the exchange would be an important signal to improve transparency, with actors along the chain aligning with the price set in the exchange. For this to work, improved market information and a high level of transparency are important.

However, this process been mired in controversy in past years. The Kenya Institute for Public Policy Research and Analysis (KIPPRA), one of Kenya's leading think-tanks, was commissioned in 2012 by the Ministry of Agriculture to determine whether Kenya was ripe for a commodity exchange (Laibuni et al., 2012). It found Kenya could not sustain a commodity exchange market, owing to:

- Limited produce supply;

¹³ Another issue pertains to ensuring the proper maintenance of infrastructure. Currently, the EAGC is charged with regulating the commodities warehousing scheme, setting the rules and admitting new members. It undertakes two main regulatory functions: i) ensuring participating warehouses are suitable both in infrastructure and systems, have sufficient insurance in place to provide protection to those who own warehouse receipts and those who finance warehouse receipts and organise periodic inspections to verify grain and warehouse receipts; and ii) ensuring that EAGC warehouse receipts are issued in accordance with warehouse receipt protocols, maintaining a register of warehouse receipts including ownership and lien information and transferring receipts into new ownership.

¹⁴ Further concerns raised by private sector actors related to the identity of the regulator (i.e. whether this should be the a parastatal linked to the NCPB or should be left to a non-governmental entity). Disputes also revolved around whether the exchange should be broadened to other, non-agricultural, commodities.

¹⁵ Although the government appoints directors to the Capital Market Authority, the authority is an independent institution and operates according to global standards.

¹⁶ The establishment of an exchange may even make the WRS law irrelevant according to the new setting of the law, as everything would go through the commodity exchange.

- Weak transport infrastructure to bring goods to the exchange and as well as uncertainty about the regulatory climate;
- Lack of assurance on quality and quantity;
- Lack of effective insurance coverage;
- Limited weather stations to receive accurate weather information for insurance purposes;
- Limited use of the available price information data by producers. Price data from RATAIN and other sources are available but whether farmers have benefited from these is yet to be known.

While the EAC region has harmonised maize standards, interviews highlighted the difficulty in implementing such harmonisation in the region. Various issues were mentioned but in particular different interpretations of standards between countries in the region (e.g. on grain colour), but also a lack of capacity, with not enough skilled staff for grading processes.

It is possible that in the interim some of these issues have been addressed, and the EAGC has – as in the case of the WRS – been pushing for the establishment of an exchange. As with the WRS, it will be necessary to establish a functional regulatory framework and also to minimise the interventionist role of the Kenyan government in grain markets to ensure trust in the price formation process. As such, some interviewees have argued it may be better to start this system with crops that are less politicised and have a lesser significance as consumption goods (such as coffee and other cash crops) and move to maize later. That said, Kenyan policymakers have taken note of the establishment of a commodity exchange in Kigali and are keen not to be left behind in this process. Thus, a regional exchange could address the already vibrant regional trade, as long as the highly varying levels of product quality can be addressed, with Kenyan millers interviewed for this study who import grain from other EAC countries arguing that grains from Uganda and Tanzania tend to be of much lower quality.

4 Conclusion and discussion

Modern national and regional value chains have emerged simultaneously with urbanisation in most developing countries. The process of modernising these value chains entails increasing the organisation and coordination among stakeholders, as well as a degree of institutionalisation. In particular, such chains require the standardisation of the quality and safety of products to allow for the reduction of transaction costs along the value chain, and to meet consumers' demand. Access to enforcement mechanisms and infrastructure is equally necessary to guarantee the level of quality and safety required.

In the specific case of Kenya, there have been substantial changes to the maize value chain in recent years, particularly as it pertains to the role of government and the opportunities and risks entailed in the EAC regional integration process. A central feature of this has been the greater reliance on public–private partnerships, of which the EAGC warehousing system is a central example. The WRS has the potential to provide an important service to mitigate risks, reduce post-harvest losses and ensure farmers receive prices that are more competitive. As such, the WRS provides a key aspect of trade-related infrastructure that can benefit smallholders. However, while there are indications that this is in fact happening for participating farmers, the number of these farmers is still small and aggregate impacts are still modest.

This demonstrates the importance of combining hard infrastructure with services to make value chain creation more inclusive and to maximise linkages to domestic economies. In this context, it will also be important to link the warehouse system to improvements in complementary infrastructure – most notably power generation, a process currently supported by heavy investments by the Kenyan government. Further, a functional EAC-wide WRS could also function as a precursor for a regional commodity exchange.

The EAGC system has attempted to specifically integrate smallholder farmers into the WRS, with substantial increases in participation seen year-on-year. However, the number of farmers participating in the system is still limited to several thousand. The new WRS, and particularly the complex political process accompanying it, holds great potential for a more inclusive and transparent value chain for smallholders that moreover allows for greater value capture. However, this entails many ifs – at this stage accessibility for smaller farmers remains limited and primarily traders and larger producers are benefiting in the absence of increased financing, as well as the improved ability of farmers to either deposit smaller amounts or aggregate at the local level.

Furthermore, trust is central here: the dual system of warehouses with highly different outcomes highlights that trust and a legitimised certification process are central to address market failures and facilitate other benefits from a functional warehousing system beyond the financial gains from time arbitrage enabled through storage, including improved quality and reduced post-harvest losses. Finally, the

substantial levels of state intervention in maize price management complicate the levels of trust required for banks and warehouse operators to engage in the system.

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