Final report UGA-25238 August 2025

Storage constraints and resistance to shocks

Lessons from small-scale entrepreneur focus groups in Kampala

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DIRECTED BY LSE UNIVERSITY OF OXFORD

FUNDED BY UKaid from the British people

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Executive summary

In Sub-Saharan African countries, over half of micro and informal firms report suffering from storage issues (WBES). In Uganda, key policy priorities highlight significant post-harvest losses due to inadequate storage in the agricultural sector and a persistently small size of firms (National Development Plan III). Handling fluctuations in demand and supply is crucial for firm resilience and growth. However, in urban areas, various constraints, including storage, limit firms' ability to manage these variations. There exists very little concrete evidence on the prevalence of storage constraints for small-scale entrepreneurs, their consequences on how firms deal with shocks and their adaptation strategies.

We present results from three focus groups in the retail, manufacturing and wholesale/processing sectors and five high-level meetings held in Kampala, Uganda with the goal of better understanding the extent and nature of storage constraints across space and sectors, orienting future data collection efforts and identifying factors that could make policy interventions less effective. Our results are fourfold:

I) **Storage issues are universal and multidimensional,** leading to issues managing input and output price fluctuations, stunted growth, and higher exposure to risk.
II) As entrepreneurs often adapt to storage constraints by collaborating with competitors or adjusting their operations, **they may not recognize lost demand or inefficiencies as storage-related issues,** leading to potential mismeasurement of the extent of the problem.
III) **Storage constraints are not credit or cash constraints**: simply providing capital is unlikely to solve these problems, as existing storage often fails to meet product-specific needs (such as temperature control or security), and infrastructure gaps like lack of electricity further limit storage solutions. Trust issues, liquidity constraints, and risk (e.g., fire or contamination) also hinder the adoption of collective or individual storage.
IV) **Cost-efficient and consensual policies exist**: successful examples of effective policies that address these multifaceted barriers can be found in government-coordinated storage for coffee. Potential interventions tailored to specific sectors have been suggested by focus group participants and governmental actors alike.

Storage constraints are ubiquitous among small-scale entrepreneurs in Kampala, Uganda, and these constraints limit the ability of entrepreneurs to manage shocks and grow. However, policies to address these constraints will need to be attentive to the capital

constraints, trust issues and product-specific characteristics of their intended users in order to be effective.

Introduction

Storage constraints seem to be ubiquitous in the developing world, especially in Sub-Saharan Africa where more than half of firms surveyed in the World Bank Informal Enterprise Survey declare suffering from issues serving demand or procuring inputs. However, there exists very little concrete evidence on the prevalence of storage constraints for small-scale entrepreneurs, the adaptation strategies of these entrepreneurs and what efforts they undertake, if any, to alleviate them. What are the unfulfilled storage needs of key actors in representative agricultural and manufacturing value chains, and what are the consequences of these gaps for firm growth and shock resilience? Moreover, what policies could fill these gaps in a cost-effective manner, taking into account multidimensional barriers to storage access?

We ran focus groups and high-level meetings around these questions, with two goals in mind. First, we intended to confirm that the phenomenon was indeed relevant in Kampala, Uganda. Second, we wanted to gather suggestions for potential policy interventions, based on the survey responses, that could help alleviate storage constraints in a cost-effective manner and evaluate the performance of such an intervention.

With these goals in mind, the project was designed around supply chains and settings of high representativity and policy relevance. We chose to run the focus groups and discussions in Kampala, Uganda based on results from the WBES data in other Eastern African countries and evidence from academic and policy documents of the salience of storage issues. In addition, Uganda's National Development Plan III notes significant post-harvest losses due to inadequate storage in the agricultural sector, so the government appears to be aware of the issue. The same document notes the persistently small size of firms, which academic research relates to inability to leverage economies of scale and highly personalized production processes (Bassi et al, 2023), suggesting these firms have limited stock to sell.

Our focus group and high-level meetings composition were also designed to maximize the policy and academic relevance of the project. We ran focus groups with retailers, wholesalers and processors in the tomato and maize sectors, and with carpenters and metalworkers as examples of the manufacturing sector. We chose to focus on maize as it is a potential export crop, but about a third is lost post-harvest due to storage conditions (NDP

III). We added tomatoes because they represent a large share of domestic demand and were of particular concern to the Kampala Capital City Authority (KCCA). Both products have specific needs representative of their broader agricultural category: maize requires dry storage like many grains and pulses, and tomatoes require cold storage like many other fruits and vegetables. We chose to add carpentry and metalworking as manufacturing sectors in order to highlight the role of other constraints (space) and because of work documenting personalized production processes suggests that entrepreneurs in these sectors do not take advantage of economies of scale (Bassi et al, 2025).

Methodology

We ran three focus groups in July of 2024 in Kampala, Uganda. Our focus groups were composed as follows:

1. Multi-product retailers selling at least maize (4) or tomatoes (4), further stratified by operating in or outside the market.
2. Carpenters (4) and metalworkers (4)
3. Processors (4) and wholesalers (4) of tomatoes and maize

The focus groups were conducted in Luganda (the most commonly spoken language in the Kampala region). We recruited participants at their place of operation to hold interviews on the same day they were recruited, minimizing the likelihood of no-shows. With variation according to the nature of the sectors and occupations of the participants, our focus groups were still designed to allow for inter-group comparisons. First, we gathered information on firm size and characteristics on a separate sheet. Then, we asked about subjective constraints to growth to have a benchmark against which to measure storage constraints. A third section asked about ideal storage, current storage, reasons for gaps between the two and difficulties servicing demand and procuring inputs. Finally, we asked them about price shock mitigation strategies that could be implemented by the government which they thought would be most helpful, as well as the acceptability of a set of hypothetical storage building policies.

Five high-level meetings were held. We met with the Ministry of Finance's Private Sector Development Unit, the Ministry of Trade's Department of Warehousing, the Coffee Development Authority, the Uganda Small Scale Industry Association (USSIA), and the Kampala City Traders Association (KACITA).

Results

First, we present detailed results from our focus groups, before exploring the conclusions from our high-level meetings.

Focus group 1: agricultural retailers

The first focus group was comprised of eight retailers, four of which sold tomatoes and four sold maize (some may have sold both). Two members of each product category sold their goods in a market setting while the other two sold their goods from sites outside of the market. This type of work is heavily female, and our focus group reflected that, with 7 women and one man.

Image credit: David Margolis

An important first point is that none of the market sellers had storage outside of their stand in the market. They would purchase inventory from suppliers individually so as to fill their stands. The maize sellers kept their inventory on palettes under the displays in the stand to keep it dry, whereas most tomato sellers in the group kept theirs directly on the ground (potentially to keep it cooler, although we did not get a precise explanation for this behavior). This was an issue as the ground of the market is not improved, as shown on the accompanying picture, and water runs through the market when it rains, increasing the risk of inventory rotting. In the evening when the market sellers leave the market, they put all of their remaining inventory on their stands and cover it with a tarp around which they wrap a cord and attach a padlock. Theft was a preoccupation reflected by the fact that the only thing purchased collectively is security services, i.e. someone to watch over stands during the night.

Retailers do vary their purchasing and selling behavior in response to price fluctuations, although the extent of that mitigation is limited by their access to storage. Most of them purchase more inputs when prices are low, up to what their limited storage can accommodate (although some still only buy what they expect to be able to sell). When input

prices were high, all of the retailers purchased less or not at all. Their strategies in response to output price variations were more heterogeneous, with some preferring to sell more when prices were low in order to minimize losses or compensate for reduced profit margins, while others (maize sellers) would sell less. When output prices rose, all of them attempted to purchase more input to take advantage of the high price, with some even selling on credit - although several mentioned that trust issues strongly affect to whom they offered credit and whether wholesalers were willing to sell to them on credit. Overall, the retailers said that they ran out of inventory to service customers between two and four times per week, but due to storage constraints, their restocking behavior varied considerably. Some restock at regular intervals, while others restock when their supply runs out and still others only restock when the wholesaler comes to them (usually three times per week).

Importantly for policymaking, retailers were all aware of what they would like to see in storage space, although priorities differed. As with the first point above, security was an important consideration, but the majority also described product-appropriate storage (cold and dry storage for tomatoes, dry storage for maize). However, all of the retailers said they lacked the financial resources and/or infrastructure to build or procure the storage they would need, and half of the retailers had no links to stable sources of finance (banks, microcredit institutions or SACCOs). In fact, a lack of capital was listed as the primary constraint to growth for these retailers. Moreover, the market from which the market sellers operated did not have electricity (an issue mentioned by several market sellers as problematic), so plugging in a refrigerator is not a feasible option, even if they were willing and able to pay for a refrigerator and the cost of electricity. Some of the newer (privately-run) markets have improved floors and electricity, so it would be interesting to compare the behavior of market sellers when the constraints associated with those two aspects of their environment (unimproved floors and lack of electricity) were eased. However, it is much cheaper to have a stand in a publicly run (KCCA) market like the one we visited, so there is likely some selection of retailers based on their own capital and ability to pay rent.

Finally, when asked what sort of actions the government could take to help them resolve their storage issues, the retailers (particularly the market sellers) suggested the construction of well designed, secure and accessible storage space at affordable prices. We did not actively solicit what would be their willingness to pay for such storage space, but the fact that many of them did not pay taxes and otherwise complained of capital constraints suggests that it might not be very high.

Focus group 2: manufacturers

The second focus group was composed of eight entrepreneurs from the selected manufacturing sectors, four carpenters, and four metalworkers (all men).

As with the retailers, the manufacturers cited the lack of capital as the major constraint to business growth. Due to limited financial resources, they operate with very small storefronts which they all rent (although some did own storage facilities elsewhere) and they installed minimal equipment in their stores. All but one participant reported being fully informal. Both the carpenters and the metalworkers usually owned small storage facilities but would purchase more if it were affordable. The storage they currently have, and what would constitute ideal storage, varies by type of manufacturer. Both groups have a preference for well-built structures with space, with a small preference for on-site storage that seems less pressing than other needs. Both groups face significant risks: carpenters are susceptible to fire losses, while metalworkers are at risk of electrical shocks due to water on the premises when they do their welding. These risks can lead to financial losses and physical injuries and as such, personal and asset safety was a key concern.

Neither type of manufacturer in our focus group produced large quantities of standardized products that could be stored for later sale: only 1 participant did not make goods on demand, and most participants did more on demand than in-advance production. Similarly, the manufacturers did not have a "showroom" per se, although they did have some sample products "on display" in front of their workplaces. For both groups, production systems are highly personalized, with items made on demand to the customer's specifications.

Image credit: David Margolis

The storefront of a metalworking firm. Firms often lack storage or a storefront to showcase their merchandise, leaving them exposed to the rain and associated risk of rust.

In line with this personalized production system and consistent with their lack of capital, the manufacturers operate on a real-time basis for input purchasing, with about half respondents buying materials only when customers provide them with the necessary funds (but not necessarily the specific materials needed to produce the requested product). As such, they are not able to fully adjust their purchases to price variations - they can sometimes buy in bulk when prices are low, but do not have enough capacity or capital to avoid also having to buy when prices are high - so they are required to pass high input prices through to their customers, something that was also mentioned as a constraint to growth. However, they are conscious of competition and thus cannot allow their prices to deviate too much from their competitors. One result is that if input prices increase after agreeing on a price with the customer, they can lose money on an order.

This real-time input purchasing, combined with product customization, leads to situations where a given manufacturer is unable to meet a customer's demand due to a lack of the appropriate inputs. In these cases, manufacturers coordinate with others who have the necessary inputs so as to have the product made by someone else, with the revenues from the sale being shared between the manufacturer who took the order and the one who produced the good. Some also report losing customers with high frequency (more than a few times a month) due to not having the right products.

To mitigate financial constraints related to price variation, manufacturers can obtain money from cooperatives to purchase supplies on credit. However, this requires membership in the cooperative for a certain period, often measured in years. They can also use their own products as collateral to secure loans. Customers may pay in installments, but there is a significant trust issue associated with this practice. All of these manufacturers had employees (from 2 to 6), although they were hesitant to train them for fear that they would leave and become competitors. They did not employ family members as they were afraid that they would be taken advantage of and the family members would not provide appropriate effort.

As with retailers, manufacturers were well aware of what would constitute ideal storage and how it differs from their current situation. For carpenters, ideal storage would include a structure to maintain timber at an appropriate moisture level for workability and fire detection and extinguishers for safety. For metalworkers, the storage would need to be protected from water to prevent electrocution and rust. For both groups, space and cost are crucial factors in storage solutions, although neither group seemed particularly concerned with the risk of theft due to the size of the materials they use. Both groups also felt that having an off-site showroom in which they could present their products would be beneficial, and some suggested that having a centralized place where many manufacturers could

present their goods could be a good idea. However, when asked about an appropriate government intervention, all members of the focus group participants expressed at least some degree of mistrust in the government's ability and willingness to help.

Focus group 3: wholesalers and processors

The third focus group was comprised of wholesalers and processors. Four were wholesalers of tomatoes, of which one was also a producer. Two others were wholesalers of maize, one was a maize miller and the remaining participant was both a maize wholesaler and a processor.

As with the other groups, the main constraints to growth for this group included a lack of capital although all those working in maize rented their space. They also cited concerns about the degree of competition, both among wholesalers and in terms of product differentiation. In particular, the tomato wholesalers noted that Kenyan tomatoes would remain in good shape for longer without refrigerated storage. Some wholesalers said they often have to wait until all of the Kenyan stock is sold before they can start selling their own. All of the wholesalers said that they would like to export if they could, but they lacked the funds and knowledge of the process.

Importantly, our focus group participants were operating in a market whereby regulations required them to rotate with other wholesalers in the same space throughout the day. Those with whom we met arrived in the early morning and had to leave by noon. They were also not permitted to transform the space adjacent to the market space, so they could not erect facilities in which they could put tomatoes or maize to protect it from the rain. Because of these storage difficulties, most would bring a limited amount to the market, consider their selling activities to be finished when they had sold all of their stock (at the latest by noon), and then take to the road on shared trucks to go pick up stock up-country for sale the following day, although in some cases the supplier would bring product directly to the wholesaler. To make sure that the tomatoes did not arrive in bad shape, they would sit with them in the back of (non-refrigerated) trucks to watch over them and cover them in case of rain. They trust each other not to steal the tomatoes from the truck, but they do not trust the market retailers and so would not be willing to leave inventory overnight near the market. In cases where they can store inventory, especially in the case of the maize miller, there could be problems related to rodents, theft, or the mixing of several products together which can make some of them go bad faster. It is worth noting that there are significant levels of mistrust of farmers from both tomato and maize wholesalers, similarly to other focus groups, and often directed at farmers and their storage methods.

Given that both maize and tomatoes are seasonal crops, to a certain degree, one consequence of these storage issues is that inadequate storage prevents wholesalers from maintaining a high-quality product and selling it for a good price. The price of "young maize" can be several times higher than that of "old maize", but humidity-controlled storage could allow maize to stay "young" for much longer. For tomatoes, wholesalers are captive to price variations as it is difficult to keep them for more than one day without refrigeration. Another consequence of the storage problems is that wholesalers spend a lot of time going back and forth to the countryside every day (3 participants restock daily, the rest 3 times a week) instead of purchasing enough inventory for several days at a time and storing it.

In terms of ideal storage, tomato wholesalers mentioned a need for air conditioning and refrigerators, while maize wholesalers and processors described a warehouse-type dry place. Both types of wholesalers advocated for storage that only houses one type of product to avoid cross-contamination. For both products, the characteristics of trucks also enter the question of ideal storage, and complaints about farmers further stress the systemic quality of storage problems. None of the tomato sellers in the focus group had cold storage, while two maize sellers had dry storage, including one that was also a miller and had some equipment.

When considering strategies to deal with price variation, wholesalers would sometimes buy on credit from suppliers when prices were high. When output prices are low, they would sometimes just give their product to retailers to sell and get reimbursed later. They change their own output prices based on demand and they closely track each other's prices. Similarly to manufacturers, wholesalers do not view their situation as ever lacking inputs, since they purchase from suppliers what they think they can sell and just end their day at the market when they sell out. They claim that they never lose products, they just sell them for lower prices or have to sell them right away. They said that government help would be appreciated in a number of areas, mentioning in particular air conditioning and humidity-controlled storage, along with training in how to grow better-resisting Kenyan tomatoes and obtaining better trucks, either refrigerated or open-deck. Although there is security at the market coordinated by the market's chairperson, they feel like security is insufficient and had a discussion about getting more security people. They did not consider storage away from the market to be particularly problematic, but they were concerned with it being refrigerated and safe.

High-level meetings

The meetings with the Ministry of Finance's Private Sector Development Unit (PSDU), the Uganda Small Scale Industries Association (USSIA), the Department of Warehousing and the Kampala City Traders' Association (KACITA) all confirmed that the various authorities were aware of the issues raised by the focus groups and that storage constraints are a prevalent and costly issue for the country. Different stakeholders stressed issues at every node of the value chain, from product rotting at the farmgate because of inadequate storage to large price-setting power of the middlemen in our chosen sectors because of difficulties mitigating input price shocks for retailers and wholesalers and output price fluctuations for farmers.

In spite of the common awareness that storage is a universal issue, there are significant non-cash barriers to storage acquisition. Our meetings highlighted infrastructure problems – electricity and roads in rural areas – making the establishment of storage facilities at the farmgate more complicated. In these contexts, trust is also an important issue, especially for the storage of unprocessed goods where the presence of parasites can spoil everybody's harvest and when those working the land loss are not those with land tenure, but their wife or children creating problems in the establishment of formal property over the harvest. and in a context where those working the land might not be those in possession of land tenure in the case of the youth and women. In urban areas, collective storage has been built but is often left idle because its characteristics are not tailored to product-specific needs. Finally, informality is a pervasive issue that can diminish the efficiency of some policies if these policies require the beneficiaries to be formal, as was the case of some business management training modules that sought to teach entrepreneurs how to address storage acquisition and management.

Many of these barriers can be alleviated, provided there is government interested in coordinated action, as was confirmed in our meeting with a quality assurance officer at the Coffee Development Authority. Because of the unit value of the product, their understanding is that if farmers can afford to grow coffee, they will be able to store it appropriately before taking it to the washing stations. Collective warehouses seem to have been made available to retailers and wholesalers down the value chain, which has helped resolve some of the issues mentioned above, and there are alternative uses of coffee (instant coffee, quality and size gradients) which ensure that even coffee that has not been perfectly stored throughout finds a destination.

Holding high-level meetings was also insightful for the scope and direction of future research. The meetings shed light on the systemic nature of storage constraints: space is a constraint that is more pressing in urban areas, but there is limited space for action if

products arrive from the farmgate already in a bad state, and the existence of other barriers than cash and space mean that there is opportunity for interventions at upper nodes of the value chain as well. These meetings also informed us of already-existing interventions that could help firms and farms resist shocks better – the procurement of refrigerators, refrigerated trucks and collective silos in rural areas are some examples. In the case where regulatory, infrastructure or behavioral barriers impeded the adoption of such innovations, solutions emerged from these discussions – the training and hiring of collateral managers in the case of collective storage or the use of solar power in the case of electricity instability, for example.

Conclusions

In this project, we have sought to shed light on the role of storage constraints for representative sectors of urban areas of a developing economy in order to gauge the potential for, and orient future research efforts.

Our conclusions from the focus groups and high-level discussions are fourfold. First, we find that i) storage issues are universal and multidimensional, and they represent an important impediment to shock management, costing entrepreneurs many hours of their working day, exposing them to significant risk and harming firm growth. However, ii) as entrepreneurs naturally adapt to storage constraints by spending more time refilling their small storage, collaborating with competitors or through other means, they do not subjectively recognize lost demand or inefficiencies as storage-related issues. This means that any effort to document this phenomenon must rely on both subjective and objective observation, and that existing databases probably underestimate the extent of the problem. Next, we found that iii) only providing capital is not going to solve these constraints, as there are product-specific needs that cannot be filled through individual action because of regulatory or infrastructure problems such as authorization to modify one's environment, the quality of roads or the reliability of electricity. Trust issues, liquidity constraints and exposure to risk of contamination also hinder the potential for policy that is not well designed. Finally, discussions with all stakeholders and experiences from high-value sectors where storage issues have been solved highlight the fact that iv) these constraints are manageable: when a product is a government priority, there exist examples of successful policies, as is the case for coffee.

There seems to be ground for mutually beneficial policy intervention, as respondents from the retail, wholesale and manufacturing sectors were aligned on their needs and the specificities they were willing to compromise on, and as there is marked interest from the government and non-governmental organizations for actions around building storage. Many

of these needs could be relatively cost-effective fixes if implemented at the right level – examples include fire extinguishers for carpenters, water protection for metalworkers or refrigerators for retailers.

We find that lack of suitable storage seems to have costly consequences for entrepreneurs, although cost-effective fixes exist and stakeholders are aligned in their interest implementing them. Making progress on addressing storage issues, however, requires more representative data than simply the information provided by our focus groups and interviewees. Collecting this data and using it to identify the highest potential interventions is a clear next step in addressing the storage constraints that have sizable consequences on firms and livelihoods everywhere.

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