Contents lists available at ScienceDirect

Global Food Security

Upgrading rice value chains:
Experimental evidence from 11 African markets

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ARTICLE INFO

ABSTRACT

Previous research has advanced the hypothesis that improving food security in Africa will require upgrading rice value chains in order to increase the quality-based competitiveness of domestic rice relative to imported rice in urban markets. We review the experimental evidence in support of this hypothesis. During 2008–2012, a research program of framed field experiments based on experimental auctions was implemented to study consumers' revealed preferences for rice quality attributes in 11 African markets. The experimental results suggest that domestic rice can compete with imported rice in urban markets if its intrinsic and extrinsic quality attributes are better tailored to urban consumer preferences. This is important for policy makers who are currently implementing ambitious national rice development strategies throughout Africa.

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1. Introduction

In the wake of the 2008 food crisis, the Coalition for African Rice Development (CARD) was launched with the aim of doubling rice production in sub-Saharan Africa within 10 years, i.e., from 14 million tonnes in 2008 to 28 Mt in 2018. The governments of African CARD members have subsequently developed ambitious national rice development strategies (NRDS) (CARD, 2014) in order to reduce reliance on rice imports which have been increasing in sub-Saharan Africa since the sixties at an annual rate of 2.2% to reach 53% of total rice consumption in 2011 (Demont, 2013; FAO, 2014a). The CARD initiative follows the perspective of the food sovereignty movement which argues that long-term food security cannot rely on dependency on food imports, but must be built on investment in agriculture (Laroche Dupraz and Postolle, 2013) and food value chains (FAO, 2012; UNCTAD, 2009; World Bank, 2008). A food value chain is defined here as "the full range of farms and firms and their successive coordinated value-adding activities that produce particular raw agricultural materials and transform them into particular food products that are sold to final consumers and disposed of after use" (FAO, 2014b, p. 6).

In order to identify priority areas and investment gaps for the development of the rice sector in Africa, Demont (2013) reviewed the NRDS that have been developed under the CARD initiative and advanced the hypothesis that in order to improve food security in Africa, more attention will need to be given to rice value-chain upgrading in order to increase quality-based competitiveness of domestic rice. Value chain upgrading is defined as a set of strategic and innovative actions and investments aiming at improving the performance (competitiveness) of a value chain. FAO (2014b) further distinguishes between what is being upgraded or what the upgrade aims to achieve. The first category of upgrading includes technology (e.g. varietal improvement or modernization of processing infrastructure), organization (e.g. collective purchase of inputs by a farmer group or collective decision-making in irrigation), network (e.g. horizontal and vertical coordination and integration), and institution (e.g. improved trade or seed laws). The second category includes process (e.g. introducing food-safety protocols or good agricultural practices—GAP), product/market (e.g. from traditional to modern retail), and function (e.g. farmers integrating transport to the market or processors integrating custom milling services into their activities).

Demont's (2013) hypothesis is that a focus on productivity alone may be insufficient to render domestically produced rice competitive against imported rice, particularly in import-biased food markets where imports have established the quality standards against which domestic rice now has to compete. However, in some cases upgrading quality may be insufficient for achieving competitiveness of domestic rice. Due to persistently inferior postharvest quality, domestic rice suffers from a bad reputation, particularly in major African cities which could otherwise be huge markets for rice growers and which are now served by Asian rice

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exporters. If the quality factor alone was at work, investment in upgrading of intrinsic quality would be sufficient. Should preferences for imported rice persist after quality upgrading, however, additional investment would be required in extrinsic quality cues such as packaging and branding in order to *dedifferentiate* domestic rice from imported rice. Once rice value chains are upgraded, investment in domestic rice productivity is expected to become more effective in improving food security in Africa.

In this article, we review the experimental evidence in support of this hypothesis. In 2008, the Africa Rice Center (AfricaRice) initiated a program of experimental economics research in order to generate empirical evidence for supporting rice value-chain upgrading in Africa (Tollens et al., 2013). A protocol for 'framed field experiments' (see Harrison and List, 2004 for a classification of field experiments) based on experimental auctions was designed and implemented in 11 urban markets throughout Africa during 2008–2012. Experimental auctions are useful tools for eliciting consumers' willingness to pay (WTP) for products or product attributes that are not yet available on the market. Because real products and real money are exchanged in experimental auctions, participants have increased incentives to reveal their true value for the products or attributes under research (Lusk and Shogren, 2007). The experiments aimed at eliciting consumers' revealed preferences for upgraded rice quality attributes and assessing under which conditions they are willing to substitute imported for local rice (Akoa Etoa et al., in press; Costello et al., 2013; Demont et al., 2013a, 2013b, 2013c, 2012; Ouedraogo et al., 2013; Zossou et al., 2013).

Shoppers were randomly approached in urban markets and invited to take part in an experiment during which they bid on alternative rice types under controlled conditions (e.g., intrinsic visual and sensory quality of the product and extrinsic quality cues like labeling and information). The advantage of field experiments over classical surveys is that they allow empirical testing of whether and under what conditions rice value chains can be upgraded, providing crucial information on how resource-poor farmers can tap into huge urban consumption zones. The experimental results suggest that domestic rice can compete with imported rice in urban markets if its intrinsic and extrinsic quality attributes are better tailored to urban consumer preferences. We conclude that quality upgrading, labeling, and information are crucial sources of competitiveness of domestic rice value chains in Africa.

2. Design of the framed field experiments

2.1. Choice of the markets

Demont (2013) distinguishes between three categories of CARD countries for which different upgrading strategies may apply: (i) coastal countries characterized by dominant consumer preferences for imported rice (Benin, Cameroon, Côte d'Ivoire, Ghana, Liberia, Nigeria, Senegal, and Togo); (ii) coastal countries characterized by dominant consumer preferences for local rice (Guinea, Kenya, Madagascar, Mozambique, Sierra Leone, The Gambia, and Tanzania); and (iii) landlocked countries (Burkina Faso, Central African Republic—CAR, Democratic Republic of the Congo—DR Congo, Ethiopia, Mali, Rwanda, Uganda, and Zambia). The three groups are shown in different colors in Fig. 1. Senegal is a special case: the region north of the Gambia River to the Senegal River valley (supplying the major cities Saint-Louis and Dakar) can be categorized under Group 1, while the southern Casamance region (supplying Kolda) can be categorized under Group 2, together with The Gambia, where rice is an indigenous crop grown for centuries.

Demont's (2013) main argument is that urban consumers in coastal countries are typically more susceptible to developing food preferences biased toward imported rice, particularly if the primary consumption zone is close to a port. In some coastal countries, urban markets are already marked by dominant import-biased rice preferences to the point of paying price premiums for imported relative to local rice (Group 1), while in other coastal countries, consumers have preserved their preferences for local rice reflected through the price premiums they are paying for local rice, despite their exposure to imported rice (Group 2). The bias toward locally produced rice endows Group 2 countries with a 'comparative advantage in demand' in the development of their rice sectors relative to Group 1 countries. The term was coined by Lusk et al. (2006) to argue that differences in the demand side can play an equally important role in comparative advantage. Improving food security through domestic rice production in Group 1 countries requires rice value chains to be upgraded following a judicious investment portfolio, whereby quality upgrading needs to precede upgrading of productivity (Demont, 2013; Demont and Rizzotto, 2012). The reason is that investments in productivity only become profitable if there is a market for absorbing the surplus created (Barrett, 2008). If production and processing infrastructure are unable to assure minimal quality standards, increased production volumes will rapidly saturate local markets and erode prices, jeopardizing farmers' incentives to invest in productivity (Demont, 2013; Demont and Rizzotto, 2012). The need for sequencing becomes less critical when one moves to countries that are somewhat shielded from import bias through (i) cultural barriers, such as coastal countries endowed with a comparative advantage in demand (Group 2), and (ii) physical barriers such as being landlocked (Group 3) (Demont, 2013).

In order to generate empirical evidence for the hypothesis advanced by Demont (2013), we conducted 14 framed field experiments in 11 major African markets across six CARD member countries (Benin, Burkina Faso, Cameroon, Senegal, The Gambia, and Uganda) and one non-member country (Mauritania) and across the three categories (Groups 1–3). The locations of the experiments are mapped in Fig. 1. Most of the framed field experiments were carried out on an urban market in or near the (densely populated) commercial capitals (Dantokpa market in Cotonou, Yaoundé, Nouakchott, Dakar, Serre Kunda, Ouagadougou, and Kampala), most of them near the port (Cotonou, Nouakchott, Dakar, and Serre Kunda). For comparison, experiments were also carried out in important provincial towns in rice production zones (Glazoué, Malanville, Saint-Louis, and Kolda).

The majority of the experiments were conducted in Group 1 countries (Benin, Cameroon, Mauritania, and Senegal) (Akoa Etoa et al., in press; Costello et al., 2013; Demont et al., 2013a, 2013b, 2013c, 2012; Zossou et al., 2013). However, despite their comparative advantage in demand, some of the Group 2 countries are also exposed to massive rice imports and so local rice needs to compete against the latter quality-wise. Therefore, experiments were carried out in Senegal's southern Casamance region (Kolda) and The Gambia to assess consumer response to newly introduced improved rice varieties, such as NERICA (Demont et al., 2013a). Like the cultural barriers (i.e., favorable preferences for local rice) in Group 2 countries, the landlocked position of Group 3 countries does not entirely shield them from rice imports. Burkina Faso, for instance, imports 60% of its rice consumption needs via the ports of Côte d'Ivoire, Ghana, and Togo (USDA, 2012) and we deemed it useful to assess the competitiveness of local rice (e.g., from the Bagré region) on the major urban consumption market of the country, i.e., the capital Ouagadougou (Ouedraogo et al., 2013). Finally, although varietal quality improvement can be a major driver for rice productivity (e.g. Kijima et al., 2011), its success also crucially hinges on urban markets, where improved rice