Innovation Systems and Development: The Journey of a Beleaguered Nile Perch Fishery in Uganda

By Rose Kiggundu

Overview

The story in this volume provides a positive and interesting example of how a technologically weak industry in sub-Saharan Africa (SSA) successfully responded to global changes in technological and competitive conditions hence departing from the implicitly bleak picture often portrayed in contemporary associated literature.

In the late 90s, the European Union (EU) imposed a set of Sanitary and PhytoSanitary (SPS) standards on Uganda’s fish exports. This led to a conditional ban of one of Uganda’s important exports when the country’s fish processing and export industry was unable to meet the new exporting requirements. Consequently, the industry was plunged into a hard-hitting export crisis and for a prolonged period fish processing firms were locked out of their biggest and most lucrative export market. Export revenues fell at a time when revenues from traditional commodity exports (coffee in particular) were also falling. Fish processing plants were forced to close in order to restructure. Jobs were lost and fishing communities lost their main source of livelihood. All this created a new form of pressure for technological upgrading. In response, Uganda’s fish processing and exporting industry successfully engaged in learning and innovation activities, changes that resulted in substantial gains for Uganda’s economy. The focus of this thesis is upon explaining the ability of Uganda’s fish processing and exporting industry to learn and innovate in a typical developing country setting.

Chapter 1 introduces the subject and approach of the study, lays out the theoretical argument and outlines the structure of the volume. Chapter 2 elaborates the analytical framework. It starts with a review of the theoretical and empirical literature and defines some key concepts. The innovation systems approach provides the analytical framework for this study. The particular line of analysis chosen derives from what Mytelka (2003) has called ‘sector-based systems’. The concept of ‘institutions’ is central to the analysis and is defined as common habits, routines, established practices, rules or laws that regulate relations and interactions between people. Organizations are understood as actors, players or ‘formal structures with an explicit purpose’ such as business associations, international development agencies, universities, banks and so on. The frame of analysis elaborated in the second part of chapter 2 was inspired by the work of Edquist and Johnson (1997). According to these authors, ‘…some organizations are directly responsible for creating institutions. There are, for example, ‘dedicated’ standard-setting organizations which formulate or determine technical standards, which, in our sense of the term, are institutions…’ (page 60). Following this example, our study considers standards as part of the concept of institutions. A change in SPS standards represents an ‘institutional change’. Our theoretical conceptualization process was also influenced by the institutionalist view that because markets are organized and institutionally embedded in practice, they cannot also be pure.

This study elaborates the concept of demanding markets in institutional and innovation systems terms and claims that what distinguishes demanding markets from less demanding ones is the balance between, what Edquist and Johnson (1997) have called ‘hard’ and ‘soft’ institutions...
governing transactions in those markets. Placed in the context of the current study, ‘hard’ institutions such as the strict policing of the EU SPS standards, serve to strengthen the quality of demand thereby substituting for weakly formulated users’ demand. For conceptual and policy making purposes, we need to view such standards as institutions potentially useful for strengthening the quality of markets. In the process of responding to stronger demands from customers, producers discontinue older rules, habits and practices that may no longer be desirable for learning and innovation. We coined the term institutionally-augmented markets to capture the phenomenon caused by the introduction of favorable practices, regulations and policies whose interaction serves to enhance the quality of markets. The theoretical terrain explaining the ability of the fish processing industry in Uganda to innovate consists of four subsystems. The first of the four is what we referred to as the firm-level subsystem. We discovered that while most anatomies of the strengths and weaknesses of innovation systems rarely include an empirical review of firm level competences and factors of influence, a common weakness of empirical firm-capability studies in developing countries is they do not take into account the workings of the innovation system as a whole. This study combines both approaches and argues that the integration of analytical approaches for firm-level behavior and competences into innovation systems research sharpens the analytical principles and explanatory power that the innovation systems approach provides. The other three subsystems identified as important were the subsystem mediating institutions in markets, the one promoting knowledge generation, accessibility and learning and the bank and non bank financial subsystem.

On a methodological front, we conducted a survey of fish and other food-processing firms in Uganda in 2002 with the aid of a questionnaire. The entire population of post-ban fish processing firms (9) was included. We obtained information on two firms that had closed down. While we identified the Nile Perch fisheries system ‘with’ institutionally augmented markets, the control group industries were identified as systems ‘without’ institutionally-augmented markets. The control group consisted of 48 firms from the meat, fruit, bakery, fish byproducts and grain processing sectors in Uganda. The data on these 57 firms is what we refer to as the food-processing dataset. Using these data, we conducted regression analysis to estimate the relative influence of different independent variables on the intensity of innovation activities (INNOVA). The latter is a composite measure of innovation activities that we developed to aid our analytical endeavor. INNOVA is our dependent variable and its construction is elaborated in chapter 4. We also conducted regressions using data assembled in 2002 by the Regional Program on Enterprise Development (RPED) unit of The World Bank in Washington D.C. This was for triangulation purposes to crosscheck data and results obtained with our small sample (57 food-processing firms including fish processing firms). The RPED sample covered 300 firms spanning 9 sectors. Besides enterprise level data assembly, information and aggregate data were collected from three subsystems identified as important. Face to face interviews using checklists was the principal method employed. This work was complemented by in-depth case studies of 8 fish processing firms. In addition, we engaged a panel of 5 fisheries scientists to evaluate the quality of innovation activities introduced by fish processing firms.

We found that from 1997, the European Union (EU) imposed and enforced a set of Sanitary and PhytoSanitary (SPS) standards on Uganda’s fish exports. This led to a conditional ban of one of Uganda’s important exports and a subsequent crisis within the fish processing and export industry when the required SPS could not be met. In response, the fish processing and exporting industry successfully engaged in learning and innovation activities. These were not radical but had a crucial
impact upon Uganda’s economy. We associated this increase in export values to the re-entry into
demanding, but high-value markets. Re-entry was only possible after accomplishment and
certification of improvements specified by the European Commission. The process of executing
these improvements embodied process-related technological change, learning and innovation.

From the analysis conducted in Chapter 4 and the in-depth case studies in chapter 5, we find
reasonable evidence to support the hypothesis that the workers’ education level, size of the firm,
access to technical assistance, export market-orientation and financial gearing variables are
important for innovation processes. Interest-bearing finance and non-interest-bearing finance are
both important and complementary and the important dynamic is how well a firm balances both
types of financing. The ethnicity variable picked up some variation in INNOVA in the food-
processing sample although it had almost no discernible effect in the RPED sample.

Within the food-processing dataset, the predicted probability of INNOVA was highest for the fish
processing and exporting industry. Based on the case studies elaborated in chapter 5 and the
discussion in Chapters 6 and 7, we attribute the ability of the Nile Perch fisheries system in Uganda
to engage in learning and innovation processes to the interplay between institutional and
organizational changes in the subsystem mediating market institutions, in the subsystem dealing
with knowledge distribution and coordination, associated sector-based policies, and to some limited
extent institutional changes in the finance subsystem in addition to a number of firm-level factors.
The emergence of flows of knowledge, support structures and inter-relationships was crucial to the
ability of fish processing and exporting firms to successfully introduce innovative change. We
therefore find that the successful introduction of innovative activity depends on the degree to which
the set-up and dynamics of various key subsystems in the support system and firm-level
competences (including firm-level institutions) bring to bear on one another. This interplay of
factors was absent across the control group.

The study refutes the view of innovation as a linear process driven by the supply of research and
development (R&D). In the case of Uganda’s Nile Perch processing industry, technological
learning and overall upgrading was dictated by institutional changes in the international trading
environment and facilitated by the institutional and organizational improvements and interactive
relationships that were introduced in the system.

In the fish sector, technological change did not take care of itself through invisible market forces.
The pressure and sense of urgency to overcome the long tradition of withholding investment in
local technological change came from enforcement of the EU’s Council Directive 91/493/EEC.
Standards exerted strong pressure to upgrade and stimulated the emergence of an improved support
system. The support structure consisted of a combined effort among the government, international
development agencies, the industry association, some buyers, and local and foreign private firms.
The government played a central role in sustaining the pressure on firms to maintain standards.
However, the response was reactive and not part of a well coordinated proactive public policy to
catch up or move ahead of the technological standards of developed countries. Hence, a number
of improvements occurred in the industry, but critical linkages and further structural improvements
were not introduced. It is possible that without well-targeted incentives, continued pressure, and
public support, the momentum for technological change in the industry might simply erode with
time.
The institutions governing the financial services provided by and through Uganda’s banking and non-banking system were found to have improved but only minimally relative to the learning and innovation requirements of firms. With support from development partners, lenders will still have to evolve the right institutional climate for developing risk and cost-sharing relationships. This will necessitate new forms of partnerships.

One of the contributions made by this study is the illumination of the important contribution standards can make to the innovation process especially in a developing country setting. The review conducted in chapter 2 noted that the literature often offers two opposing perspectives on standards and developing country trade. While the bulk of the literature views “standards as barriers to trade”, an emerging and alternative perspective projects “standards as catalysts” (Jaffee and Henson 2004). The present study offers a much broader perspective of standards. We looked at standards from an institutional perspective and also argued that standards are not just a matter of addressing the market’s inability to effectively facilitate information flows. They are not merely a question of non-tariff trade barriers although they have and could be used to serve trade protectionist objectives. The thesis is that standards augment the quality of demand thereby making markets more demanding. They additionally exert pressure on producers to discontinue outdated and unsuitable working practices. Research has however drawn our attention to the counter-productive effects of imposing rigid and inflexible regulations (Yarime 2003). Hence, while policy making should obviously encourage other more subtle ways of stimulating learning and innovation processes, this study suggests a role for the enforcement of innovation-enhancing standards.

We are not the first to advance a demanding markets hypothesis as a factor for technological change and innovation. The story we have told seemingly has a lot in common with the demanding markets hypotheses advanced way back in 1980 by Walker, Keith Pavitt and others in relation to the weak innovative performance of Britain and her loss of industrial vitality in the period 1850-1950. Similarly, Westphal (2000) points to the importance of more vigorous market pressures in export markets as a factor for technological capability development. Porter (1990) also stressed the character of demand as one of the important factors for competitiveness. The historical antecedents to our story could therefore be traced back to these and related variants of the demanding markets hypotheses. However, the ideas developed in the present volume present a somewhat different and more systemic variant of the demanding markets hypothesis. As previously mentioned, we find that ‘hard’ standards can assist to make markets more demanding. On the supply-side, the pressure exerted on producers provokes a discontinuation of older working practices, beliefs and illusions (institutions) that might be difficult to extinguish in the absence of equally effective pressure and incentives for change. This study has also shown that ‘hard’ standards can spur changes in the support system. We propose a role for standards in the innovation-systems building endeavor.

Uganda needs a sharper and elevated appreciation of the importance of innovation as a key driver of economic growth and development. Public agencies have an important role in promoting the required interplay of factors and in ensuring that the benefits are diffused and adopted by other sector-based innovation systems. In Uganda this could imply the effective delegation of powers to some form of high-profiled competent authority – perhaps a restructured Uganda National Council of Science and Technology closely aligned to or working in partnership with the recently established National Planning Authority (NPA). The remit would be to coordinate, develop and
strengthen national and sector-based systems of innovation. This thesis makes a contribution to the growing menu of ideas on how the innovation process can be stimulated and supported in a developing country context.