

Institutional Changes, Technological Capabilities and Fish Exports from Uganda and the Gambia

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Abstract: *Most works on the importance of fish as an agricultural commodity and its contributions to economic growth are focused on the developed countries. While developing countries have enjoyed substantial technological adaptation and upgrading such as Chile, Vietnam and China, the accounts are still limited to high middle income countries. In this paper, the authors assess the institutional and technological developments in the two least developed countries of Uganda and The Gambia by examining the fishery industry's experience. There is compelling evidence that industrial specialisation and institutional development are critical in solving collective action problems to sustain technological capability development in Uganda. Although the country still lacks participation in the high value added segments of product development, marketing and R&D, Uganda benefited from government policy promoting industrial fishing and coordination to overcome the ban on fish imports by the European Union (EU) as the landing, packaging and testing centres responded positively by to complying with internationally accepted sanitary standards. With a focus on artisanal fishing, much of the fish exported from The Gambia either landed in neighbouring countries or carried foreign countries names when exported. Hence, the fishing industry in The Gambia lacked the capacity to respond to pressures from large overseas markets.*

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1. Introduction

Fish is an important economic commodity for Uganda and The Gambia. Being landlocked, most of Uganda's fish come from the fresh waters of the lakes, with Lake Victoria being the most important source of White Nile. In The Gambia on the other hand, fish is sourced both the sea and river. Several attempts in the past have been made by the governments of Uganda and The

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Gambia to promote technological change to enhance fish exports. Constrained by inappropriate policies, weak institutions, poor infrastructural support, weak meso-organisations and unstable macroeconomic environment, both countries had until the late 1980s faced great difficulties in stimulating technological upgrading to support exports. Uganda and The Gambia have taken different technological trajectories to promote fish exports (Kiggundu, 2006; Mendy, 2009). Improvements in the macroeconomic conditions and impressive Gross Domestic Product (GDP) growth rates in the late 1980s and 1990s did not induce rapid technological change in the fishery industries. With strong integration in global markets, external pressures spurred technological improvement in Uganda. In contrast, the dominant role of inward-oriented artisanal fishing in The Gambia denied the country similar trigger for technological change.

Instead, the technological trigger in Uganda took place following the European Union's ban on fish imports from Lake Victoria region over the period 1997–2000 that destabilised the industry and the livelihood of thousands of fishermen dependent on the industry (Kiggundu, 2005, 2006). The industry, government of Uganda, international development partners and other key stakeholders responded by raising the sanitary standards of the fish industry (Fulgencio, 2009). In The Gambia, the government collaborated with the United Nations Industrial Development Organisation (UNIDO) and African Development Bank (AFDB) in 2009 to upgrade the laboratory and discover new landing sites, train Fishery Department officials and equip landing sites with basic infrastructure to test quality of fish and ensure it conforms to international safety standards prior to exports to the EU market (Department of Fisheries, 2011).

The technological improvements in Uganda was unprecedented with effective interactions across the industry – input suppliers, fish processing and export firms, overseas buyers, government policymakers, support agencies, international development agencies and the private sector association - Uganda Fish Processors and Exporters Association (UFPEA). Over the 1997- 2000 period, standards and processing systems were upgraded to meet the European Union health, sanitary and food safety requirements. The nutritional value and quality, the organoleptic appearance of the fish and how fish is caught and traded locally and overseas were enhanced significantly (Kiggundu, 2006: 301). Knowledge and techniques introduced during this period were not novel but new to the fishing industry in Uganda which helped to galvanise technological change; this enabled fish processing factories to provide high quality products to sophisticated global markets.

This paper examines the development of the fishing industry in Uganda and The Gambia by focusing on institutional changes that enabled factories and fishermen in the former to acquire, learn, adapt and upgrade technologies to

enhance export competitiveness; the lack of institutional changes has restricted technological improvement and export expansion in The Gambia. Other factors vital to catch-up phase such as macroeconomic stability, political and business environment, legal systems to provide a reasonable level of contractual enforcement, protect property rights and the quality of human resource skills are also examined.

The objective of the study is to assess institutional changes and technological capability building in enhancing fish exports in Uganda and The Gambia. Do institutional and technological developments enhance fish exports in Uganda and The Gambia? This forms the study's research question.

We take the past works of Katz's (2004, 2006), Lall (1992, 2005) and Rasiah (2006, 2007) arguments to examine in the next section the macroeconomic environment, institutional developments and technological capabilities of the fishing industry in the two countries. The literature review and methodologies are detailed in Section Two and Three respectively. The fourth section analyses the factors driving technological learning and upgrading in the fisheries sector focusing on upgrading and export competitiveness. This is followed by an analysis of impacts on fish exports and value addition. The final section discusses the implications and concludes the paper.

2. Literature Review

Much of the traditional theoretical and empirical studies neglected the need for developing countries to build technological capabilities. In developing Sub-Saharan Africa (SSA) countries, despite trade liberalisations in the 1980s, the region failed to exploit the opportunities offered by global trade largely due to low firm capabilities, weak public sector support and inability to meet sanitary and quality standards, (Lall, 1992, 2002; Rasiah, 2006, 2007). SSA's share of global manufacturing value added fell from 0.43% in 1980 to 0.41% in 2000 and its share of manufactured exports shrunk further from 0.3% in 1980 to 0.2% in 2000 (this compared with East Asia's 6.8% and 18.4% respectively), (Lall and Mbula, 2005:2). The region is seemingly 'off the map' in dynamic technological upgrading and has become marginalised in global economy. Addressing these problems require strengthening domestic technological capabilities and boosting technological efforts by attracting foreign direct investments (FDI). However, this can only be achieved under favourable macroeconomic framework conditions, skills development and acquisition of state-of-the-art equipment for growth and competitiveness, (UNIDO, 2006; Lall and Mbula, 2005).

Enhancing technological capabilities requires human skills, huge investments and other inputs often beyond the capacity of local firms in SSA. Without public sector agencies in SSA providing infrastructure and

technological investments, firms are likely to go without building the required capabilities. The inability of firms to meet this investment requirement, and ensure quality control among others rendered unlikely to compete effectively in global markets (Lall, 1992:168; Katz, 2006). It is important that firms overcome investment, production and linkage obstacles to participate and compete in the complex global markets where human resource skills, sophisticated equipment, quality control and diffusion of technology matter. Like firms, countries differ in their abilities to utilise or innovate technologies and often this is reflected in their productivity, export growth and volume as well as economic development. According to Nelson (2008), for National Technological Capabilities (NTC) to develop adequately, there must be improvement in capabilities in the form of physical investment, human capital and technologies. SSA governments must intervene to enhance economic performance and global competitiveness of investment projects which are often beyond the capabilities of the private sector. Southeast Asia's rapid economic growth was a direct result of improved firm and national technological capabilities (Lall, 1992; Stiglitz, 1996; Chandra *et al.* 2006; Nelson, 2008; Katz, 2006; Rasiah, 2006, 2012).

3. Framework of Analysis and Methodology

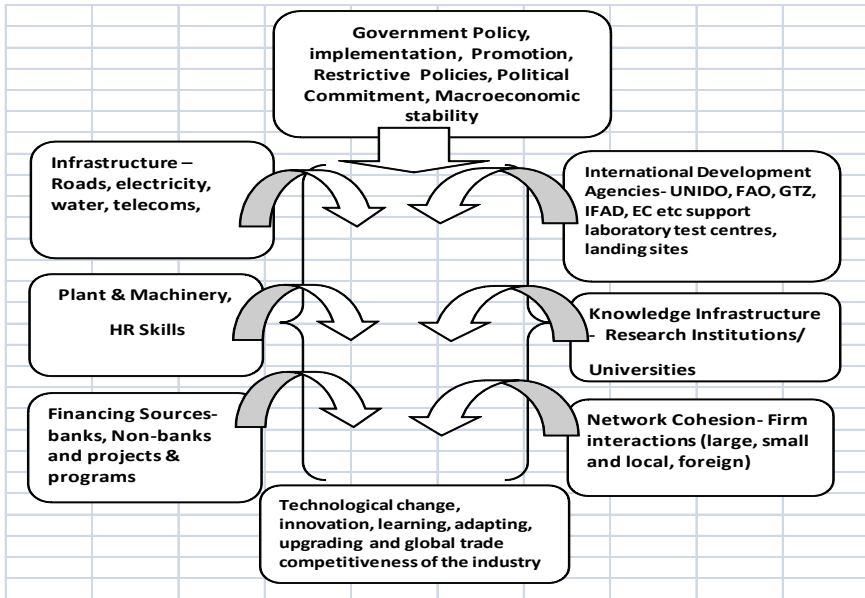
Figure 1 provides an outline of the analytical framework of the study; it shows the pre-requisites for technological learning, adapting and upgrading in the fishing industry. Effective government policies are vital and the political will to ensure stable macroeconomic environment, good infrastructure, tax incentives, and collaboration with development partners are crucial for technological learning and upgrading. A cohesive private sector network, knowledge infrastructure (universities and research institutions) and financial markets are key in pushing the technological learning towards a new frontier.

The study adopted mainly an analytical approach by assessing policies, macroeconomic environment, institutional capabilities, roles of international development partners such as UNIDO, government agencies and overseas importers in the fisheries industries. The study also analysed quantitative data sourced from the Uganda Bureau of Statistic, The Gambia Bureaus of Statistic, Bank of Uganda, Central Bank of The Gambia, Uganda Department of Fisheries Resources, Gambia Department of Fisheries, World Bank website and FAO fish statistics (Fishstats, 2010).

4. Findings

The findings as discussed in sub-sections 4.1 to 4.6 are evidence that institutional changes and technological developments matter a great deal in facilitating change. Stable macro-economic environment, enabling institutions, supportive

Figure 1: Analytical Framework of Technological Capability Change



Source: Jaabi and Rasiah (2012)

meso-organisations and legal reforms are crucial in this effort. Government’s collaboration with international organisations such as UNIDO was key in building human resource skills and rehabilitate laboratories in both countries to produce export-quality fish conforming to international safety standard. National governments in promoting investments and attract FDI helped to relocate regional foreign firms into Uganda. The foreign firms’ linkages with local firms enhanced capacities in fish production, exports and earnings. Overall, these developments impacted considerably on fish exports in Uganda as shown in Figure 3; however, The Gambia was not able to enjoy such positive developments due to the dominant artisanal fishermen and the fact the fishing industry lacked basic capabilities.

4.1 Macro, Meso and Micro Coordination

Government efforts to improve the macroeconomic environment helped provide the stability required for the introduction of policies to strengthen the meso-organisations and support technological upgrading of the firms in Uganda and The Gambia. This has resulting in an impressive GDP growth rate for Uganda which rose from 0.2% in 1980 to a low of -0.3% in 1985 to an impressive level of 8.1% in 2007, while the GDP growth rate of The Gambia increased to 6% in

2007 from 5.2% in 2000 and 1.6% in 1980. Uganda began recording positive growth since 1987 following the end of political and economic chaos that characterised the former President Idi Amin's era in the 1970s as well as the rebel wars of the National Liberation Movement (NRM) of the 1980s (Bigsten, 2000; Bigsten *et al.*, 2004; Kasekende and Ssemogerere, 1994; Keizire, 2004). Except for a couple of years of instability following the overthrow of the Jawara government in 1994, The Gambia has enjoyed a stable political and economic environment.

Improvements in the economy of Uganda saw inflation dropping from 196% in 1988 to 48% in 1992 and further to 12.2% in 2010 (BOU, 2011). This appreciable GDP growth was achieved partly as a result of the depreciation of the Ugandan Shilling against the US Dollar in the wake of an economic downturn during the late 1980s. The currency fell from 558 shillings to a US dollar in 1988 to 1,333 shillings to a US dollar¹ 1993, which seriously affected the fishing industry as it made imports costly (Morrissey and Rudaheranwa 1998; Kiggundu, 2006: 302; Kasekende, 2002). High imports and falling export revenues to cover rising imports led to rising foreign debts with deficits continued to be financed by increased external loans. As a result, the total debt service dramatically increased from 39% in 1987 to 55% in 1992 before stabilising at 15.8% in 2005 and 12.2% in 2010. In the case of The Gambia, external debt ratio fell 11.9% in 2005 from 18.0% in 2001 and 8.4 in 2003. Inflation improved to 5% in 2010 falling from 4.9% in 2005 and 14% in 1990. The Gambia recorded an average annual GDP growth rate of 4.1% over the period 1980-2010, which is impressive for a least developed country (Central Bank of The Gambia, 2011).

Prior to the Economic Recovery Programmes (ERPs) of the late 1980s price controls that drove prices below market rates, acted as a disincentive to producers which undermined the agricultural export base of both countries as the small and undiversified economies failed to be insulated by critical meso organisations such as the Central Banks and the marketing boards thereby leaving them vulnerable to external shocks (Kiggundu, 2006; Central Bank of The Gambia, 2011). The ERP transformed the situation by closing down or privatising inefficient marketing boards. Foreign exchange base gradually improved to several months of imports. The meso- organisations were further strengthened when the ERP gave way to the Program for Sustained Development (PSD) in 1990 aimed at sustaining improvements in the economy.

The macroeconomic environment in both countries improved from the late 1980s so that macro-institutions did not adversely affect the fishing industry. However, differences in the initial conditions with industrial fishing dominating in Uganda and artisanal fishing in The Gambia, and the nature of institutional change produced contrasting outcomes in the two countries. We will examine these issues in the subsequent sections.

4.2 Institutional Development

To support the traditional and non-traditional agricultural exports, several initiatives were taken by both governments to boost the export market through diversification into high valued products. The Ugandan Export Policy Development Unit and The Gambia's Investment Free Zones and Exports Agency (GIFZEA) were established with the purpose of offering fishermen and fishing firms the fillip to expand fish exports.

In 1980s and 1990s, the Government of Uganda set up credit schemes at the Development Finance Department of the Bank of Uganda to support SME financing and promote export expansion and economic growth (Kiggundu, 2006). The government in The Gambia established The Gambia Commercial and Development Bank, The Gambia Co-operative Union, Agricultural Development Bank and several donor projects to address financing needs of SMEs in general, and SMEs that focus on fish exports in particular. Some of these schemes performed relatively well in the short-run while many others failed to achieve their objectives due to the time factor ie the duration it takes to process loans, high interest rates, political hijacking, poor appraisal and monitoring (Morrissey and Rudaheranwa, 1998; Jaabi, 2004; Nathan and Associates, 2000).

Policy changes in the 1990s saw the establishment of the Uganda Investment Authority and The Gambia Export Investment Authority to promote local and foreign direct investment, provide tax reliefs and other incentives to investors and exporters. It was in 2000 that Uganda introduced a new regime on tax breaks and incentive in the form of allowances for plant and machinery, scientific research, training and start-up costs (Kiggundu, 2006:304). However, though these incentives were recognised as promoting investment in the sector, they were unable to effect an overall dramatic change in technological upgrading of the fisheries sector. Research centres and universities played a greater role offering training in fish technology, laboratory tests, fish breeding to populate the lake and conduct numerous studies on the industry.

4.3 Role of International Organisations

The Food and Agricultural Organization (FAO) began supporting Uganda in the 1950s-60s to assess the fish stocks in Lake Victoria. However, it was only in the early 1990s that new donor-led strategies helped the government in planning and monitoring, resource evaluation and statistics compilation, management measures and enforcement, research and extension, export promotion and quality control, education and training, and credit schemes (Frielink, 1990; Kiggundu, 2006: 307)². Despite establishing several projects in both countries, efforts to reform the fisheries department into several units (statistics and

planning, law enforcement, R&D, and training) to enhance effectiveness, policy coordination and streamlining support systems did not lead to much technological progress in the sector. As a result, the promotion, technological learning, diffusion and upgrading fell considerably short of international food quality and safety standards. Access to data and information on fish resources and yields were difficult. Management measures on mesh sizes, laws and regulation were often inconsistent and inadequately enforced (see Frielink, 1990; Jansen, 2000).

Fish training programmes are limited in The Gambia as the university and training colleges in the country are still nascent. Hence, much of the training is still carried out in Ghana and Nigeria. In Uganda, undergraduate degrees in fish and fish culture are offered primarily at Makerere University which provides only general programmes in animal science, instead of specific skills training in fisheries-related technology. Similar training programmes in aquaculture were limited and collaborations with specialists in food or veterinary science seriously lacking (Geheb *et al.*, 2008; Kiggundu, 2005). According to Frielink (1990), despite the efforts of the Fisheries Training Institute (FTI), skills and technological learning and upgrading remained extremely low in the sector.

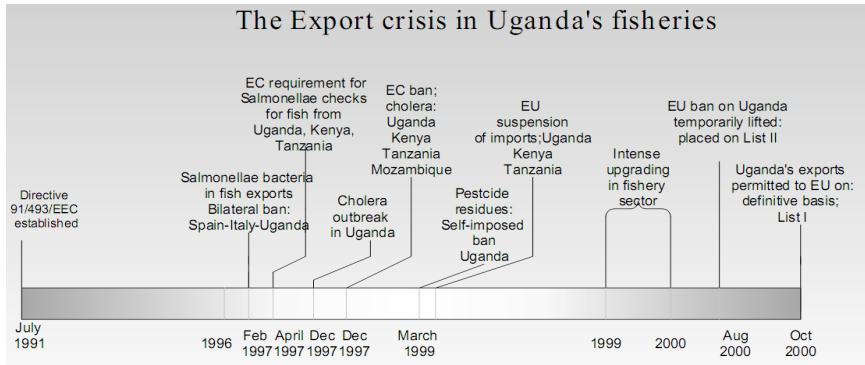
Until 1997, sanitary standards in both countries were poor when compared with international food safety and quality standards. Most fish landing sites in Uganda lacked basic infrastructure such as water, ice, electricity and lavatories (Keizire, 2004; Kiggundu, 2005). Though it is aware of international sanitary standards, the Uganda National Bureau of Standards (UNBS)³ found it difficult to enforce healthy fish handling and processing practices. The inability of Department for Fisheries Resources (DFRs) to improve and comply with higher standards also became apparent. The network body- UFPEA was not effective in providing the right technical support to the industry. There is no such network association in The Gambia to coordinate and communicate with government authorities on sector constraints and engage in dialogue on policy changes to support growth and development.

The European Commission's sanitary phyto-sanitary (SPS) technological standard through Council Directive of 91/493/EEC in July 1991 was instrumental in providing the trigger to transform the safety standards of fish processing in Uganda. In 1997, the EC through Council Directive of 97/296/EC required all developing countries to seek authorisation from the EC before exporting fish products to the European Union (EU Council Directive 1991; McCormick, 1999; Kiggundu, 2005). There were several conditions that had to be met to comply with EU Fisheries Council Directive (Nathan and Associates, 2000) including the appointment of EU-approved local inspection authority, improved infrastructure and sanitary conditions at landing sites and high standards of hygiene and fish handling along the supply and value chains.

Fish processing firms can obtain export certificate to EU only after fulfilling requirements in operations, plant layout and HACCP inspections (Kiggundu, 2005). The list of compulsory sanitary requirements is long and complicated requiring huge investments in plant and machinery, infrastructure and human skills. Compulsory sanitary standards is required by not only the EU but other major importers, such as the United States, Japan and Australia which differ making matters considerably more complicated for exporters (Henson and Mitullah, 2004).

However, despite the introduction of stringent certification standards, the pace of technical change in the fish industry remained frustratingly slow. In February 1997, Spanish authorities detected salmonellae bacteria in Uganda’s fish exports which caused the death of two after eating the contaminated fish (McCormick, 1999: 1536)⁴. This was followed by a cholera outbreak in December 1997; Spain and Italy followed by the EU imposed a joint ban on fish imports from Lake Victoria. Figure 2 shows periods of fish export crisis in Uganda.

Figure 2: Fish Export Crisis, Uganda, 1997- 2000



Source: Kiggundu (2006: 131)

Increased exports from 2001 till 2006 followed an over-exploitation of the Nile Perch which then shifted demand to Daga, Tilapia and other fish species but eventually also threatening the exhaustion of fish stocks. Institutional changes quickened to absorb, spread and ensure that compliance with EU-imposed sanitary conditions was achieved. Although the government was a slow starter, it played an important role along with other stakeholders such as the private sector, universities, research institutes and international development partners to meet the stringent EU standards.

4.4 Role of Government

Until liberalisation in 2002, the Ugandan government's regulations allowed only local businesses to engage in fish related activities; the reform provided impetus for the development of the local industry (DFR, 2002). While industrial fishing firms dominate the cash economy, artisanal fisheries operators use traditional processing methods such as sun drying, smoking, and salting fresh fish which are often low quality and juvenile fish, not accepted by the more lucrative overseas markets. In addition, public sector agencies and knowledge infrastructure institutions have low capabilities and connect very little with artisanal fishermen to assist them in meeting buyers' demands.

The Ugandan government played two key roles in facilitating technological change in the fishery sector (see Figure 2), namely:

- i. Facilitating compliance with sanitary requirements and
- ii. Investing in building food safety capabilities and the associated knowledge institutions.

The Ugandan authorities also strengthened the legal framework to empower the DFRs to monitor and enforce food safety measures in all fish-processing plants. It thereafter assumed full responsibility to respond to the fish export crisis by setting up committees and developed standards based on EU SPS compliance requirements. However, it became clear that DFRs was over-ambitious and lacked sufficient skilled human and financial resources.

The government of Uganda in collaboration with the United Nations Industrial Development Organization (UNIDO) supported the Uganda Integrated Program (UIP) which provided technical assistance to the industry. UNIDO UIP hired foreign consulting firms to strengthen sanitary audit systems at DFRs, train inspectors and quality assurance officials in fish processing and exporting firms, steps that were key to the re-entry of Uganda's fish into the EU markets, (Kiggundu, 2006:311; Keizire, 2004). The UIP supported DFR with office equipment and assisted in publishing a manual on fish inspection that was further developed by DFRs local fish scientists. This enabled effective inspection and regular surveillance to ensure compliance. The collaborative inspection missions with similar specialist organisations enhanced improvements in fish inspection services thus facilitated entry into the United States market which demand approved HACCP systems.

Export-oriented fish had initially been tested in Europe prior to the upgrading of in-country laboratories. Financial support from UNIDO helped to upgrade the local laboratories to internationally acceptable standards which saw the upgrading of Belgian-owned private laboratory approved by the EU to conduct test analysis. Uganda's fish laboratories were eventually upgraded to EU standards to facilitate re-entry to EU markets. UNIDO is also

supporting The Gambia to upgrade local laboratory to meet exacting market requirements. The Fisheries Department and the Department of Livestock Services laboratories are currently tasked with testing and ensuring the fish conforms to international quality and safety before the UNIDO-supported laboratory upgrading is completed.

The World Bank in collaboration with DFRs, UNBS and Food Science Research provided financial support for the introduction of specialised fisheries courses at Makerere and Mbale Universities; the latter also train officers in international food science and safety. The Gambia relies on sub-regional fisheries research institutions in Ghana and Nigeria to train its officers. The University of The Gambia (UTG) does not have programmes on fishing technology though various local training workshops are also held to build capacities in food safety and technologies in the industry.

The need to resume and sustain exports to the EU drove the private sector to participate in fish safety and training of officers involved in fish processing and exporting. Local firms also emerged to provide pest control and fumigation services. The Bank of Uganda with its credit scheme, financial institutions and lease companies provided important investment and debt capital support to import plant and machinery, technology and total upgrading of their processing chains. The Centre for the Development of Industry (CDI) assisted UFPEA on hygiene control, chemical and microbiological testing, waste management and product cycle flow (Kiggundu, 2006: 312). The construction of a new industrial landing jetty in Banjul and upgrading of four more funded by the African Development Bank (AFDB) are expected to contribute to industrial and small-scale fishing operations to produce high valued products for global markets.

It is also important to note that overseas importers of Nile perch played a vital role in assisting Uganda to solve the fish exports crisis (Jansen, 1999; Keizire, 2004; Abila, 2000). The EU importers played an advocacy role through an association formed during the crisis to update the EU on progress made in Uganda's SPS standard compliance. Many went further to provide pre-shipment financial support, as well as loan schemes to upgrade operations, plant and machinery and technologies to local firms to meet export requirements. Some eventually became equity shareholders in Ugandan firms. Many overseas importers also assisted by investing in fishing equipment such as inland fish cooler trucks, to transport fish from landing sites to process centres, and high quality mesh gears, the cost of which are beyond many local fishermen. Overseas buyers were also vital source for new fish product development, designs and marketing in the supply chain.

Among the key measures adopted to boost Uganda's fish industry were the government ban on export of unprocessed fish (see Rasiah, 2006; Mathew,

2006; Naik, 2006; Kiggundu, 2006) and the prompt compliance with EU council directive of 97/493/EEC. It was vital that the government demonstrated a clear vision, leadership, and political will to institute technological changes and upgrading in the industry. There was an urgent response to institute legal reforms, establish effective statutory and enforcement powers with new competent authority and national standards to match EU standards. The Gambia did not follow similar policy measures in banning unprocessed fish exports. Most foreign firms in The Gambia are also licensed in neighbouring countries, while some come from EU and other Asian countries, transporting their catches from Gambia's EEZ for processing in foreign countries. This is due mainly to poor policy support to build appropriate port facilities for industrial fisheries. The catches are processed, labelled, branded and exported from other countries, denying the government of vital foreign exchange earnings. Through the agreements of 1987 – 1996 with EU countries, fish resources were heavily exploited for a meagre compensation to The Gambia⁵ (Kaczynski and Fluharty, 2002: 86). Also, the bilateral agreement with Senegal provided major benefits to the latter as it has much larger capacity; in addition, fishing in The Gambian waters is dominated by Senegalese fishermen. The value of legal catch transported to Senegal is estimated at USD5-USD10 million annually over the last ten years with an added 25% of illegal fishing, which in total exceeds the amount of fish exported from the Gambia annually (Department of Fisheries, 2011).

The Gambia did not even have a dedicated fish landing site for industrial fisheries⁶ until 2009 and as a result, high value fish are transported to neighbouring Senegal and overseas ports where such facilities are available; in addition, firms in Gambia did not have the capacity to process all the raw fish caught. Dried shark fish is exported to Ghana and most West African sub-region while smoked and salted fish are exported to Guinea and Cameroon. Shark fins and fish maws are exported to Asia, mainly Hong Kong (Mendy, 2009).

4.5 Development of Technological Capabilities

Uganda and The Gambia took different paths in acquiring technological capabilities with the former advancing considerably since the late 1990s and the latter remain trapped in low technology artisanal fishing. The technical and managerial capabilities in the fish industry in Uganda are dominated by regional multinational corporations (MNCs). The firm level capabilities are higher among foreign firms with a capacity to partner with international foreign firms than domestic firms. Importing capital goods such as plant and machinery and equipment may allow domestic firms acquire technology only if they have technological capabilities to use such equipment (Chandra *et al.*, 2006; Rasiah

2009; Rasiah and Vinanchiarachi, 2013). Fish handling and processing are labour-intensive, involving transporting from landing sites to fish processing factories where they are weighed, washed, sorted and graded for processing, (Nsimbe-Bulega and Akankwasa, 2002). Fish is processed based on importers' specifications- skinned or skin on based on buyers' preference.

Most fish processing firms either own ice-making facilities and refrigerated trucks or hire them. The fresh fish and chilled products are transported to handling stores at Entebbe Airport for shipment to mainly EU markets while frozen fish is transported by refrigerated trucks to Kenyan seaport of Mombasa for shipment.

Prior to the 1980s, technological capabilities in the fisheries industry were either limited or non-existent in the two countries. Local firms were not large enough to attract high skilled labour or able to access adequate formal financing and make use of tested technologies and exploit the opportunities of wide network. Due to these constraints, local firms had difficulties to undertake huge investments in plants and machinery and technologies. They lacked access to information and knowledge infrastructure locally and overseas and faced acute financing constraints. As a result, many relied on pre-shipment financing from their overseas partners. The lack of domestic pool of scientific skills to sustain technological adaptation in Uganda and Gambia has shackled the industry and prevented from technological deepening and competing in global markets.

Multinational foreign firms are relatively larger in size than local firms (Rocca *et al.*, 2009, 2011; Michaelas *et al.*, 1999; Berger and Udell 1998, 2006; Becks *et al.*, 2004, 2006) and thus, are able to attract skilled manpower, bank financing, technological investment and invest in heavy plant and machinery to learn, adapt and upgrade technologies. International firms' linkages with foreign firms quickened technological learning and adaptation for Uganda's industrial fish exports. However, given the absence of R&D, low product development and control of global marketing chains, foreign firms have not been able to produce high value frontier products.

It is noteworthy to mention that the public and private capabilities in Uganda were at best able to ensure sector's compliance with EU's SPS and US HACCP standards and not more than that (Kiggundu, 2006: 317; Chandra *et al.*, 2006: 35). The diffusion of technological transfer from FDI in the developing countries depends largely on the effectiveness of local capabilities through expansion and improvements of human and physical capital as summarised in Table 1.

Uganda's fish processing enterprises responded to EU sanitary standards by introducing computer-based devices to track temperature and yield as well as using upgraded equipment. The nature of the processing stimulated technological learning through product diversification and food safety. It

Table 1: Importance of Technological Mechanisms

	Fisheries in Uganda	Fisheries in Gambia
Foreign Direct Investment- FDI	High	Low
Import of capital goods/inputs	Medium	Low
Local industry development and participation	Low	Low
Contracts/Consultants	High*	High*
National R&D	Low	None
Harnessing Diaspora skills/ technology parks	Low	None

Source: Adapted from Chandra et al. (2006:41)

resulted in an overall improvement in firms' in-house laboratory capabilities resulting in reorganisation in plant layout, sanitary standards, fish handling, which aided exports to sophisticated global markets (Kiggundu, 2005, 2006).

Exports also benefited from deliberate efforts to diversify markets within EU and exploring new markets of United States, Middle-East and South Asia. Some began to process by-products such as fish frames for fishmeal and skins that were earlier discarded. The latter (Jansen, 1999; Abila, 2000) gave birth to firms engaged in downstream products such as juice, crumbs, marinated fish, fish pellets, flour, fish meal and tray packs (Kiggundu, 2006). The developments in the industry drove further differentiation and division of labour in the industry to specialise in producing ice, boats, outboard engines, components, and fishing nets at major fishing centres. As a result, the fish industry became increasingly more complex, vibrant and a key economic activity in Uganda overtaking coffee as the largest agricultural export commodity.

Despite such technological advancements, there is still room for further changes as Nile perch exports enter EU as semi-processed products which are further processed, branded and repackaged for overseas markets. However, the challenges are daunting not only because of increased competitiveness of the industry but also rapid technological changes require sophisticated skills and capabilities (Rasiah, 2007: 207). Even more challenging is the path facing artisanal fishermen in The Gambia. Lacking in bank financing and infrastructure development, technological learning here has been too slow to assist fisherman to transform to industrial fishing.

The meso-organisations in Uganda provided coordinating systemic learning, leadership, institutional support and facilitated a platform for interaction among key players through soliciting valuable support from UNIDO

with UIP project. Table 2 shows the contrasting technological experiences in the two countries.

Table 2: Technology and Performance Outcomes

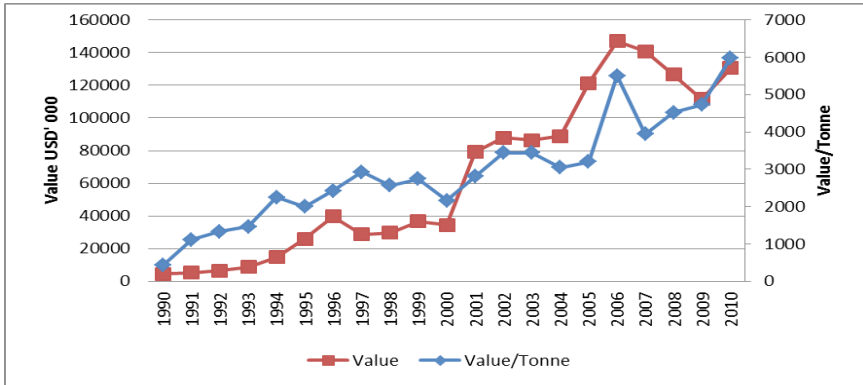
Key Factors	Fisheries in Uganda	Fisheries in Gambia
Level of technological ability	Successful learning but little R&D	Limited processing
Control over marketing chains and product development	Supply chains controlled by foreign buyers	Little integrated in global markets
Domestic control of fisheries sector	Regional MNCs control industry using larger size, resources, skills, technologies and linkages with buyers abroad	Artisanal orientation
National capabilities	Weak national firms capabilities, though, an ecosystem of system of capabilities (including national firms) has evolved around regional MNCs.	Underdeveloped fishing ecosystem.

Source: Adapted from Chandra et al. (2006: 50)

4.6 Impact on Fish Exports

Uganda’s fish landings rose from 1400 metric tonnes in 1983 to 100,000 metric tonnes in 1989, 219,356 metric tonnes in 2000 and 400,000 tonnes in 2009 (Namisi, 2000; Fish Statistics 2010). As a consequence, Uganda’s fish exports rose from USD1.9 million in 1990 to USD5.3 million in 1991, USD34.4 million in 2000 and to its highest of USD147 million in 2006 before dropping to USD130.6 million in 2010 (Bank of Uganda, 2010) (see Figure 3). The increase in volume and value of exports was largely due to collaborative efforts among key stakeholders (that became strong since the fish export crisis to meet overseas sanitary requirements, abide the laws governing fishing and the sector policies that attracted international and regional foreign firms into Uganda to exploit opportunities in the industry.

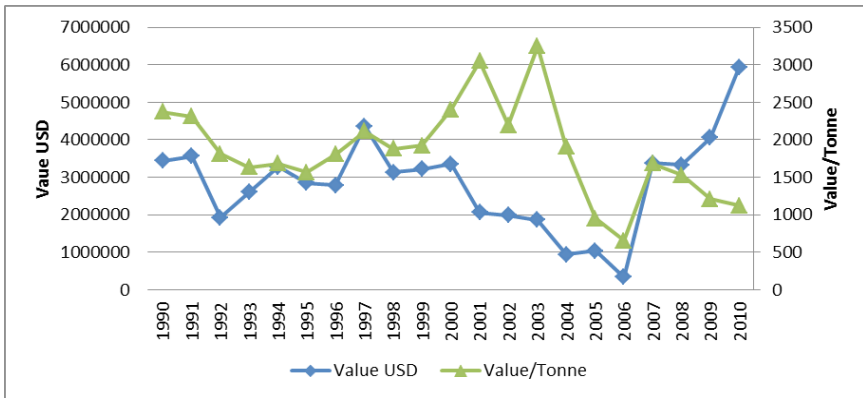
Figure 3: Fish Exports, Uganda 1991 – 2010



Source: Uganda Bureau of Statistics, Bank of Uganda

Figure 4 shows a declining trend in The Gambia’s fish exports from 1997 to 2006 as exporters targeted high valued fish species in addition to the difficulties faced in meeting EU sanitary requirements.

Figure 4: The Gambia’s Fish Exports 1991-2010



Source: The Gambia Bureau of Statistics (2011), Department of Fisheries (2011)

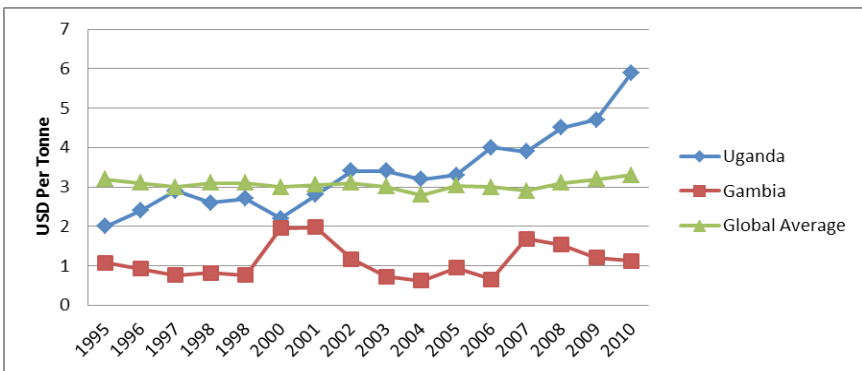
The unit value of chilled fillets from Uganda matched the global average in 2001, recording close to the US\$3,000 per tonne value of 1997, the year when the country was hit by the fish export crisis (see Figure 5). Unit prices rose sharply in 2002 to overtake the global average. The Gambia faced a completely different experience as the ratio of fish export value per tonne remained lower

than the global average throughout the period. The increase in export values from 1991 to 1996 was due to higher export volumes but dropped in 1997 through to 2000 due to export crisis and rose again in 2001. However, the export quantity fell from 28,000 metric tonnes in 2001 to 25,000 metric tonnes in 2002 but export value recorded an increase from USD\$79.04 million to USD\$87.9 million. The ratio of value to quantity grew from 2.8 in 2001 to 3.4 in 2002 (see Figure 5). The same scenario continued in 2005 and 2006 when export quantity plunged from 37,836 metric tonnes to 26,717 metric tonnes while export value rose from USD\$121 million in 2005 to USD\$147 million in 2006. The value to quantity ratio grew once again from 3.2 in 2005 to 4.2 in 2006. This continued through to 2010 when the ratio of value and quantity rose from 3.9 in 2007 to 4.5, 4.7 and 5.9 in 2008, 2009 and 2010 respectively while the quantity consistently declined during the period. The drop in quantity is associated with over-exploitation of Nile perch that attracts higher prices in overseas markets.

Despite concerns of overfishing (Jansen, 2000; Keizire, 2004; Kiggundu, 2005, 2006), exports from Uganda have increased sharply since 2001. Rapid technological transformations helped expand exports to competitive markets (Kiggundu, 2006: 322) that attach high premiums to food safety, freshness and overall quality. In contrast, The Gambia lags behind in sophisticated technology as seen in Figure 5.

Despite efforts by the government in collaboration with UNIDO and other government agencies to support the industry since 2010, there has been little progress. Thus, small wonder that The Gambia’s exports have remained below the global average throughout the period 1995-2010.

Figure 5: Value/Quantity Of Chilled Fish Exports, 1995-2010



Source: Uganda Bureau of Statistics; The Gambia Bureau of Statistics

5. Conclusions and Implications

Institutional development related to fisheries in both countries were inadequate and incoherent until the late 1990s when joint efforts from key stakeholders in Uganda helped to transform the technological capabilities in operational systems, plant layout, hygiene in landing sites and overall processing chains. The EU ban had in fact acted as the trigger to quicken technological upgrading in Uganda. Although the macroeconomic environment improved in both countries since the late 1980s, the important transformation of Uganda's fishing industry was achieved through the development of technological capabilities and the lack of it has stifled The Gambia's capacity to export to high valued markets.

The pressure and sense of urgency to address lapses in the industry and invest massively in adapting and upgrading technology came when the EU enforced the Council Directives of 91/493/EEC and 97/296/EC. The standards set on the fish industry forced rapid technological upgrading. The joint efforts from Ugandan government, international development partners, network body (UFPEA), overseas buyers and knowledge infrastructure were crucial in saving the industry from collapse and to transform it to regain high value export market. The Uganda government played a key role in sustaining the pressure on processing firms to meet the required standards, including but not limited to monitoring and surveillance to ensure responsible fishing and food safety. Such pressure was missing in The Gambia to trigger technological change. Not only that fishing has been dominated by the artisans, there has also been a lack of a comparable monumental crisis to quicken learning, adaptation and upgrading in the Gambia. There is an urgent need to boost The Gambia government's collaboration with UNIDO to upgrade Department of Fisheries' laboratory to test for fish safety and improve systems to enhance fish exports; this should be expanded to include complementary activities as well.

Sustaining an enabling macro-economic environment and enforcement with the public sector providing important political commitment in legislating new laws is crucial in supporting compliance with EU Council Directive prescriptions. Attracting industrial fisheries and enhancing effective upward and downward linkages with overseas MNCs and artisanal local firms are essential to encourage spillovers in technological learning and upgrading in the industry. Promoting collaborative efforts are instrumental in solving collective actions problems as shown in Uganda which could be adopted in The Gambia.

The contributions of the study is summarised as follows:

- i. Past works on the significance of agricultural fish commodity in economic growth have focused on super exporters such as Chile, Norway, China and Vietnam (Keizire, 2004; Kurien, 2004; Katz, 2004, 2006). This study however, examined the industrial experience of two LDCs of Uganda and The Gambia in SSA.

- ii. The findings indicate that industrial fisheries have greater capabilities in accessing finance, attract human resource skills and connectivity along the supply and value chains in global fish markets in addition to being able to adopt tested technologies, though in existence elsewhere but new to firms in Uganda relative to the artisanal (small-scale) fisheries in The Gambia.
- iii. Collaboration and coordination among key stakeholders (government of Uganda, industry association, international development partners, financial institutions, meso-organisations and overseas importers) are instrumental in lifting the industry out of the fish export crisis that cost the industry and the economy dearly.
- iv. Kiggundu's (2005) work is the only known study on technological capabilities in the fishery industry in Sub Saharan Africa, making it an invaluable work for anyone for wishes to enhance knowledge in this area.

Although Uganda has clearly outperformed The Gambia in stimulating technological change which contributed to better fish exports in terms of output and value, efforts must be taken to support R&D and marketing to stimulate further upgrading in the industry. Research & Development and control over value chains have not evolved in Uganda, but The Gambia lacks industrial fishing and the linkages associated with it. Hence, the focus of Uganda should be targeted at reaching the technology frontier through the strengthening of R&D support services at the universities and R&D laboratories. ; The Gambia should be on the hand actively promote of industrial fishing through a strong regulatory framework and collaborate with meso-organisations to offer training, export promotion, development of landing sites, refrigeration, maintenance of fishing boats and fish gears. Efforts must also be taken by both governments to promote productive linkages among all the key stakeholders.

Notes

- ¹ The Ugandan Shilling continued to depreciate against US Dollar; levelled to US\$1, 577 per 1 US Dollar in year 2000, further to US\$ 1,740 in 2005 and worsen to US\$ 2,282 in 2010.
- ² Despite efforts of projects – AFDB USD14 million support in 2003 to develop artisanal fisheries, USD 0.35 million for fish quality control laboratory and USD2.5 million Gambia-Senegal Sustainable Fisheries Project 2009 -2014, these have not translated into much technological improvements in the sector.
- ³ The competent authority in Uganda.
- ⁴ Small fishermen had to resort to poisoning the lake to catch fish as the industrial fisheries dominated the capture fish market equipped with modern fish gears. The former also left marginalised as the policy support is skewed to promoting fish export revenue than building their capabilities.

- ⁵ Between 7.5%- 10.5% of total catch value equaled the compensated fund to West African coastal states.
- ⁶ Only three industrial firms were landing catches at in-country sites for local processing which is where much of the potential lies for local value added. Processors are operating far below capacity as they depend almost totally on artisanal catches. It is estimated about 80% of the catch of the licensed industrial fleet and 100% of illicit catches were landed abroad (Mendy, 2009).

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