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Subsidisation and Sustainability Impacts on Contract Producers

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Abstract

Production subsidies tend to be provided as government development support instruments. This paper examines their potential impacts on lower-tier producers. Those impacts are partly elucidated by a mixed-methods study of small-scale fish producers of Seychelles targeting foreign fish markets. Scale disadvantages tend to prevent such producers from overcoming the entry barriers of foreign markets without government assistance, including subsidisation. In the study, a screening survey helped assign a group of 34 randomly-selected fish producers to a Managed Value Chain (MVC) – buyers and producers engaging in supply-demand matching coordination, and another 32 randomly-selected fish harvesters to an Open-market Value Chain (OVC) – comprising buyers and harvesters without intentional supply-demand matching coordination. Using 5 months of production-related data, the study first compared the means of the production capacity, level and efficiency of the producers. Four highest-producing MVC producers subsequently gave an interview on their operations. Results inter alia indicate that a gradually increasing range of fisheries subsidies have been helping MVC producers to raise their production capacity, standard and level. However, the subsidies have also been indicatively decreasing the productivity of commercial stocks. The study inter alia suggests that unless marine biological resources are carefully managed, export-oriented production subsidies threaten their environmental sustainability.

Keywords: subsidies, environmental sustainability, value chains, SME, productivity

1. Introduction

A subsidy tends to be a type of state aid for public and private enterprises. It may target various outcomes: financial – perhaps, a desired level of revenue, capital inflow, trade imbalance, etc., and/or non-financial – possibly, an aspired level of productivity, nutrition, employment, self-sufficiency, etc., Irrespective of its outcome/s, a subsidy represents a cost to taxpayers and is charged to the national budget. However, it is not necessarily a cash transfer, as it may also be an intangible measure - like a concession on applicable charges/requirements. That said, private enterprise subsidisation appears to be more contentious, as it tantamount to giving money collected from taxpayers to a firm that may subsequently trade with some of them. On the one hand, the taxpayers trading with a subsidised firm unsuspectingly part-prepay the production of what they buy. On the other hand, subsidisation does not only deliver a cost advantage to a targeted firm but also serves as a state intervention tool in its 'private' operation. If the subsidised firm engages in international trade then it may also have a cost advantage over its overseas partner/s - not having equivalent supports, and, depending on its impact, the advantage may be construed as an 'unfair trading' practice and trigger potential conflicts.

By implication, a subsidy has potential economic, social, political and even environmental impacts. To elaborate, as its awarded cost advantage typically helps increase capital inflow into specific economic activities, a subsidy may not only improve the political influence of its advocates but may also be an important strategy for implementing particular economic, social and political programmes. However, the potential positive impact of subsidisation on production is also being increasingly linked with environmental harm. For example, as Michel and Sticklor (2012) contend, over the past 50 years or so, the oceans have soaked up some 90% of the added heat of global warming, boosting ocean surface temperatures by about 0.1^0C. The warming is gradually being associated with harmful chemicals emitted by many large-scale operations, which - often for economic and strategic reasons, tend to be subsidised, as (Alamu, 2013; Lawrey and Phillarisetti, 2011; and Katsuro, 1984) indicate. Such implications potentially explain why subsidisation is not only a ubiquitous instrument of government but also oftentimes triggers debates, even disputes - both nationally and internationally.

The potential serious impact of subsidisation on international trade conflicts and global environmental harm appears to

be at the heart of multiplying calls for its regulation. Underlying contentious issues include the type, rate, timing and frequency of subsidisation. For instance, industrial production subsidy is widely thought to influence overfishing, being increasingly blamed for the commercial extinction of some fisheries and the dwindling productivity of remaining viable fish resources. More and more, the elimination of harmful subsidisation is advocated for avoiding both the commercial and biological extinctions of remaining high-demand fisheries.

In its State Of World Fisheries and Aquaculture (SOFIA) report for 2014, the Food and Agriculture Organization, (FAO) contends that the fishery trade is particularly important for developing nations. Fishery exports peaked at US$129.8 billion in 2011, up 17% on 2010, but declined slightly to US$129.2 billion in 2012. However, FAO (2008) argues that 80% of commercially valuable fish stocks are now overexploited, fully exploited, significantly depleted or slowly recovering from depletion. FAO (2010) adds that in 2008: 15% of monitored stocks were underexploited; (3%) moderately exploited and (12%) have production-growth potential. According to Van der Elst et al., (2004) the Western Indian Ocean (WIO) has 2200 species, representing some 83% of all the fish families known. FAO (2014) adds that the total catch in the Indian Ocean has been continuously growing and, in 2012, two new record highs were achieved for the Western (4.5 million tonnes) and Eastern (7.4 million tonnes) fishing areas. On the profile of fish producers, FAO (2010) estimates that most of them are small-scale, operating on coastal and inland fishery resources and contributing more than half of the world's marine and inland fish catch.

Harper (1984) contends that a small-scale producer typically has inadequate skill and initiative in marketing, which incline it to serve the poor, who in turn helps limit its access to growth capital and distant markets. What's more, as many high-demand fish resources become overexploited, world competition for fish is intensifying and diminishing the returns of major fish traders - so-called, 'lead firms', predominantly based in the developed world. Consequently, lead firms come under competitive pressure to cut costs and improve productivity by not only scouting for more viable fish resources but also engaging with their suppliers - including developing-country small-scale producers. Under the leadership/governance of the 'lead firm', the ensuing sequence of cross-border, yet independent, businesses co-ordinate their operations for improving fish supply-demand alignment and, with it, individual, collective and consumer value gains. Such operationally interlinked businesses are often also considered as a Global Value Chain (GVC). In the words of Humphrey and Schmitz (2001), a lead firm presses for cost reduction, quality and speed enhancements; helps improve layout, production flows, skills and also transmits best practices. Lee et al. (2012) add that the sourcing strategy of some international agri-food traders – that reflects the demand of a retailer or manufacturer, is critical for integrating smallholders into export-oriented chains. In producer-driven chains, a processor in a developing country imposes safety controls on farming. Such multiple chain governance structures as well as stringent private food standards tend to shape the strategic options that a smallholder faces: upgrading; downgrading; exit. By implication, a small-scale fish supplier of a GVC is one with an upgraded production process and the capacity to overcome inherent barriers of foreign-market participation – including production quantity, quality and productivity. In the views of Van Dijk (2012), upgrading of developing-country value chains increases the benefits that they derive from being integrated into world markets. Van Dijk and Trienekens (2012) add that most developing-country producers tend to be commodity suppliers for their value chain partners in the West. Upgrading for these producers should focus on numerous business aspects and also help them to consistently meet market standards. However, in the arguments of Barney and Hesterly (1999), the resource-based view of the firm suggests that an upgraded producer's unique resources also impact on its production. Congruently, Cooney and Malinen (2004) suggest that the decisions of an entrepreneur shape the nature of a firm. Further still, North (1994) contends that firms that develop reflect the opportunities created by the institutional environment, including formal constraints - such as rules, laws, constitutions, and informal constraints - such as norms of behaviour, conventions, self-imposed codes of conduct, along with their enforcement schemes.

On fishing sustainability, Tientenberg and Lewis (2014) argue that a fishery is environmentally sustainable when its catch levels do not exceed the growth of its biomass or 'total species weight'. If so, stock reductions from commercial exploitation, natural mortality or out-migration are offset by stock increases from births, growth of the fish in the remaining stock, and in-migration. Concurringly, Baker (2006) argues that a sustainable yield is a harvest rate that, in principle, can be maintained indefinitely. FAO (2014) adds that species exploited within biologically sustainable levels have an abundance at/above the level associated with their maximum sustainable yield (MSY). While fish stocks with a biomass considerably above the MSY level are under-fished, those having a biomass at or very close to their respective MSY levels have no production-growth prospects but need MSY management instead. UNEP (2011) affirms that some species that were once the staples of regional economies, such as cod in the northwest Atlantic, are commercially extinct. However, fish stocks fluctuate considerably over time owing to variability of water temperature and factors relating to fish regulation, including fleet capacity. Adding on, Van der Elst et al. (2004) contend that some factors impacting on catch fluctuations can be linked to changes in market demand, shifting fisheries and depletion of stocks. Crathorne, Rees & Harlow (2001) argue that - as chemicals causing environmental harm, pollutants may be emitted

from a point source - like a specific industrial site, sewage works, and/or diffuse or non-point source. And, in the arguments of Tientenberg and Lewis (2014), a global pollutant is one whose damage affects the whole planet and include sulphur and nitrogen oxides.

UNEP (2011) further argues that given its potential to raise fishing effort, fisheries subsidy is universally accepted as negatively impacting fish stocks. However, in the arguments of Vrooman (1978), the classical marginalistic theory of the firm predicts that, in a perfectly competitive industry, a subsidy has a zero impact on the internal operations of assumedly profit-maximizing firms. Hence, a subsidy helps its awarding community to achieve some overriding extra-market need without diminishing the economic efficiency of the beneficiaries. However, imperfectly competitive industries tend to be closer to the norm and the firm basically pursues a satisficing rather than a profit-maximizing objective. In addition, the behavioural theory of the firm anticipates that the behaviour of a subsidised firm tends to be directed less towards profitability and more towards broad managerial perquisites and comparatively higher wages than a nonsubsidised firm. Further still, as subsidisers typically possess very poor information about relevant industry costs, managers of subsidised firms are free to argue that the costs creating their deficits are approximately the minimum necessary costs of producing the desired output. That said, a subsidy assumedly helps achieve its targeted social need but at a potentially higher inefficiency than basic marginalist microeconomics indicate. In addition, Bergström (2000) contends that a subsidy appears to have conflicting impacts: it may positively impact the production technology; economies of scale; slack and rent-seeking behaviour of the beneficiary. While the enhanced production technology and economies of scale of the subsidised firm are likely to help it increase its output and productivity, slack and rent-seeking behaviour are likely to have counterproductive internal impacts. Slack in the firm, which may increase with a subsidy, is a form of waste associated with the firm's capital investments that generate zero or suboptimal productivity. Rent-seeking behaviour allows the subsidised firm to generate income - also known as economic rent, not through real production but lobbying activities for primarily sustaining and/or increasing its subsidy. In the case of some Korean Industrial Policies, for example, Lee (1996) argue that they helped to structurally transform the Korean economy but were not successful in promoting productivity growth. Excessive trade protections seemingly improved the allocation of resources in the Korean manufacturing sector but never brought about higher productivity growth in the supported industries. Tax incentives, in particular, appeared to be positively correlated with the output and capital growth of the manufacturing sector. However, the incentives did not accelerate overall growth of the economy and may have retarded it. The evidence of negative links between protection and productivity growth seems to shed light on the intrinsic difficulty of implementing infant industry protection. Targeting the right industry is not only arduous but may even be impossible. The impact of government industrial policy and trade protection of the Korean manufacturing sector implies that less government intervention in trade is linked to higher productivity growth. In relation to a study of subsidised and nonsubsidised manufacturing firms in some underdeveloped regions of Sweden, Bergström (2000) argues that, as well as in the EU, many politicians in Sweden consider subsidisation as an efficient instrument to increase growth in such businesses. The study suggests that subsidisation is positively correlated with growth of value added and that the productivity of the subsidised firms seems to increase the first year after subsidies were granted. Even if there might be market failure justifications for subsidies, it is not certain that resources will be efficiently allocated. The influence of important pressure groups can lead to subsidisation of less productive firms, which implies that industrial policy prevents or delays the structural transformation of the industry and can also make firms less efficient.

UNEP (2011) identifies 8 categories of fishing subsidies: (1) free-of-user charge fisheries infrastructure, like fishing ports; (2) Management services and research, especially free-of-charge monitoring and surveillance, stock assessments and research on sustainable fishing systems; (3) Subsidies for accessing foreign fish stocks, like for fishing rights/licences that may effectively subsidise a distant-water fleet of a foreign country; (4) Grants for decommissioning vessels and fishing license retirement; (5) Subsidised capital costs, including below-market loans for acquiring/modernizing a vessel; (6) Subsidised variable costs, including tax rebates on fuel purchases, vessel insurance programmes; payment for damages plus below-market bait, training and transport services; (7) Income support and unemployment insurance, particularly for temporary fishing incapacity; (8) Price support, such as export subsidies, border measures (tariffs and quotas) for raising domestic fish price. However, UNEP (2011) adds that the subsidisation of artisanal fisheries tends to be given some special considerations on the assumptions that they: (a) are not likely to be harmful and (b) may be important and necessary components of government policies aimed at poverty alleviation and development.

Based on the above discussion, the fishing industry of Seychelles is conceptualized as comprising two fish value chains: an industrial tuna GVC, which is dominated by foreign owned and operated tuna harvesters plus a canning factory, and a Fresh and Frozen Fish (FFF) value chain, reserved for and dominated by native small-scale operatives. Both chains benefit from the fisheries subsidies as inferred by UNEP (2011), although not equally, as discussed below. The FFF value chain is further conceptualized as comprising two streams: a Managed Value Chain (MVC) whose independent

firms - including approximately 50 harvesters, deliberately collaborate for fish supply-demand alignment and improving economic gains plus an Open-market Value Chain (OVC), whose participants – including approximately 400 harvesters, do not intentionally collaborate for supply-demand matching purposes but casually transact. MVC harvesters were assumed to have more sophisticated vessels thanks to intra-chain synergizing processes, industrial fishing policies and their unique resources. That said, the FFF value chain is defined as an inter-firm network of firms exploiting marine fish resources, for both native and foreign markets, and operating in an institutional environment fashioned by both national and international governance instruments.

Production wise, (SFA, 2012) contends that the total fish production - destined for human consumption in the year 2012, stood at 233,979 tonnes: 2,502 and 231,979 tonnes were contributed by the FFF and industrial tuna value chains respectively. The production of the FFF value chain is estimated to have climbed to just under 6,000 tonnes, in late 1980s, and has since been unsteadily declining as Fig. 1 makes visible.

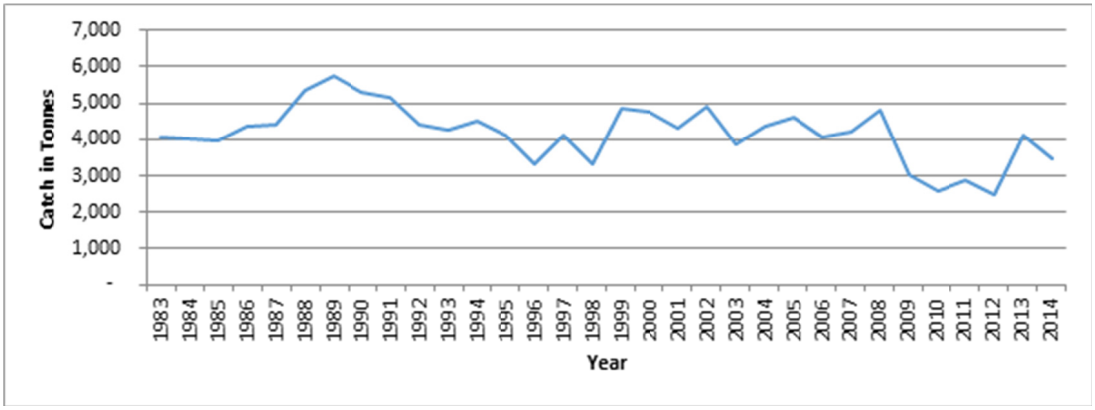

Figure 1. Small-scale fisheries production for the period 1983 – 2014

Sources: CBS Annual Reports (1987 – 2007); NBS Reports: Seychelles in Figures (2008-2015); SFA Annual Reports (2006-2012)

The debt status of its economy assumedly pressures Seychelles to link up with GVCs. Since early 1980s, the country has provided a range of subsidies for fishing capacity expansion. Those still in place primarily support the FFF value chain, perhaps because it is seemingly the preferred source of animal protein for natives. For example, in its annual report of 2011, the Seychelles Fishing Authority (SFA), discloses that registered FFF harvesters benefit from Goods Sales Tax (GST), and Trades Tax exemptions on imported goods, Business Tax concessions as well as Gainful Occupation Permit (GOP) or work permit exemptions for foreign workers employed. In 2011 alone, USD1.45 million worth of claims for GST and Trades Tax concessions were processed. SFA (2012) further confirms that a "Sickness Benefit Scheme" compensates registered FFF fishers in case of temporary fishing incapacity. In addition, a refund of USD0.62/ltr is granted on commercial fishing fuel purchases. In 2011, as SFA (2011) also cites, 3,952 fuel rebate claims worth USD1.5million were processed and this amount was an increase of 15% over the 2010 level. In fact, based on available data captured by Fig. 2, the fuel subsidy of the FFF value chain has steadily increased over the years and its rate of increase has been far higher than that of the export revenue that it helps support.

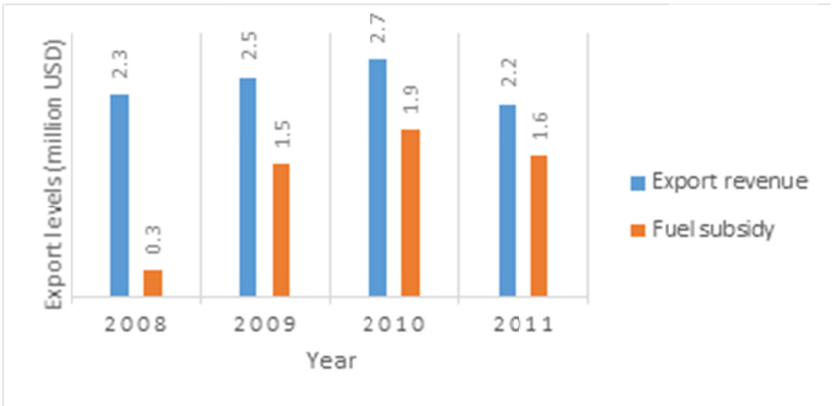

Figure 2. Levels of export and fuel subsidy of the FFF value chain

Sources: export revenue levels (NBS Reports for the period 2012-14); fuel subsidy levels (SFA Annual Reports for the period 2007-2011); average exchange rates (CBS Annual Reports for the period 2008-2011)

According to SFA (2012), FFF fishers may also purchase plate ice from SFA, at USD2.3 instead of the market price of USD6.2 per 50kg. SFA's Research & Development (R&D) department has - since its inception in 1985, also spearheaded fishing capacity expansion initiatives, including the development of fishing ports and ancillary facilities. For supporting FFF value chain development, the R&D inter alia commissioned the construction of higher-capacity vessels and brokered below-market loans for uptake promotion. Although privatized in/around 1995, SFA also built fish storage facilities in the communities in late 1980s plus a FFF processing-exporting plant. Those initiatives allowed fish exploitation intensity to increase dramatically in the 1980s. The rising trend persists: CBS (2014) reports the arrival in 2014 of the first of 15 large long liners to be owned by a local firm, for example. Moreover, SFA also provides resource monitoring and surveillance services. Associated costs are minimally recovered from the fishing sector; to an even lesser degree from the FFF value chain. For instance, while firms supplying the industrial GVC are legally-bound to surrender their production records, those targeting the FFF value chain are de facto not obliged to do so. Instead, on the arguments of Robinson et al. (2007), the management of FFF production is mostly undertaken by SFA, including the enumeration of individual landings. Arguably, the industrial GVC, including the European Union (EU)'s distant water fleet, is less subsidised than the FFF chain. The EU may even help subsidise the FFF Chain, as a usual condition for EU's fishing fleet to exploit local stocks is the financial support of FFF value chain development. Corroboratively, SFA (2011) reports that in July 2009 a Fisheries Development Fund (FDF) of Euro 2.7 million, funded by EU's sectoral support Programme for Seychelles, was established to boost fisheries investments. Between 2010 and 2011, the FDF helped elongate the processing quay of the principal fishing port - from 45m to 98m. Another development fund of Euro 16.8 million was available between 2011 and January 2014, comprising an annual payment of Euro 3.380 million - for EU vessels of 52,000T to harvest local stocks, plus a yearly contribution of Euro 2.200 million to support the local fisheries and maritime policy. As SFA (2012) further confirms, the first long-liner acquired through an FDF-funded loan joined the fishery in 2012. However, in spite of such wide-ranging subsidies, the production of the whole FFF value chain peaked in late 1980s and has since been unsteadily decreasing, as Fig. 1 aptly captures.

Turning to other parts of the investigation, MVC intra-chain synergizing processes were surmised as supporting the upgrading of small-scale harvesters and their subsequent foreign-market participation. Assuming the MVC exploits productive fish stocks, disadvantages of small-scale harvesting suggest that those synergizing processes should substantially focus on structural improvements, particularly production 'process upgrading'. And, since upgraded harvesters are the principal suppliers of the higher-yielding MVC, their economic performance is potentially better than for OVC harvesters. Hence, measurable business outcomes are the best estimators of allied upgrading advantages. That said, drawing on the resource-based view of the firm, such advantages may also be attributed to unique resources of the harvesters and the wider institutional environment, including subsidisation. As FFF production is monitored primarily by the authorities – actually, 6 days a week by SFA field enumerators at specific landing sites, as hinted above, the harvesters are dis-incentivized from keeping their potentially useful financial data. Therefore, for comparing MVC and OVC harvesters, only variables relating to their landings, viz., production capacity, level and efficiency are readily available. The objective of the study was to empirically test the significance of MVC impact on the small-scale harvesters and illuminate some related mediating and moderating variables. The question posed was: How does an MVC influence the production of its harvesters? The investigation called for not only a comparison of testable business outcomes but also a potential narrative for them, hence a mixed-methods approach. In the arguments of Moffatt, White, Mackintosh, & Howel (2006), such an approach is not uncommon in social research, in spite of the paradigmatic divisions of quantitative and qualitative investigations. Adding on, Tornikoski (1999) argues that the goal of research, from the positivist point of view, is to: (1) search for regularities and test in order to predict and control and (2) describe and explain in order to diagnose and understand, according to subjectivism.

The conceptual framework informed three testable hypotheses. The likely impact of the targeted demand on production motivated the first. Assuming productive fish stocks are targeted, production quantity and standard are likely to be positively impacted by the type of vessel used. Based on Harper (1984) contentions, the targeted market too impacts on vessel suitability. Corroboratively, the sectorial review indicates that harvesters with lower-capacity vessels are mostly day-trip suppliers of fresh whole fish to native, lower-income customers, and those harvesters using higher-capacity vessels are mostly multi-day suppliers of partly-processed fish to higher-income foreign customers of primarily the MVC. In this sense, MVC participation appears to be structurally sustained. For MVC participation, a harvester seemingly upgrades its production process, primarily in vessel size and allied production capacity. Such dynamics motivated the testable hypothesis that: MVC harvesters are likely to have higher production levels than the ones in the OVC. And since MVC and OVC harvesters employ higher and lower capacity vessels, respectively, the second associated hypothesis is: MVC harvesters are likely to have higher production capacities than those in the OVC. The

production objectives of the MVC and OVC harvesters too are quite different. Those in the OVC trade in fresh whole fish. Allied high perishability rate, coupled with the 'afternoon' buying habit of lower-income customers, restrict their sale period to between noon and equatorial sundown, typically around 18:00hrs. Hence, harvesters come under pressure to not only limit how much but also when to fish. Indeed, the viability of a large landing past sundown tends to be extremely compromised. However, being multi-day harvesters, MVC suppliers may agree on their landing times with their buyers and thus keep harvesting to fill up their fish-hold. Such operational disparities compellingly motivated a third testable hypothesis: MVC harvesters are likely to have higher efficiencies than those in the OVC. The qualitative part of the study sought to shed light on some potential sources of the three hypothetical impacts. It was kept focussed on production-related factors by two assumptions, namely: the MVC is a market attracting (1) already higher-producing small scale harvesters and (2) small scale harvesters with individual higher-production potentials.

2. Materials and Methods

The quantitative part had to confirm supplier-buyer links, sample comparable MVC and OVC harvesters and compare the distribution of their production capacity, level and efficiency. With these considerations in mind, only randomly-selected, single-vessel harvesters were investigated. Those targeting the public were assigned to the OVC and those collaborating with their buyers were assigned to the MVC, on confirmation of associated interactions by both parties. Production level was estimated by the landed kilogram catch weight. Production capacity was estimated by the design kilogram catch weight of the vessel used. Efficiency was estimated by the per cent of (landed catch weight)/(production capacity) over the entire data collection period. The quantitative study tested the nominal variable, the FFF value chain, for a significant difference of means between its independent MVC and OVC subgroups, on dependent variables: production capacity, level and efficiency. The independent variable was 'nature of demand', i.e., managed vs open-market. The parameter tested was the difference in the means of the two unrelated populations of harvesters. For the tests, the unequal-variances t-test was used as the standard deviations of the dependent variables were not expected to be equal. For the qualitative part, four highest-producing MVC harvesters, as the quantitative phase had confirmed, gave a semi-structured interview, which were individually analysed using the 'content analysis technique', described by Krippendorff (2004). Procedure wise, the two fish plants accepted to hand over their cumulative list of 50 harvesters. A separate list of another 50 harvesters were randomly selected from a database of registered native fishers. Sorted by their bases of operation, the owners of the fishing firms were in turn telephone-invited to take a screening survey. Altogether, 70 of them accepted to do so: 36 and 34 from the first and second list of harvesters, respectively. They were later individually interviewed, with confidentiality assurance, on 6 categorical variables: harvest disposal, landing site, production capacity, point of sale, principal buyer and supplier-buyer interaction. A respondent who reported interactions with its buyer was assigned to the MVC, otherwise to the OVC. Next, the landings of the participants were weighed during their peak fishing season, viz., November 2013 through March 2014. The production of OVC harvesters was mainly estimated by weighing a sample of their landed species and multiplying the average figure by the total quantity of each specimen. Weighing was undertaken by SFA field enumerators, 6 workweek days, using a hand-held 25kg spring-balance scale. Weighing of MVC landings was done by their buyers, with the aid of 3,000kg digital scales. On completion of the weighing, the four highest-producing MVC harvesters were subjected to a recorded, semi-structured interview on their individual operations. The raw dataset was cleaned from zero returns and, on ethical grounds, the data from an MVC harvester that had lost its vessel and crew at sea were also eliminated. After the process, the independent samples dropped to 34 MVC and 32 OVC harvesters. Table 1 summarises their relevant attributes. As it displays, MVC harvesters mostly target the fish plants and those in the OVC mostly supply the general public. The few multiple-buyer MVC suppliers have a greater average production capacity than those targeting the fish plants only. Equally noticeable, the average production capacity of OVC suppliers of the fish traders far exceeds that of general public suppliers.

Table 1. Key attributes of investigated fish harvesters

Customers	Harvesters (Nos)		Mean Fish-hold (MT)		Mean Crew Size (Nos)	
	MVC	OVC	MVC	OVC	MVC	OVC
Fish plants	22	0	4,061	0	5	0
Various	7	2	6,029	1,075	7	3
Traders	5	1	1,300	6,000	3	5
Public	0	29	0	1,139	0	3

3. Results and Discussion

The t-tests produced a statistically significant difference in only the mean production levels and capacities of the two groups. As the probability of finding results as extreme as those obtained in both cases was $p < 0.01$ (or 1 in 1000) and far lower than the set significance level of 0.05, there was thus overwhelming support for a positive impact of the MVC on the production capacity and, associated with it, output of its producers. However, at $p > 0.14$ (or 14 in 100), the t-test

did not produce a statistically significant difference in the mean efficiencies of the two independent groups of suppliers.

Potential robust explanations for those partly unexpected results emerged from the analysis of the interviews with the 4 MVC suppliers, using the content analysis technique described by Krippendorff (2004). Drawing on that analysis, subsidised infrastructure allows MVC participants to establish their base at the principal fishing port. Key stakeholders in the industry, including SFA, fish plants and self-help associations offer fishing firms with practically free-of-charge access to educational and training resources. Also, an MVC harvester tends to be an expansion venture of a firm from another economic sector. It is reportedly attracted by MVC higher-returns prospects and associated subsidies. At the outset, the expanding firm leverages accessible business intelligence, state-brokered below-market loans and bootstrap finances to acquire a higher-capacity and relatively sophisticated fishing vessel. Once in the MVC, subsidised factors of production – particularly, ice, fuel, taxes, support its viability. However, its inadequate fishing business experience pressures it to delegate management of practically all aspects of its MVC business to the captain of its vessel, including sales. Moreover, the firm faces a high and low fishing seasons, which influence the profile and management of its fishing hands: they tend to be unskilled, learn to fish on the job, live off fishing and used as temporary staff. Further still, as commercial fish resources are managed on a common-pool and open-access basis, harvesters are incentivized to fish at will or produce as much as possible. Over the years, batch and cumulative productions have gradually decreased, albeit the trend is impacted by environmental factors too. Corroboratively, exploited resources are not only deep-sea and seasonal but also elusive, as they are wild, sensitive to not only time of exploitation but also to weather and ocean conditions, reportedly under increasing pressure from deleterious global impacts of human pollution. These risk factors seemingly create a fairly hostile production environment for MVC harvesters as they tend to be challenged to fulfill any accepted MVC fish orders. By implication, both MVC buyers and suppliers maintain a fairly open-ended contract. Through it, the buyer tends to credit-fund some of its supplier's ice and bait, as fish order down-payment. The harvester tends to deliver fish to its buyer to at least cover the down-payment and the buyer, in turn, usually keeps fish storage for its supplier to at least recover its down-payment. On the one hand, the down-paid orders are rarely adequate 'dependent' sales/demand for sustaining the harvester's viability. Consequently, the harvester typically enters into open-ended supply contracts with various foreign-market traders, including upmarket hotels and restaurants. On the other hand, the down-paid orders, or part of them, that the harvester tends to honour are usually insufficient levels of 'dependent' supply for the buyer, which enters into open-ended supply contracts with various 'upgraded' harvesters, not only for managing their supply but cost risks too – by pitting the harvesters against each other. Such dynamics compromise not only the MVC sales and price risks of the supplier but also its batch and cumulative viabilities. In response, it partly diversifies into OVC-targeting operations.

The analysis of the interviews thus reveals that, as predicted by a common hypothesis in the GVC literature, the MVC positively impacts on not only the production process but also the associated output of its independent suppliers. Affirmatively, in order to participate in the MVC, a supplier has few alternatives but to upgrade its production process by acquiring a vessel that is capable of inter alia exploiting a relatively high quantity of a relatively narrow range of species – seemingly at least 100 miles offshore, preserving and also delivering them at pre-set quality standards. Hence, in order to supply foreign markets, a small enterprise has to improve both its production capacity and overall management. Primarily through its demand parameters, the MVC coordinates the production of its independent suppliers by influencing not just their production process design but production objectives too. That said, the positive impact of the MVC is not a monolithic force but, as hinted above, draws heavily on unique resources of the suppliers – as the resource-based view of the firm supports, and beyond – including wide-ranging government subsidies. Such dynamics help illuminate the action in the MVC of both explicit and implicit public and private influences, as well as their associated inherent conflicts. Fish demand specifications are the first and foremost instruments of private control of the foreign-oriented MVC. Drawing on the views of Humphrey and Schmitz (2001), they constitute the governing parameters that are not only set by the lead firm – in this case, located primarily in the European Union, but with which all firms in the relevant value chain have to comply. The lead firm uses those parameters as gatekeepers, for accepting and rejecting particular deliveries depending on whether/not they meet pre-set standards of quantity, quality and species composition. Through their interaction with their respective lead firms, the local fish plants, in turn, use the governing parameters to not only coordinate their suppliers' production process design – in terms of size, technology and allied production potential, but also control the quality and quantity of their deliveries. However, as the MVC context exploits nutritionally crucial resources – being the preferred native source of animal protein, its business activities are also 'governed' by the public through state institutions. Those institutions define laws and regulations that impact on not only basic MVC production process, particularly relating to health & safety requirements, but general conduct of business too, including employment practices, production restrictions for resource conservation purposes and others. Fisheries subsidies are among some of the strongest public control/intervention instruments of the MVC. As reviewed above, a small-scale harvester does not only leverage them to thrust into the MVC but to also sustain its viability once inside. Corroboratively, the overviewed free-of-user-charge infrastructure; R&D services; monitoring & surveillance

services as well as below-market capital and variable costs do not only help keep the entry but also operating costs of the MVC to relatively low levels. Consequently, the small suppliers that upgrade to target foreign markets have the opportunity to have higher production capacities and outputs than those that do not upgrade and target open-market fish customers instead. Paradoxically, such wide-ranging subsidies have also been indicatively having negative impacts on the whole FFF value chain. In particular, as the chain exploits common-pool fish resources on an open-access basis, its extensive subsidisation has incentivized high-intensity productions that have helped decrease the productivity of targeted fish resources, which are already indicatively suffering from global impacts of human pollution including adverse perturbations in ocean temperature, currents and chemistry. The said productivity downturns are in turn pressuring down particularly the batch and cumulative efficiency of the harvesters. After all, the likelihood of finding results as extreme as those obtained for the difference in the mean efficiencies is very high: 14 times in 100. Another indicative consequence of the increasing scarcity of targeted marine resources is that suppliers become increasingly unable to honour their accepted fish orders. Eventually, both suppliers and buyers are challenged to make and fulfill trade promises to each other and settle for indeterminate business contracts. In its attempt to increase its dependent demand and sustain its viability, under such relatively hostile production and sales environments, the economically weaker small supplier diversifies into both multi-buyer sales and multi-chain productions, producing fish for both foreign and native customers. By implication, an MVC supplier initially upgrades to target foreign customers but viability threats eventually pressure its partial downgrading to target native customers too. Routine multi-buyer and multi-chain operations ultimately become the modus operandi of MVC suppliers, a profile that by definition disqualifies them as ‘upgraded’ firms.

In addition, Fig. 2 readily suggests that the fuel subsidy alone is not only a key factor of production sustaining suppliers and buyers alike but its level may be so high that the net financial benefit to the national economy of MVC exports may, at best, be very small and, at worst, negative. In fact, the subsidies to the MVC may collectively be keeping the cost of fishing so low that they paradoxically counteract their underlying objective of increasing its production, productivity and foreign-exchange earnings. Put differently, thanks to their heavily subsidised business costs, MVC suppliers may be able to stay in business and survive even at suboptimal productivity. Subsidisation may thus be dis-incentivizing them from not only optimizing the use of their higher and more sophisticated production capacities but perhaps also from innovating and exploring new fisheries. Worst still, both the level and rate of increase of the fuel subsidy of the chain compared to that of its export revenue also point to potential rent-seeking and fraudulent activities, like the exploitation of fisheries management weaknesses for illegitimately securing subsidised fuel. Indeed, Robinson et al. (2007) argue that while the number of monitored fisheries in Seychelles is high, problems are encountered with the management regimes and monitoring methodology. A large number of fisheries management (e.g. fisher/vessel registries) and biological (e.g. length, frequency) databases are not linked to the monitoring systems, often leading to data duplication and inefficiencies. Partially concurring, SFA (2011) indicates that national fisheries surveillance faces both Human Resource and equipment shortages. For example, the shortage of field enumerators to cover all fish landing sites partly explains a 13% drop in small-scale fishery production in 2011 compared to 2010 when piracy was at its peak.

In this sense, the empirical study does not only compellingly suggest that suppliers of particularly the MVC suffer from suboptimal productions but that the subsidies supporting them are their important, if not principal, inefficiency risk factors. As reviewed above, the subsidies appear to have paradoxical impacts on the MVC: they do not only allow almost at will access to key commercial resources but also promote their high-intensity exploitations thus helping an exponential downturn in their productivity and associated exploitation efficiency. In other words, by keeping fishing productions indicatively far below market costs, existing subsidies are not only promoting excessive investments in production capacity (or, in a word, overcapitalization) of key fisheries but also overfishing and an associated gradual decrease in individual and collective efficiencies of the MVC. Although the subsidies are government control instruments of fishing and de jure intended to safeguard the public good, their overall impacts appear to counteract the overarching objective of lead firm governance - that of boosting the productivity of the MVC. As such, overfishing and associated downturns in individual and collective efficiencies are inter alia compelling indications of governance conflicts in the MVC. Such impacts in turn suggest that both the commercial and environmental sustainability of the chain at least require the scaling down, perhaps even displacement, of subsidies that incentivize further expansion in exploitation intensity of key marine resources.

4. Conclusion

As instruments of government, subsidies tend to be some of the tools adopted for safeguarding public interests in private exploitation of key resources. In this sense, subsidies allow for a level of public participation in the management (or governance) of strategic resources. Much as empirically established in other economic sectors reviewed, for a period of time subsidisation helps to protect infant value chains but eventually serves to incentivize their inefficiency, including through their rent-seeking activities. In the studied context, fisheries subsidies were first and foremost

introduced as part of a strategy for stabilizing the supply of the around 60kg per capita demand of staple fish species, which yearly experience high bi-seasonal fluctuations. However, the debt status of the economy plus the higher-returns potential of world fish markets – dominated since the 1980s by GVCs scouting for untapped resources, helped pressure the introduction of subsidies for fishing capacity expansion, including the infant export-oriented industrial fishing.

Subsidies supporting industrial productions are increasingly being linked with overfishing. The export-oriented production subsidies in focus have been empirically found to mostly promote inter-sectorial upgrading of small firms - particularly those having a relatively strong resource base, by facilitating their access to information, finance and market. Subsidies to capital and variable fishing costs, in particular, tend to help those small firms to both upgrade and participate in the MVC. However, statistical testing of 5 months of the production data of those upgraded firms overwhelmingly indicates that in spite of their intensive support they suffer from suboptimal productivity. A further in-depth qualitative analysis suggests that overcapitalization and associated overfishing, impacts of piracy, global pollution and internal weaknesses are key inefficiency risk factors of the upgraded supplier.

As elaborated above, fisheries subsidies in place seem to keep fishing cost so low that they encourage overcapitalization followed by its associated high overfishing and environmental harm risks. The threats of violence posed by Somalian Pirates effectively seal off access to some important national exploitation sites. The traditional management of targeted resources on an open-access and common-pool basis suffers from high overexploitation/scarcity risk as it incentives fishing at will and, with it, little deterrence of illegal, unreported and unregulated (IUU) exploitations. Seemingly assisted by global pollutants, deleterious perturbations – particularly, of temperature; current patterns; and chemistry, in the habitat of targeted resources are also indicatively increasing the rate of their natural impoverishment. Finally, as the MVC supplier tends to be relatively small and labour-intensive, its predominantly unskilled labour, important management and leadership challenges also apply a downward pressure on its productivity. By implication, the impact of the heavily-subsidised MVC on its suppliers appears to be predominantly structural. The chain helps its suppliers to improve their production size and technology and, along with them, exploitation intensity and potential output but not their access to sustainable fish resources and dependable foreign demand. Under such high production and sales risks the upgraded supplier comes under viability pressures to multi-chain and target multiple buyers, in both the native and foreign markets.

In sum, subsidies in context do not just help disrupt market regulation of fishing – that tends to eject inefficient firms, but also strongly support the MVC to practically shoot itself in the foot. The high-intensity exploitations that the subsidies promote decrease the environmental sustainability of targeted resources.

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