

**State-Assisted Entrepreneurial Ventures:
The Case of Aquacultural Development and the Seafood Industry
in Hong Kong**

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Abstract

The market-enabling capability of government is featured in an industry analysis capturing the transformation of marine fishing to aquaculture in ways that require changes to the law and regulations, as well as private venturing initiatives. Private initiatives for innovation in the aquaculture industry are essential because of the variety of species available for a sophisticated market and a preference for seafood. Government-as-enabler for species development and product differentiation of products locally-produced as a complementary input is also important. Structural changes have been shown to be essential for ventures and entrepreneurship and can contribute to the establishment of a public-private partnership for a Schumpeterian type of innovation. The study is another illustration of the 4th Coase Theorem.

Keywords

Schumpeterian innovation; law and economics; Coase theorem.

Introduction

Much effort has been spent studying the conceptual characterization, transformative power, institutional implications, and various cultural and strategic factors of entrepreneurs in the economic and management literature (Schumpeter 1932; Hayek 1945; Kizner 1997; Christensen, 1997; Ireland et al. 2003; Bruton et al. 2008; Andries et al. 2013).

This paper focuses on a much-neglected aspect of the entrepreneurial process in managerial economics by highlighting the cooperation between the state and private entrepreneurial ventures to develop a potentially disruptive innovation in light of VUCA (volatility, uncertainty, complexity, and ambiguity) affecting the industry. The suggestion in the management literature that the state can play a role is mentioned in Bruton et al. (2015). In the arena of economics and planning, the state's ability to expand an existing private market was explained by Lai and Lorne (2015) based on an idea of Coase (1988). These attempts have been rather recent in terms of academic endeavor, as the intellectual fixation on the false market/plan (command) dichotomy¹ has hitherto affected many for a long time. The problem the authors want to address goes beyond the public-private partnership (PPP) and is really a matter of innovation. It is in this context that the 4th Coase theorem is relevant.

Before dwelling on some theoretical concern, it should be pointed out that the economic literature genre of this work is not a statistical study on a focused hypothesis, but in the tradition of Coase (1959 and 1974), who relied on in-depth real world case studies on the Federal Communications Commission and Trinity House. Coase did not adduce statistical data to demonstrate arguments based on differentiations in property rights arrangements. The various versions of Coase theorem that came after his original writings, likewise, were not statistical derivations, but were various writers' own conjecture based on assumptions on

¹ The field of comparative economics has stuck to a dichotomous view of the world's economic systems as command versus market after the end of the Cold War. This view did not change until later in the 1990s. Coase has been often regarded as strictly pro-market, but this notion can hardly be substantiated upon a more careful reading of his works.

transaction costs. This methodology is consistent with the methodology used in VUCA analyses, which often relies on educated guesses in formulating strategies.

Elaboration of the Innovative Nature of the Problem:

Entrepreneurial activities can be categorized as Schumpeterian because they emphasize “outside circular flow” innovation and new technological breakthroughs. They are distinguishable from the Kirznerian approach which emphasizes efforts in discovering exchange opportunities based on existing technologies and preferences (i.e., opportunities given the existing demand and supply). Schumpeterian entrepreneurship emphasizes new technologies and a changing consumer preference. Schumpeterian entrepreneurs bring the market out of equilibrium, while the Kirznerian entrepreneurs can be perceived as bringing the market into equilibrium as conventionally defined by the intersection of demand and supply. Neither Schumpeter nor Kirzner integrated the role of government into their analyses. Entrepreneurship is largely considered an individualistic activity triggered by access to uniquely-private information or a stroke of genius on the part of the entrepreneur.

For most product life cycles, development assumes an initial stage of operating in “outside circular flow”. After refinement when the technology or new organizational method assumes its shape, it will be back into the “normal circular flow” of an economy. It is the technological development, its refinement, and its adoption that constitute the crux of managerial decisions under VUCA.

This paper focuses on the “outside circular flow” aspect of entrepreneurial activities, not addressing to the scalability issue crucial for returning to “inside circular flow”. At this stage, entrepreneurs are often lone wolves. Their activities challenge conventional methods of doing things, as well as suggest ideas that were previously not considered. The role of government, whose bureaucratic nature renders it a laggard in new ideas, is not obvious in this regard. This motivated the authors’ study of Hong Kong’s seafood industry, with which the Hong Kong Government has traditionally taken a *laissez faire* approach. Whether a PPP can be adopted for outside circular flow activities to help shape the seafood industry remains an open question.

Public-Private Partnership: a Literature Survey

In business and government administration studies, there is a vast amount of literature on PPP, which enjoys very comprehensive treatment in theory as well as via case studies across different countries. For instance, Osborne (2000) and Falch and Henten (2010) concentrated on the telecommunication industry, which exhibited public goods features that naturally called for PPP. Chan et al. (2011) thought proper risk allocation was essential for PPP projects in China. Hussain et al. (2012) studied SMEs in Pakistan and found the concept to be “mixed and not so encouraging.” Carbonara et al. (2013), while reaffirming the applications of PPP to the world varied by country, suggested a three-layer theoretical framework for Italy. More recently, Gujrati and Malik (2016) examined PPP and its various perspectives in India, which emphasized “a government-sponsored proposal or system, which involves the use of private finance to make easy the condition of services to the public or the release of social infrastructure assets.”

As far as aquaculture is concerned, Sinha et al. (2016) discussed the need for a transparent PPP through exposure to national and international best practices in aquaculture and other food production systems. Murekezi et al. (2018) emphasised the effect of PPP on contract farming, whose primary purpose was to enhance youth opportunities, as securing work was the main objective. Contract farming is an *institutional* innovation in the socio-political environment of East Africa, but it is not a *technological* innovation in the Schumpeterian and Kirznerian sense. Weirowski and Hall (2008) offered a useful and relevant case study of PPPs in organic catfish production in Vietnam, but they emphasised production rather than technical invention, which is the focus of this paper.

Many previous studies of PPP had very broad scopes – aiming for some socio-economic developmental objectives for whole societies. The motivation of this paper is in response to the role of entrepreneurs in the innovation of species that became nearly extinct due to overfishing, as well as the industry’s downturn as a result of VUCA, which occurred in Hong Kong. The authors will articulate the view that the state can be a cooperative partner in private entrepreneurial ventures initiated by the private sector. By providing a case study of entrepreneurial outside circular flow activities in the context of aquaculture and Hong Kong’s seafood

industry, the authors hope to debunk the libertarian myth that entrepreneurial activities are entirely individualistic.

The focused angle of studying a PPP as a Schumpeterian innovation, as in the case of Hong Kong, is particularly important for addressing a VUCA environment in which strategic decisions need to be made.² With VUCA, state participation is only natural in that the origin of VUCA stemmed from a situation in which the state was directly involved in the winning of a battle.³ The term has since been used for the formulation of business and management strategies, which implies its applicability to mainly business schools. This suggests its significance to private businesses including entrepreneurial ventures. Certainly entrepreneurial studies have conventionally emphasized a decentralized, individualistic, and idiosyncratic process of knowledge and information. To Friedrich Hayek, state involvement in this process would be inconceivable. Yet, in terms of strategic alliances successfully developed for business ventures, there is no *a priori* reason to suppose that the state cannot be a strategic partner in a private business venture, such as when it grants charters to private lighthouse merchants (Coase 1974; Lai, Davies, and Lorne 2008). This is the point that Lai and Lorne (2015) brought to the limelight. The state, in some situations, can be considered, in a social welfare-enhancing manner, a contracting party to or partner of private business ventures. This also applies to its role as an enabler of new markets. This paper provides a reaffirmation of the authors' earlier proposition in relation to new markets.

VUCA affects Hong Kong's seafood industry in that:

- a. ocean fishing is volatile in quantitative and qualitative dimensions, which aquaculture can help reduce;
- b. uncertainty over regulations that address overfishing, which results in the tragedy of the commons, may find a better (and more stable) solution in aquaculture;

² See Bennett and Lemoine (2014) for a detailed discussion of the term, VUCA.

³ The notion of VUCA was introduced by the U.S. Army War College to describe an environment of volatile, uncertain, complex, and ambiguous situations popularized after 9/11 in the U.S. (Kinsinger and Walch, 2012).

- c. the complexities of different species and the management and growth of baby fish (fingerlings) entail scientific knowledge best conducted by a decentralized method of trial and error; yet, a centralized method of certification may also be desirable; and
- d. the ambiguity of how aquaculture may be perceived by the public implies that venturing into this area would entail considerable public relations and education of the public.

Competition in Hong Kong's regional economy has contributed to great uncertainty in the industry, which has suffered from a secular decline in marine output. Disruptive measures must be adopted to counter a declining trend. Studies of emerging economies have demonstrated the various success factors and elements of importance in entrepreneurial ventures in China, India, and other BRICS countries (Ahlstrom et al., 2006, 2007; Bruton et al., 2003, 2008, 2013; Soh and Yu, 2010; Prabhu and Jain, 2015; Pandit et al. 2018, Chen and Lyu, 2017; Sengupta et al., 2017). Hong Kong could be interesting in this regard in that it is emerging and has yet to be subjected to the tremendous competition that large countries such as China and India can present. A small economy such as Hong Kong's does not have national financial backing, which can be disadvantageous, since that would contribute to the ambiguity of a VUCA mission and be advantageous in terms of its flexibility in dealing with the problem.

The methods of aquaculture and choice of fish continue to compete in size and scope throughout the world so that no one can say for sure which method or choice is the best for satisfying its food demands. In view of the wide stretches of ocean surrounding many countries, developing a niche based on serendipitous circumstances may not be the best strategy. The role of the state serves not only to allow entrepreneurial initiatives to happen, but also to provide the infrastructure needed so that a locality under state jurisdiction can distinguish itself among its competitors. It is in this sense that coping with a VUCA problem can be assisted by local government, which is why studying a PPP is important.

This paper studies how Hong Kong has navigated the VUCA of its seafood industry via both the government action of promoting aquaculture due to overfishing, which has changed industry practices and preferences, and an entrepreneurial venture between the private and public sectors. The case of a privately-owned and

managed Aquaculture Technologies Asia (ATA) was selected to illustrate a successful PPP entrepreneurial venture in VUCA stressing innovation. The case is also remarkable in its strategic choice of an indoor monoculture of a fish species and location that fully utilizes its proximity to a proven consumer market. Given the scope of over 300 species that the world aquaculture industry now experiments with, a strategic choice of monoculture, species, location, technology, and marketing in public relations management could impact the outcome of a venture – particularly its ability to excel in both opportunity and advantage-seeking behaviors.

The organization of the rest of this paper is as follows: in Section II, the history of Hong Kong's aquaculture industry will be reviewed. In spite of early government efforts to enable it, the industry suffered setbacks due to regional competition, environmental considerations, etc., so that even had it occurred as a disruptive transition for Hong Kong's old style fishing villages, it would not have become a major regional player in the seafood industry. In Section III, the authors will describe how the proximity of a vast, rich, and mature consumer market can facilitate the selection of species and technologies. This role must be filled by private initiative rather than by the government. The way Chinese consume live seafood and other animals has much to do with the success of a business venture. It was the high demand for farm-to-table restaurant seafood in Hong Kong and its many seafood restaurants that led to the adoption of the logistics of delivery that springboarded this success. In Section IV, the role of the state in dealing with competitive pressure, environmental concerns, and food safety issues, along with assisting in public relations and education, will be described.

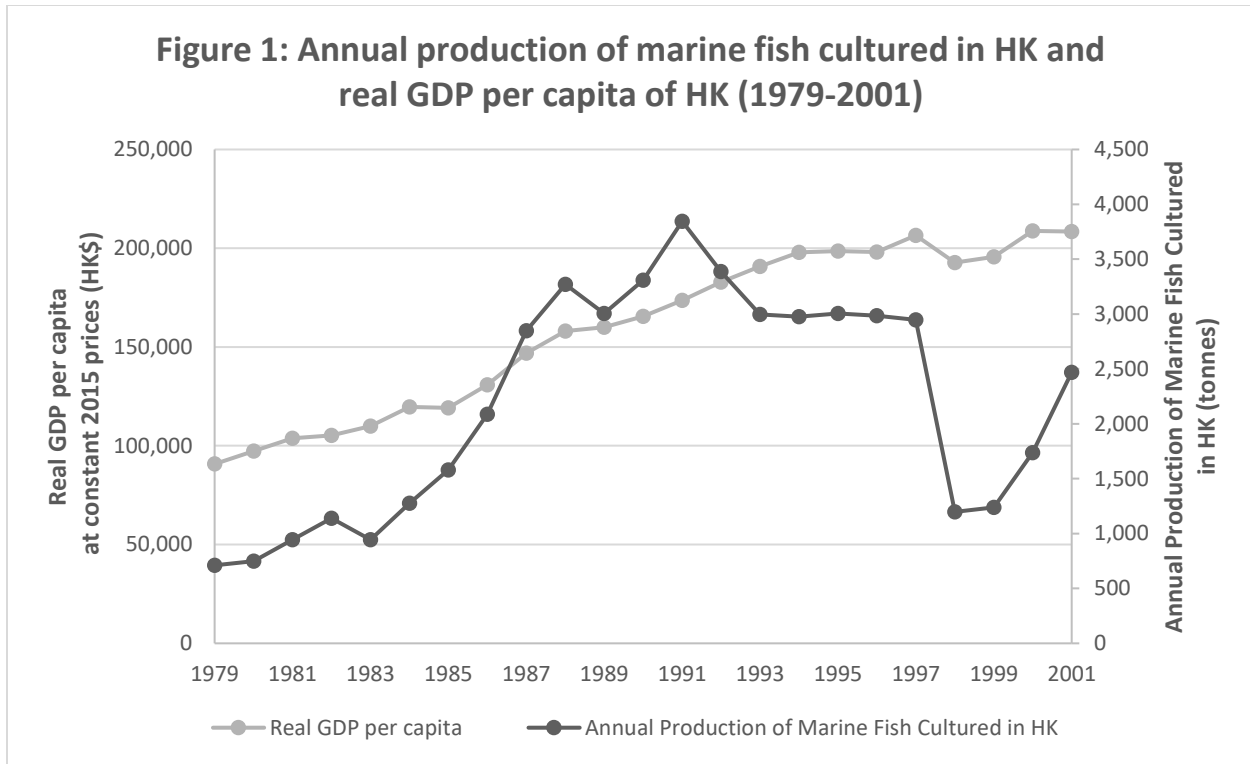
Section II: Genesis and Evolution of aquaculture and Seafood restaurants in Hong Kong

To appreciate the uniqueness of Hong Kong as a locational response to a VUCA environment in the aquaculture industry, it is worth knowing that for a long time, it was only a fishing village whose livelihood depended on the sea. Traces of it still remain off the southern part of Hong Kong Island. Partly because of disruption to modern commercial activities and partly due to overfishing, Hong Kong's source of

seafood no longer relies solely on ocean fish. In 1982, its government enacted a Marine Fish Culture Zone to actively promote aquaculture off its shores.

The rights to cultured fish in these zones emerged from squatter fish farms (Lai 1993, 1995, Lai and Yu 2002a, 2005, Lai and Lorne 2014.) as a means to bypass the harsh regulations of the government's Fish Marketing Organisation (FMO), a legal monopsony that buys all captured fish that are not alive (Lai and Yu 2002b). As a result of this conferment of exclusive rights to culture under the Marine Fish Culture Ordinance of 1982, Hong Kong marine fish culturists offer a great volume and steady supply of a great variety of coral fish that are of standard sizes, which led to the rise of live seafood restaurants (Lai and Yu 1995, 2002a). The FMO system, which prevents vertical integration, is harsh, as it uses auctions to sell fish and only "licensed buyers" may bid for the fish it collects. Well before there was any sign of the tragedy of the commons in Hong Kong's fishing industry, some entrepreneurial local fishermen gave up fishing and started to rear marine fish in cages attached to rafts kept afloat by empty industrial containers. The government regulated these squatting activities through licensing and helped develop a new mode of fishery that spawned a new seafood industry. This culture is superior to fishing in terms of avoiding the tragedy of commons, but is prone to water pollution and can eventually affect food safety.

The enactment of the Marine Fish Culture Ordinance got off to a good start, as shown in the annual production of cultured marine fish in Figure 1. But this peaked in 1991. This is rather puzzling in light of the increase in GDP per capita throughout the period. If marine fish is a normal good, production should go together with the increase in GDP per capita.

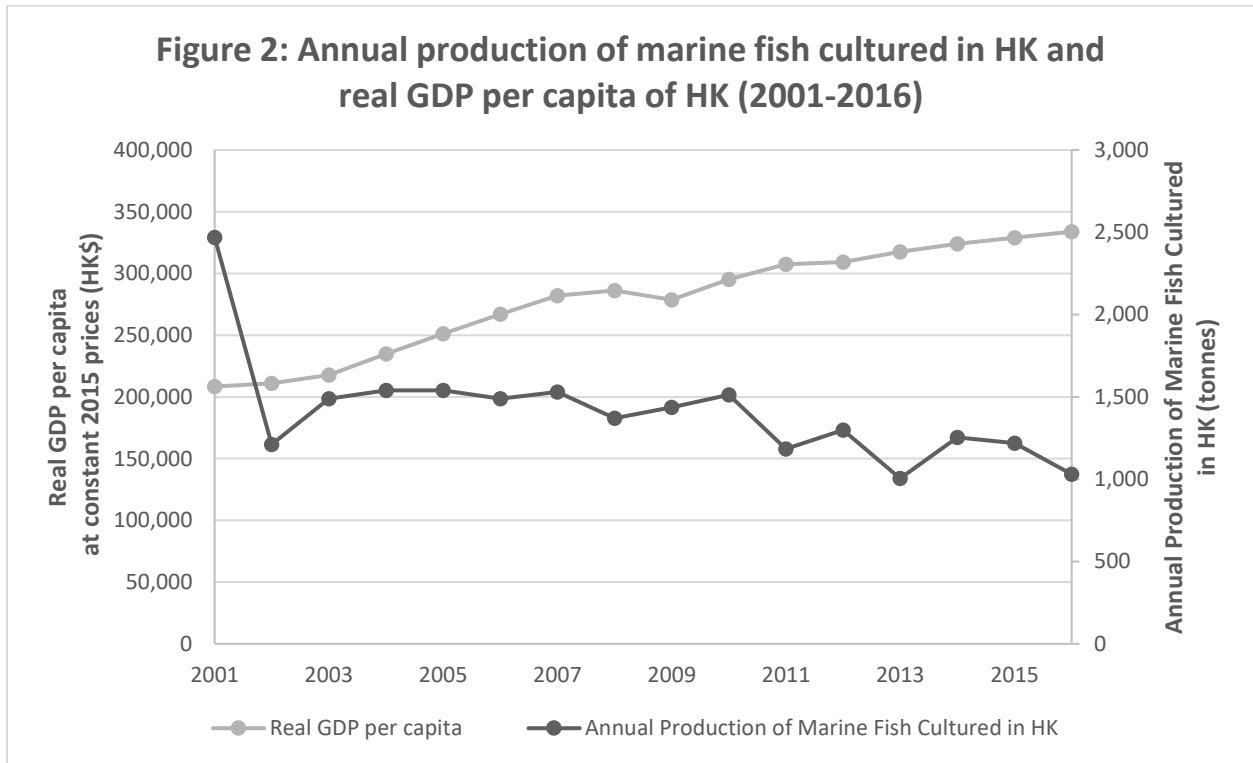


Source: Lai et al. (2005: 305)

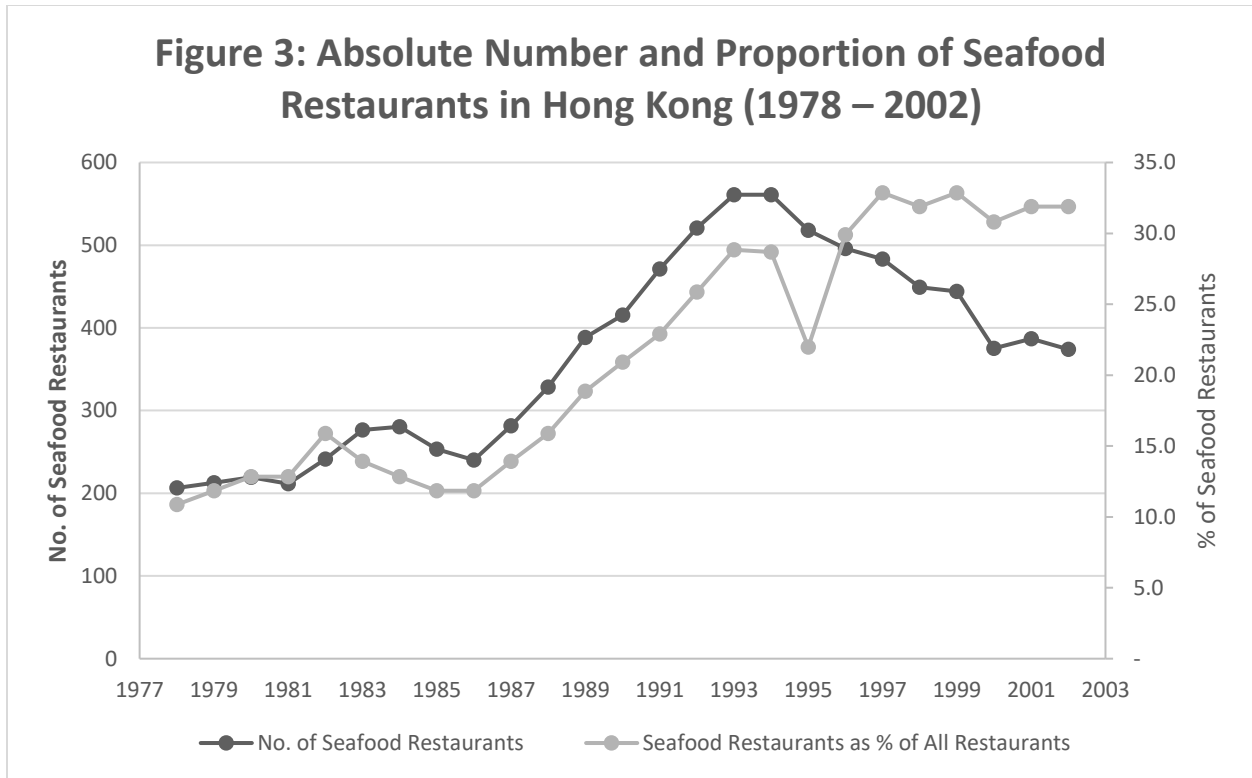
There were many reasons for the drop in production until after 1999. One was the economic integration of Hong Kong and China during this period. Imitation by Chinese competitors during the 1990s and R&D by Chinese scientific institutions⁴ forced Hong Kong fish culturists to seek new ways to sustain their businesses.

Post-1997, Hong Kong has benefited and suffered from regional integration with competing Mainland industries and businesses. For marine cultured fish, the proliferation of fish farms in the Pearl River Delta has led to a continuous decline in marine cultured fish, as shown in Figure 2. Indeed, the post-1999 surge was temporary; there was a secular decline in marine fish production in Hong Kong after 2001.

⁴ The World Aquaculture Conference was first held in Beijing in 2002. This major event suggested that regional competition between Hong Kong and China preceded the decline in marine aquaculture production in Hong Kong. This highlighted the reason for VUCA being a key culprit in the decline and strategies of finding ways to deal with it.

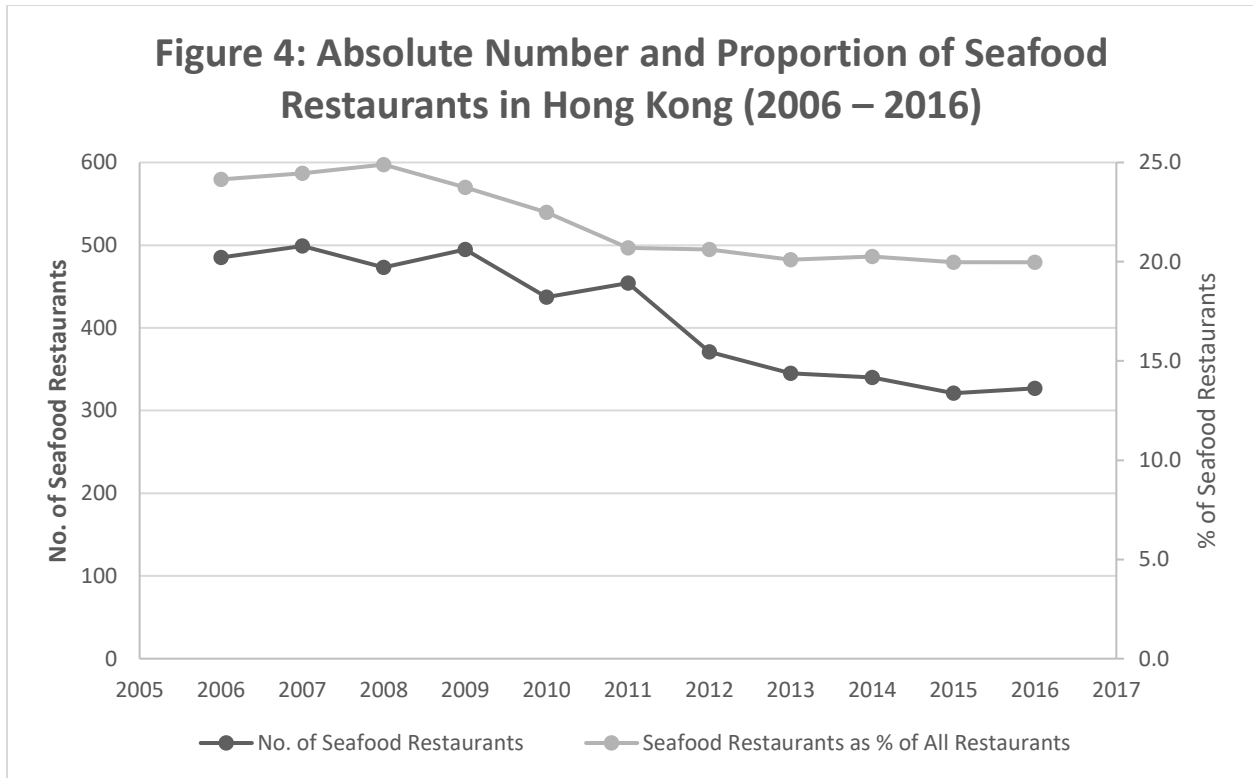


There was another significant impact of marine captured fish affecting the industry’s organizational structure. Partly because of the ineffectiveness of the Hong Kong Fish Marketing Organization (Lai and Yu, 2002b) and because the storage of live fish in farms allowed for the organized and efficient delivery of fish, Hong Kong’s marine cultured fish boosted the popularity of farm-to-table consumption of live fish (Lai et al. 2005). Many seafood restaurant chains now have their own fish containers to ensure freshness and efficiency in delivery. Figure 3 shows the total number of restaurants in Hong Kong from 1978 to 2002 and the percentage of them that were seafood. The significant rise of seafood restaurants in Hong Kong from 1983 to 1993 (its peak) could be attributed largely to the cultured fish phenomenon.



Source: Lai et al. (2005: p.304)

There are many factors that have contributed to the decline in the number of seafood restaurants in Hong Kong in absolute and percentage terms after 1993. Before 1997, Hong Kongers who visited China on weekends did so for leisure purposes. Nearby Shenzhen attracted many of the tourist dollars Hong Kongers brought with them due to its lower prices. The Hong Kong economy, with the exception of some very high-end products that continued to exert their comparative advantages over their Mainland counterparts, suffered greatly from inter-regional competition. Moreover, many Hong Kong residents owned weekend homes north of the border. Indeed, this pattern of declining seafood restaurants in Hong Kong can be seen in Figure 4, which shows the 30% seafood restaurant ratio in Figure 3 declining to around 20% in recent years.



The VUCA implications of Hong Kong’s seafood industry are evident: although technological and industrial changes have advanced the industry, it has also suffered from severe competition, environmental concerns, changing demographics, etc., so that perhaps no single factor alone can sustain this industry and only if the Hong Kong Government helps manage VUCA. It has some advantages over other governments in this regard. Although aquaculture in other parts of the world often has to deal with the ambiguity of farmed versus wild fish from a regulatory perspective, no such ambiguity exists for the Hong Kong economy, which is relatively unhindered. This means that the government assumes a survival-of-the-fittest attitude towards competition between farmed versus wild fish. Consumers have dictated their preferences between farm and wild fish and, for a long time, wild fish commanded a market premium over farmed fish in wholesale markets and restaurants. Such a preference may have to change, at least for certain species, as foreign food influences, cooking methods, and lifestyle changes also influence Hong Kong’s food industry and dining habits.

In recent years, the Agriculture, Fisheries and Conservation Department (AFCD) has listed 33 species of common live sea fish consumed in Hong Kong.⁵ Some are locally cultured in marine fish culture zones. Food safety, a big issue in China's pond and marine fish culture industry, has been stressed by the Hong Kong Government and business sector in the face of large volume production of cheap Chinese pond and marine fish. This is a point that the authors will examine in Section VI.

Section III: Proximity to a vast, increasingly rich, and mature consumer market and selection of species and technology

From the outset, Hong Kong has had an insatiable appetite for seafood. It consumes over 70 kg (11 stone) per capita of it every year – ten times more than in the U.S. A proven consumer market in close proximity to production (thus, lower transport costs) suggests huge opportunities to implement cost reduction methods for high-priced species such as grouper.

The grouper has long been one of the most sought-after seafood species in much of Asia. Rising demand and a desire to reduce dependence on wild stocks and produce a stable supply of fish have fueled a growing aquaculture industry. The commercial culturing of grouper dates back to the mid-1970s, when Taiwan became one of the first countries to farm it on a vast scale.

At the time, the industry relied on wild-caught fingerlings for cultivation, but by the early 1980s, a closed cycle culture (in which mature fish, also known as brood stock, spawned in regulated environments and fertilized eggs were collected and nurtured in controlled conditions until hatching, while larvae, fry, and fingerlings were cultivated in closed systems) was successfully achieved for two grouper species, Orange-spotted grouper (*Epinephelus coioides*) and Malabar grouper (*E. malabaricus*).

The list of grouper species for which the life cycle has closed and which are being farmed on a commercial or semi-commercial scale has grown since then and now includes around a dozen species, mainly from the *Epinephelid* family. Volume-wise, most grouper species farmed in Southeast Asia are of lower value (e.g., orange-

⁵ [http://www.hk-fish.net/english/fisheries information/marine fishes.html](http://www.hk-fish.net/english/fisheries%20information/marine%20fishes.html). The papers of Lai and Yu (1995, 2002) identified a much greater variety.

spotted grouper, which wholesales for an average price of US\$20/kilo). However, a few higher-priced species, including the highfin grouper (*Cromileptes altivelis*) and Giant Grouper (*E. lanceolatus*), are now being farmed commercially (there is evidence of the hatchery production of Leopard Coral Trout (*Plectropomus leopardus*), one of the highest-priced species that was subsequently sold in China's wholesale markets).

Taiwan has long been the leader in the full-cycle culturing of grouper and this industrial sector is now highly-segmented with enterprises specializing in either cultivating and breeding broodstock, nursing larvae, and fry. The industrial sector is also capable of growing fingerlings (from 5-10cm) and farming various species until they grow to market size. By the early 2000s, Taiwan was successfully breeding and growing Giant Grouper—the largest of the grouper family and a favorite at Chinese banquets.

Established in 2003, ATA, based in the New Territories, is Hong Kong's premier supplier of full-cycle farmed Giant Grouper. Its founder, Mark Kwok, an executive director of a well-known, century-old department store, Wing On, invested HK\$20 million to start the business.⁶ He intimated to the second author that he came up with the idea as a diver when he found that the sea was dying with its fish stocks depleted. He came up with the idea of a "land oasis" or Noah's Ark (i.e., gene bank) for sea fish with consumers in mind. The choice of an upmarket species, the Giant Grouper, as the premier species in his oasis would support his huge investment. Giant Grouper, a Chinese delicacy, is the largest grouper species and commands the highest prices in the grouper family. Its thick, chewy skin contains collagen and is as nutritious as salmon.

Wild Giant Grouper used to be very rare. What happened was that when a fishing boat lucky enough to catch one (adults tend to grow to over three metres long), it would inform a friendly restaurant to advertise it in advance of its availability, while customers had to pay in advance for how much of it they wanted to eat. As this big

⁶<http://www.scmp.com/business/companies/article/1267505/fresh-farmed-fish-tap>.

fish could not be kept alive, but iced, it had to go through the FMO, but somehow different restaurants received shares of the fish. The rise of the cultured Sabah Grouper, a hybrid of the Tiger Grouper (*Mycteroperca tigris*) and Giant Grouper bred according to a Malaysian university's R&D, affected wild Giant Grouper stocks, as it is cheaper and just as delicious. Yet, like ordinary fish cultured in the sea, the Sabah Grouper is susceptible to marine pollution, especially micro-plastics.

ATA uses its own recirculation aquaculture systems technology – a large-scale, 30,000-square foot indoor farming facility that was the first to be recognized as an accredited fish farm by Hong Kong's AFCD. Through the exclusive use of tap water and aquarium salt, ATA recreates an environment in which the Giant Grouper's habitat can be monitored and controlled for safety and quality. The water in the tanks the grouper live is as shallow as their natural habitats. A mechanical system that stirs strong currents through the fish tanks forces the fish to be in constant motion like salmon swimming upstream. The health and food safety of the fish are constantly monitored by in-house, qualified fish experts and veterinary experts who take care of them and send samples of water and fish tissues to laboratories for various tests. The indoor method not only allows a more controlled production method, but prevents the Giant Grouper from being contaminated by marine and atmospheric pollution.

ATA brings in Giant Grouper as fingerlings from a hatchery. Raising a fingerling into a footlong, 1.2-kilogram Giant Grouper takes about 12-18 months, Kwok said. The fish's size can double in the following year, which means it takes about five years to grow into a 75cm, 40-kg adult. A fingerling costs from HK\$20-\$30, but that fish can be sold for HK\$600 in 12-18 months when it grows to 1.2 kg. A wild Giant Grouper of similar size would sell for about HK\$500.⁷

ATA now supplies Giant Grouper averaging 1-9 kilograms to a number of high-end hotels and restaurants and fetches a wholesale price of between US\$30-\$40 per kilogram – sometimes even up to twice that. The wholesale prices for hotels and clubs and the retail prices for sales outlets or home callers are fixed one year in advance. This supply is further complemented by auxiliary infrastructure that fully utilizes the density and proximity of Hong Kong's population. There are numerous "vertical fish farms" in Hong Kong that have become key fixtures in the grouper

⁷ Based on an interview with Mr. Kwok. See the *SCMP* article.

supply chain. Many are situated on roofs atop tall buildings. Hong Kong's limited space led to this unique method of delivery, which assures freshness and saves space.⁸

The success of ATA can be a combination of many factors including the opportunity to obtain a sustainable supply of Giant Grouper fingerlings from Taiwan and feeding them with meal powder imported from Denmark and Latin America. The grouper are fed high-quality feed free of heavy metals and other pollutants that are commonly found in coastal sea fish. Unlike conventional aquaculture, ATA's farm is indoors. These are micro-strategic management decisions that, combined with location and choice of species, contributed to Kwok's success in a VUCA environment. In addition to making micro-decisions, Kwok joined forces with the Kadoorie Agricultural Research Centre at the University of Hong Kong, which helped develop technologies in indoor water reticulation and filtering by gravity and make the business sustainable.

In the context of coping with a VUCA environment, Kwok commented in an interview:

Growing the fish indoor means making the unpredictable predictable and the impossible possible. The ways we run the fish farm mean that we can deliver 100, 200, 300, 400 almost identical fishes at any given time with similar taste and texture. We even have forward contracts for 6-9 months in advance, which lock up selling prices and avoid price volatility...The mortality rate of indoor fish farming is pretty low at ten percent – compared with 50 percent of those kept in floating pontoons. The indoor fish farm is unlike traditional “sea cage” fish farmers, who are vulnerable to uncontrollable factors such as pollution, red tides, typhoons and even radiation leaks from the Fukushima nuclear plant disaster in Japan.

⁸ <http://www.bbc.com/news/business-26627408>, April 2014.

The indoor farming of fish has another advantage, given Hong Kong's VUCA environment. As the fish is not caught from the sea, it is non-indigenous and, therefore, exempt from the Marine Fish (Marketing) Ordinance even if it is not alive. The official document stipulates:

“Marine fish” (魚) means any fish or part thereof, whether fresh or processed, in any manner indigenous in sea water or partly in fresh water and partly in sea water, including any product derived therefrom, but excluding all crustaceans or mollusks and fish alive and in water (*Emphasis added*).

The ecological concerns over the expensive farmed fish in relation to wild fish are less pronounced in the case of the Giant Grouper compared to other aquaculture species such as the Sabah Grouper. Scientists have long been concerned over the ecological impact of the Sabah Grouper, a popular and far cheaper farmed fish released into Hong Kong waters for religious purposes, as an exotic species.⁹ For Kwok's Giant Grouper, his challenge of ambiguity is more modest:

Consumers generally tend to believe wild fishes taste better and are more valuable, a belief that our Giant Groupers may be able to reverse (*Kwok Interview*).

There is a French saying, “*De gustibus non est disputandum*” (“In matters of taste, there can be no disputes”), which is the only objective evaluation of what is observed. In Hong Kong's seafood restaurants, it has become increasingly popular to provide standard menus for live steamed fish at reasonable prices. During the 1990s, a live-steamed wild grouper at a seafood restaurant could easily cost

⁹ Scientists from the Borneo Marine Research Institute reported the first observation in a fish laboratory of the natural spawning of the Sabah Grouper since its first production in 2006. Spawning, triggered by a sudden change of water depth from 3.0 to 1.5 metres, occurs between January and April. The water temperature in the holding tanks was very warm (around 27 degrees Celsius). The sea temperature in Hong Kong during July and August can be as high as 30 degrees Celsius. The broodfish of the Sabah Grouper had been reared in the hatchery for ten years and weighed from 12-20 kg, according to a research paper by Ching et al. (2018). Using the regression equation derived by Luin et al. (2013), the body weights corresponded to a length of 80-95 cm.

US\$100. Nowadays, many seafood restaurants offer steamed cultured Sabah Grouper also cooked alive at just US\$50 each.

ATA also adopts unique delivery methods for Hong Kong. The company provides a service hotline to deliver Oasis Giant Grouper to restaurants and homes. A home-delivered fish, of course, cannot be alive and can be sold by part. For instance, a fillet costs \$54/100 g; a belly goes for \$57/100 g; a head/bone for \$28/100 g; tail for \$33/100 g; and collar for \$43/100 g. Of course, a consumer can buy the whole fish at \$460/tail weight of around 900 g, \$600/tail of around 1200 g, and \$690/tail of around 1,500 g. Because the fish is indoor farm-raised, precision in measurement allows for differential pricing.

Table 1 below further suggests how the broad scope of Hong Kong's fish market can affect ATA strategic business measures.

Table 1: Wild and Farmed fish prices, 2006 and 2016

Fish (Price in HK\$/kg)	January 2006			January 2016		
	Capture	Culture	Ratio	Capture	Culture	Ratio
Common name <i>(Scientific name)</i>						
Red grouper <i>(Epinephelus akaara)</i>	492.6	301.7	1.6	1,076.6	412.5	2.6
Green grouper <i>(Epinephelus coioides)</i>	128.7	84.8	1.5	194.4	98.5	2.0
Yellow grouper <i>(Epinephelus awoara)</i>	137.8	90.2	1.5	203.0		N/A
Areolate grouper <i>(Epinephelus areolatus)</i>	147.1	104.0	1.4	226.9	123.5	1.8
Yellowfin seabream <i>(Acanthopagrus latus)</i>	125.7	67.2	1.9	217.0	78.4	2.8

Goldlined seabream (<i>Rhabdosargus sarba</i>)	79.2	42.1	1.9	119.6	84.2	1.4
Black seabream (<i>Acanthopagrus schlegeli</i>)	106.5	58.7	1.8	136.7	70.4	1.9
Russell's snapper (<i>Lutjanus russellii</i>)	121.3	48.3	2.5	152.1	84.2	1.8
Mangrove snapper (<i>Lutjanus argentimaculatus</i>)	69.3	41.6	1.7	107.3	55.7	1.9
Red snapper (<i>Lutjanus sebae</i>)	52.8	43.6	1.2	115.5	60.6	1.9
Crescent sweetlips (<i>Plectorhinchus cinctus</i>)	87.0	48.5	1.8	127.9	65.5	2.0
Barramundi (<i>Lates calcarifer</i>)	38.8	32.5	1.2	59.4	36.3	1.6
Chinese emperor (<i>Lethrinus haematopterus</i>)	47.9	35.6	1.3	82.5	54.5	1.5
Moray eel (<i>Gymnothorax spp.</i>)	42.9	26.4	1.6	92.4	49.5	1.9
Green wrasse (<i>Choerodon schoenleinii</i>)	254.7	247.5	1.0	406.3		N/A
Humphead wrasse (<i>Cheilinus undulatus</i>)	826.2	396.0	2.1	1,262.3		N/A
Black rudderfish (<i>Girella melanichthys</i>)	317.6	172.2	1.8	462.0	177.4	2.6
Scat (<i>Scatophagus argus</i>)	175.2	94.1	1.9	242.0	89.7	2.7

Japanese sea perch <i>(Lateolabrax japonicus)</i>		33.0	N/A	57.8	41.3	1.4
Japanese meagre <i>(Argyrosomus japonicus)</i>	31.9	35.3	0.9	74.3	49.5	1.5
Chicken grunt <i>(Parapristipoma trilineatum)</i>	33.0	33.6	1.0	107.3	82.5	1.3
Head grunt <i>(Pomadasy argenteus)</i>	49.5	35.1	1.4	99.0	64.4	1.5
Pompano <i>(Trachinotus blochii)</i>	68.5	43.2	1.6	115.5	60.9	1.9
Purple amberjack <i>(Seriola dumerili)</i>	60.5	38.8	1.6	115.5	83.7	1.4
Malabar grouper <i>(Epinephelus malabaricus)</i>	144.7	96.5	1.5	212.3	115.5	1.8
Two-spot red snapper <i>(Lutjanus bohar)</i>			N/A	123.8		N/A
Brown-marbled grouper <i>(Epinephelus fuscoguttatus)</i>	177.8	118.6	1.5	403.5	199.7	2.0
Giant Grouper <i>(Epinephelus lanceolatus)</i>	182.2	111.6	1.6		175.4	N/A
Camouflage grouper <i>(Epinephelus polyphkadion)</i>	217.5	178.8	1.2	407.6	284.6	1.4
Squairetail coral grouper	223.9	184.3	1.2	336.6	297.0	1.1

<i>(Plectropomus areolatus)</i>						
Leopard coral grouper <i>(Plectropomus leopardus)</i>	446.3	412.5	1.1	580.5	324.5	1.8
Humpback grouper <i>(Cromileptes altivelis)</i>	728.5	693.0	1.1	990.0	655.9	1.5
White blotched snapper <i>(Lutjanus stellatus)</i>			N/A		101.0	N/A
Cobia <i>(Rachycentron canadum)</i>			N/A		60.2	N/A
Red drum <i>(Sciaenops ocellatus)</i>			N/A		42.9	N/A
Black spotted croaker <i>(Protonibea diacanthus)</i>			N/A		80.9	N/A
Potato grouper <i>(Epinephelus tukula)</i>			N/A		161.3	N/A

Source: HK Fish Net – Wholesale Prices: all prices were expressed in HKD. The exchange rate between the HKD and USD was HK\$7.8 = US\$1.

www.hk-fish.net/english/fisheries_information/wholesale_prices.php

Between 2006 and 2016, the premium of captured over cultured fish generally increased. The exceptions were Goldlined seabream (*Rhabdosargus sarba*), Russell’s snapper (*Lutjanus russellii*), Purple amberjack (*Seriola dumerili*), and Squaretail coral grouper (*Plectropomus areolatus*). Considering the ocean fish depletion problem over that decade, the increase in the premium seemed modest and did not particularly indicate a clear superiority of captured over cultured fish in terms of consumer preference. The Giant Grouper category, the species ATA

acquired a competitive advantage in producing, did not report public wild fish data. Its average cultured price in 2016 of \$175.4/kg was higher than the 2006 cultured price of \$111.6/kg and only slightly below the 2006 captured price of \$182.2/kg. That meant the technology ATA introduced to the Giant Grouper industry mirrored the 2006 captured vs. cultured consumer preferences.

Also notice that Table 1 had no entry for Giant Grouper captured in 2016. As a practical matter, wild Giant Grouper had become very rare in the ocean by then.

There are other dimensions to running an impactful operation. A field trip to the AFCD's Au Tau Fisheries Station revealed how a fish hatchery and R&D base for local aquaculture research can enhance ATA's competitive edge. The research base used to supply fry for the local freshwater pond fish culture and now studies an exotic (Queensland) fish called the "Jade Perch". The research on quantity and quality (food security (Barclay and Epstein 2013) and environmental protection) certification for this and other locally-reared fish, including Giant Grouper cultured indoors, is a very important component of this entrepreneurial venture.

The strategic edge of innovation and collaboration with government research facilities goes beyond ATA's Giant Grouper "monopoly," which can be accidental, with the backbone of the Kadoorie Agricultural Research Centre. In 2004, Brian Ho and HKU's Kadoorie Farm and Botanical Garden cooperated to import an "indoor water re-circulation technology" from Australia. Under Ho's leadership, Hong Kong's two largest eco-friendly indoor fish farms were successfully developed and opened to produce sustainable premium grouper for the local market.¹⁰ The competitive edge of this private-public alliance can produce a qualitative (food security) edge over Mainland farm products by way of government certification. The safety of the food supply has been a major concern of China, which has a coastal water area vastly superior in terms of size to Hong Kong's. Without food security, a multi-million dollar seafood industry cannot serve its own consumer market. Therefore, a VUCA angle to this problem must turn to the local government's role in enabling its competitive edge in the regional economics of competition. This the authors will explain further in the next section.

¹⁰ Source: <http://mbaquatics.com/en/home/>.

This paper aims not so much that the ATA example is particularly unique over other cases of PPP in other countries, but that PPP for species innovation in Hong Kong serves the VUCA mission almost perfectly in light of the historical development of the seafood industry, which have gone through various threats and uncertainties as the paper explained. The emphasis is on the role of government in helping the industry confronted by VUCA, not that it is an example of PPP that other countries should necessarily emulate.

Section IV: State cooperation in Private Entrepreneurial Ventures

Chinese seafood has a long tradition, particularly when steamed. The success of the vertically-integrated structure of live fish consumption in Hong Kong can be widely observed in most seafood restaurants, which openly display fish tanks near their dining areas to ensure that a steamed fish destined for a table is still alive in the tank only minutes before being cooked – usually by steaming. This is a very unique cooking style that has existed for centuries in China, but the tank that assures freshness is a modern marketing necessity.¹¹ Connoisseurs debate over whether the optimum period for steamed fish is one or two minutes. Unlike other aquacultural produce consumed in other parts of the world, the method of steaming fish is unique.

The Hong Kong Government recognizes this uniqueness and, starting with the Marine Fish Cultured Ordinance, initiated numerous measures to enable the industry's operation. As described in Section I, the government operates in a VUCA environment. Innovation, therefore, must continuously occur to deal with competitive pressures, environmental concerns, and food safety issues.

Competitive pressures are a market phenomenon. The government upholds the city's market economy and, under the directive of China's "One Country, Two systems" approach, there is no direct government intervention in the local seafood industry. A state-private association for dealing with this aspect of the VUCA problem needs to have a transparent open competitive application procedure for

¹¹ Note, however, that in exclusive clubs and hotels that offer Chinese banquets with fish, publicly-displayed fish tanks are rare, even though they are often present to show customers that the fish served was alive and swimming before being cooked. Indeed, Giant Grouper have long moved away from a live sea fish display environment.

all private initiatives that wish to enhance their competitive advantages via innovation. The Hong Kong Government, through the AFCD, seems to have managed this aspect of openness fairly well by publishing literature and website information and making them accessible.

Environmental concerns have been increasing in Hong Kong. The government has specific units (the Environmental Protection and Food and Environmental Hygiene Departments) to deal with them. In addition, ATA's entrepreneurial ventures, as articulated in some of Mark Kwok's YouTube promotions (https://www.youtube.com/watch?v=WZ349-t_rpc), have shed light on how this aspect of VUCA can be addressed. ATA is well-connected with the World Wildlife Fund (WWF) in its public relations campaign.

As for food safety, given that steaming fish remains a dominant cooking style for the Chinese, product differentiation of cultured fish raised in Hong Kong can potentially give a competitive edge to its cultured fish over those raised elsewhere. This role must be uniquely provided by the government, as private marketing campaigns would be too costly and untrustworthy.

Since 2005, the AFCD has had an "Accredited Fish Farm Scheme" that aims to help local fish farmers enhance their operations and production standards, as well as provide better and safer aquaculture products to the public. Its services include the regular monitoring of fish health and water quality, regular disinfection of tools, quarantines for newly-acquired stocks, separation/proper treatment of sick fish, proper disposal of fish carcasses, controlled use of minced fish, appropriate use of feed additives and drugs, and proper maintenance of fish farm management records. Quality assurance includes both a regular and pre-marketing inspection and monitoring component. Fish so produced are tagged with a unique ten-digit serial number to help trace their origins. Thus, fish farm products can be branded.¹²

Competitive pressures and food safety concerns work together to highlight specific contributions made by the state to enable the operation of Hong Kong's aquaculture industry. In order to help local and marine caged fish culturists grow in the face of cheap Chinese imports, the certification scheme described above serves as a form of product differentiation in a "made in Hong Kong" strategy that

¹² Details of this scheme can be found at www.hkaffs.org/en/

is arguably unique in light of the thousands of fish sources in China. The idea was predicated on food security because the public found the substitutes from Mainland seafood sources to be suspect. The abuse of fish medication and antibiotics in overcrowded ponds and cages features in the media from time to time, while better-off consumers are willing to pay a premium on fish accredited by the government.

Under the certification scheme, a fish farm is certified when it meets some government criteria. ATA operates a certified farm. Caged sea fish culture is hard to certify, as seawater quality is hard to control. The variety of fish available for restaurant or household consumption was discussed in Section III. ATA specializes in a particular niche market among many that have complexities and challenges in developing farm-raising techniques. The measures developed by AFCD do not favor a particular species or company; that is left to open market competition. This political positioning is economically correct in that the ultimate decider of the success of an innovation or venture should be the consumer.

There are other semi-government bodies that also provide assistance on certification and environmental concerns. WWF Hong Kong recently assessed Giant Grouper coming from the ATA farm. Its seafood guides use a traffic light system to rate the sustainability of seafood coming from wild and farmed sources with species rated red (avoid), yellow (caution), or green (recommended).

Most farmed grouper listed in the new *WWF Seafood Guide* are rated yellow or red. This has led to concerns over the sourcing of wild juveniles for rearing, a lack of sustainability and traceability in the fish feed, and the general lack of effective control over the use of feed and chemicals, which can lead to a polluted marine environment.

ATA has made tremendous efforts to source only hatchery-produced fish, purchase traceable fish feed, and invest significantly in the use of a recirculation system to minimize any pollution of the environment. In addition, it partners with consultancy firms to reduce its overall electricity use, thus reducing carbon emissions and saving on costs. All of these actions have contributed to the overall sustainable brand name of this production system, so Giant Grouper production has been rated green in the latest WWF guide.

Conclusion

This paper summarizes the transition of marine fishing in Hong Kong to aquaculture via law enactment, regulations, and moral persuasions that a VUCA problem for seafood supply in Hong Kong has been aptly dealt by a PPP. The volatility of and uncertainty over marine fishing is well-known for fishermen in Hong Kong, which was once a fishing village. The Hong Kong Government passed the Marine Fish Culture Ordinance to promote aquaculture for the region. Although that action significantly assisted the supply logistics of the seafood industry, the industry was still threatened by regional competition. This added element of uncertainty called for drastic actions by both the private sector and government to resolve. The authors discussed the complexities of species for consumption in Asian waters by comparing wild and farmed fish prices before and after (2006 and 2016) Hong Kong's PPP actions.

Entrepreneurial experimentation with a particular species was the focus of this case study. The transformation of a marine fish to an indoor fish culture can be disruptive in the sense that the fish production essentially became factory production – no different from any manufacturing process. This case is most suitable for telling the tale of Schumpeter's "outside circular flow" innovation, as indoor fish farms are a significant departure from the conventional way of catching fish from the sea. The prospect of this new form of fish farming in Hong Kong reduces the "VUC" aspects of a VUCA problem. The ambiguity of the VUCA problem in Hong Kong's seafood industry has been largely addressed by education, marketing, and PR promotions. This paper tells the business side of the story of how a VUCA problem can be strategically used to build a regional niche for the industry.

Recently, the Lands Department of Hong Kong, via the AFCD's recommendations, granted exclusive land rights (under short term tenancy on government land/short term waivers on private land) to ATA to operate land fish farms. Building fish farms on agricultural land is a wise move, as agricultural production in Hong Kong is already negligible. Reallocating land originally zoned to produce a good or service that was displaced by regional competition helps maximize diversity and flexibility. Agriculture produce need not be grown in Hong Kong. Most could be easily imported from elsewhere in the region or any other place in the world. But food

safety is squarely the government's responsibility because private initiatives sometimes ignore them in favor of novelties and short-term profits. This is particularly true for entities that lack a well-established brand name that would assure prospective customers of their qualities.

The reallocation of zoning infrastructure requires the government to clear some administrative hurdles. Private initiative alone cannot solve this problem. The AFCD established a system of quality fish culture certification, which has led to more expensive fish products (but with a health premium) and allowed the industry to establish itself. The partnership offered moral support to culturists who advertised their certificates through the media. State involvement in solving the VUCA problem in Hong Kong, with the study of ATA as the focus of this paper, demonstrated an example of the how government can act effectively to enable new markets, which are the infrastructure necessary for venturing and entrepreneurship.

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References

Ahlstrom, D. and Bruton, G.D. (2006), "Venture capital in emerging economies: Networks and institutional change." *Entrepreneurship Theory and Practice*, 30(2), pp.299-320.

Ahlstrom, D., Bruton, G.D., and Yeh, K.S. (2007), "Venture capital in China: Past, present, and future." *Asia Pacific Journal of Management*, 24, pp.247-268.

Andries, P., Debackere, K., and Looy, B. (2013), "Simultaneous experimentation as a learning strategy: Business model development under uncertainty." *Strategic Entrepreneurship Journal*, 7(4), pp.288-310.

Barclay, K., & Epstein, C. (2013), "Securing fish for the nation: food security and governmentality in Japan." *Asian Studies Review*, 37(2), pp.215-233.

Bennett, N, Lemoine G.J. (2014), "What a difference a word makes: Understanding threats to performance in a VUCA world." *Organization Performance*, 57, pp.311-317.

Bruton, G. and Ahlstrom, D. (2003), "An institutional view of China's venture capital industry: Explaining differences of China from the west." *Journal of Business Venturing*, 18, pp.233-259.

Bruton, G., Ahlstrom D., Obloj, K. (2008), "Entrepreneurship in emerging economies: Where are we today and where should the research go in the future?" *Entrepreneurship: Theory and Practice*, 32, pp.1-14.

Bruton, G.D., Filatotchev, I., Si, S., and Wright, M. (2013), "Entrepreneurship and strategy in emerging economies." *Strategic Entrepreneurship Journal*, 7(3), pp.169-180.

Bruton, G., Peng, M.W., Ahlstrom, D., Stan, C. and Xu, K. (2015), "State-owned enterprises around the world as hybrid organizations." *The Academy of Management Perspective*. 29 (1), pp.92-114.

Carbonara, N., Costantino, N., Pellegrino, R. "A three-layer theoretical framework for analyzing public private partnerships: The Italian case." *Organisation, Technology and Management in Construction*, 6(2), pp.799-810.

Chan, A., Yeung, J., Yu, C., Wang, S.Q., Ke, Y. (2011), "Empirical study of risk assessment and allocation of public-private partnership projects in China" *Journal of Management in Engineering*, July 2011.

Chen, J., and Lyu, R.W. (2017), "Innovation in China: The state of art and future perspectives." In *Revolution of Innovation Management* (pp.69-103), London: Palgrave Macmillan.

Ching, F.F., Othman, N., Anuar, A., Shapawi, R., & Senoo, S. (2018), "Natural spawning, embryonic and larval development of F2 hybrid grouper, tiger grouper *Epinephelus fuscoguttatus* × giant grouper *E. lanceolatus*." *International Aquatic Research*, 10(4), pp.391-402.

Christensen, C.M. (1997), *The Innovator's Dilemma*. Boston, MA: Harvard Business School Press.

Coase, R.H. (1959), "The Federal Communications Commission." *Journal of Law and Economics*, 2, pp.1-40.

Coase, R.H. (1974), "The lighthouse in economics." *Journal of Law and Economics*, 17(2), pp.357-376.

Falch, M, Henton, A. (2010), "Public private partnerships as a tool for stimulating investments in broadband." *Telecommunication Policy*, 34, pp.496-504.

Gujrati, R. and Malik, D. (2016), "The role of public private partnership: its various perspectives in India." *International Journal of Trade & Global Business Perspectives*, 5(2), pp.2285-2292.

Hayek, F. (1945), "The use of knowledge in society." *American Economic Review* 35(4), pp.519-530.

Hussain, I., Farooq, Z., Akhtar, W., (2012) "SMEs development and failure avoidance in developing countries through public private partnership" *African Journal of Business Management*, 6(4), pp.1581-1589.

Ireland, R.D., Hitt, M.A., and Sirmon, D.G. (2003), "A model of strategic entrepreneurship: The construct and its dimensions." *Journal of management*, 29(6), pp.963-989.

Kinsinger, P. and Walch, K., (2012), *Living and Leading in a VUCA World*. http://www.forevueinternational.com/Content/sites/forevue/pages/1482/4_1_Living_and_Leading_in_a_VUCA_World_Thunderbird_School.PDF

Kirzner, I. (1997), *How Markets Work: Disequilibrium, Entrepreneurship and Discovery*. Great Britain: The Institute of Economic Affairs.

Lai, L.W.C. (1993), "Marine fish culture and pollution – An initial Hong Kong empirical study," *Asian Economic Journal*, 7 (3), pp.333-351.

Lai, L.W.C. and Lorne, F. (2015), "The Fourth Coase Theorem: State planning rules and spontaneity in action." *Planning Theory*, 14(1), pp.44–69.

Lai, L.W.C. and Yu, B.T. (1995), "The 'Hong Kong' solution to the overfishing problem: A study of the cultured fish industry in Hong Kong." *Managerial and Decision Economics*, 16 (5), pp.525-535.

Lai, L.W.C. and Yu, B.T. (2002a), "The evolution of the fry market in the marine fish culture industry of Hong Kong: an economic perspective." *Aquaculture Economics and Management*, 6(3 and 4), pp.191-214.

Lai, L.W.C. and Yu, B.T. (2002b), "The Hong Kong Fish Marketing Organisation: a case study of the financial problem of a legal monopoly," *Pacific Economic Review*, 7 (1), pp.85-96.

Lai, L. W.C., Chau, K.W., Wong, S.K., Matsuda, N. and Lorne, F.T. (2005), "Marine fish production and marketing for a Chinese food market: a transaction cost perspective." *Aquaculture Economics & Management* 9(3): pp.289-316.

Lai, L.W.C., Chua, M.H., and Lorne, F.T. (2014), "The Coase Theorem and market for squatting on Crown land and water: a Hong Kong comparative study of the differences between the state allocation of property rights for two kinds of squatters." *Habitat International*, 44, pp.247-257.

Lai, L.W.C., Chau, K.W., Wong, S.K., Matsuda, N and Lorne, F.T. (2005), "Marine fish production and marketing for a Chinese food market: a transaction cost perspective," *Aquaculture Economics and Management*, 9(3), pp.289-316.

Leavy, B. (2014), "India: MNC strategies for growth and innovation." *Strategy and Leadership*, 42(2), pp.30-39.

Luin, M., Ching, F.F. and Shigeharu, S. (2013), "Sexual maturation and gonad development in Tiger Grouper (*Epinephelus Fuscoguttatus*) X Giant Grouper (*E. Lanceolatus*) Hybrid." *Journal of Aquaculture Research and Development*, 5(2). doi:10.4172/2155-9546.1000213

Murekezi, P., Menezes, A. and Ridler, N. (2018), *Contract farming and public-private partnerships in aquaculture. Lessons learned from East African countries.* FAO Fisheries and Aquaculture Technical Paper No.623. Rome, Italy.

Mohanty, B.P., Mohanty, A., Mohanty, S. and Sankar, T.V. (2016), "Role of public private partnership in fish food safety assurance and quality management in fish trade." *Public Private Partnerships in Aquaculture.* Narendra Publishing House, pp.217-228.

Osborne, Stephen P. (2000), *Public-Private Partnerships—theory and practice in international perspective*, Routledge: New York.

Pandit, D., Joshi, M.P., Sahay, A., and Gupta, R.K. (2018), “Disruptive innovation and dynamic capabilities in emerging economies: Evidence from the Indian automotive sector.” *Technological Forecasting and Social Change*. 129, pp. 323-329.

Prabhu, J., and Jain, S. (2015), “Innovation and entrepreneurship in India: Understanding jugaad.” *Asia Pacific Journal of Management*, 32(4), pp.843-868.

Sengupta, S., Sahay, A. and Croce, F. (2017), “Conceptualizing social entrepreneurship in the context of emerging economies: an integrative review of past research from BRIICS.” *International Entrepreneurship and Management Journal*, pp.1-33.

Sinha, V.R.P., Keshavanath, P., Sharma, A.P., Mohanty, B.P. (2016), *Public Private Partnerships in Aquaculture*. Narendra Publishing House.

Soh, P.H. and Yu, J. (2010), “Institutional environment and complementary assets: Business strategy in China’s 3G development.” *Asia Pacific Journal of Management*, 27(4), pp.647-675.

Vinig, T. and Bossink, B. (2015), “China’s indigenous innovation approach: the emergence of Chinese innovation theory?” *Technology Analysis and Strategic Management*, 27(6), pp.621–627.

Weirowski, F., Hall, S.J. (2008), *Public-Private Partnerships for Fisheries and Aquaculture: Getting Started*. The WorldFish Center.