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Reflections and Current Processes: Whole Fish Utilization in the Tilapia Industry in Chinese Taipei

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Fu-Sung "Frank" CHIANG

- Regional Director, International Association of Aquaculture Economics and Management (IAAEM), 2009
 Present.
- Visiting Professorships: University of Maine-Orono, USA, 2011-12; University of California-San Diego, USA, 2011;
 Can Tho University, Vietnam, 2014-15; Nha Trang University, Vietnam, 2008-10, 2013.
- Committee, Seafood Safety Advisory Committee, Taiwan Aquaculture Foundation, 2012 - Present.
- Dean, College of Humanities and Social Sciences, National Taiwan Ocean University, Chinese Taipei, 2008-09.
- Professor and Director, Institute of Applied Economics, National Taiwan Ocean University, 2006-08.
- **Executive Director, Taiwan Tilapia Alliance, 2004-07.**

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- Invited Expert, Tilapia Feedmill Project Assessment in Guatemala, Oct. 2013 to May 2014.
- Invited Expert, Freshwater Pacú (*Pyaractus mesopotamicus*) Hatchery Project Assessment in Paraguay, March 2014.
- Invited Expert, Tilapia Processing Plant Project Assessment in Guatemala, April 2014.
- Committee, Scientific Committee for International Institute of Fishery Economics and Trade (IIFET) 2012 and 2014 Conferences.
- Lecturer, Workshop on Tilapia Culture, International Cooperation and Development Fund, Honduras, March 2011.
- Advisor, Myanmar Fish Farmers Association, Union of Myanmar, 2007-12.

Outline

- I. The Role of Aquaculture Sector in APEC Region in the Global Seafood Supply
- II. Why Tilapia? Continuing to Increase in Popularity Globally
- III. Current Development of the Tilapia Industry in Chinese Taipei
- IV. Whole Fish Utilization: The Chinese Taipei Experience
- **V. Concluding Remarks**

1. The Role of Aquaculture

2. The Role of Aquaculture Sector in APEC Region in the Global Seafood Supply I. The Role of Aquaculture to Meet the Future Demand for Animal Sourced Protein

- Fish accounts for 17% source of the global population's intake of animal protein.
- Relative contribution of aquaculture and capture fisheries to food fish consumption was almost the same in 2013.
- Rapid growth in aquaculture production
- Contribution in the economics: employment, business, and trade

The Role of Aquaculture Sector in APEC Region in the Global Seafood Supply (I)

- In 2013, global aquaculture production was 70.2 million MT.
- Top 10 inland fin fish producers in 2013 were: 1) China (60.1%); 2) India (10%); 3) Indonesia (6%); 4) Vietnam (5.7%); 5) Bangladesh (4%); 6) Egypt (2.6%); 7) Myanmar (2.1%); 8) Thailand (1.1%); 9) Brazil (0.9%); and 10) Philippines (0.8%).
- To maintain 2007 consumption level in every economy, 159 million MT of fish needed to feed world population in 2030.

Global production of some major farmed fishes



Source: Fitzsimmons, Kevin, Market Stability: Why Tilapia Supply and Demand Have Avoided the Boom and Bust of Other Commodities, Tilapia 2015, Kuala Lumpur, Malaysia, April 2-4, 2015.

The Role of Aquaculture Sector in APEC Region in the Global Seafood Supply (II)

- In terms of "conversion efficiency" and "carbon emissions", farmed aquatics have a better performance than other animal sourced foods.
- Net exports in developing economies from fish have increased during the last two decades.
- In order to reach the goal and/or bridge the gap, a better and improved management mechanism is needed, such as increasing production and reducing wastes.
- Sustaining aquaculture growth needs: 1) technology & innovations; 2) good public-private partnership; and 3) governance & policy.

II. Why Tilapia?

- **Tilapia is the fish for the 21th century**
- Omnivorous fish
- High density viable
- The most labor-saving aqua-farming sector
- The cheapest farmed white meat that compliments the natural environment

Global Tilapia Development

- Tilapia farming is now becoming more wide spread in many parts of the world, especially in the developing and less developed economies.
- The ease of production and beneficial contribution to food supply make tilapia a very attractive product.
- Issues relating to sustainable aquaculture practices and environmental concerns will be critical in the future and will need to be addressed by the tilapia industry.

Tilapia is Continuing to Increase in Popularity Globally

- Tilapia production in 140+ economies.
- China is world's largest tilapia producer.
- Among APEC economies, Indonesia, Malaysia, Philippines, Chinese Taipei, and Thailand are significant tilapia producers.
- Promoted by the most aid agencies and NGOs.
- Tilapia grows well in the most production systems.
- Global farmed tilapia sales in 2012 was US\$7,656,257,000 (FAO FishStat 2014). It is expected to exceed US\$10, 000, 000, 000 in 2014.
- Imports to US in 2013 were US\$1,034,501,000.

M.T.



Global Production of Tilapia, 2007-2013

Source: Yearbook of Fishery Statistics Summary Tables, FAO, 2014.

M.T.



Tilapia Production among APEC Economies in 2012

Source: Fishery and Aquaculture Statistics, FAO, 2014.



The Percentages of APEC Tilapia Production in the World in 2012

Source: Fishery and Aquaculture Statistics, FAO, 2014.

Tilapia Products (I)

G & S





Block

Normal skinned



Semi-deep-skinned



Deep-skinned



Tilapia Products (II)





Butter-marinated





Battered & breaded tilapia



The U.S. Tilapia Imports by Economy, 1992-2014

Source: U. S. Department of Commerce, Bureau of the Census, 2015.

III. Current Development of the Tilapia Industry in Chinese Taipei

- Thirteen tilapias (*Oreochromis mossambica*) were brought into Chinese Taipei in 1946.
- Chinese Taipei began to export whole frozen tilapia in the late 1980s and frozen fillets to Japan in the early 1990s with a price of USD12 per kg.
- In the early 2000s, tilapia became a commodity.
- Chinese Taipei's tilapia production and value were 73,342 M.T. and US\$114.47 million in 2012, respectively.
- Chinese Taipei has gained a worldwide reputation in tilapia farming technologies and has made tremendous contributions to creating a global market for tilapia products since the 1980s.



Whole-Frozen Tilapia

Fish Nugget or Fish Portion

IZUMIDAI-SASHIMI 潮鯛生魚片

Frozen Tilapia Fillet 🚫



生のいずみ解

李林刻真境、杏林刻真新

IN NUMBER OF COMM · 如果的 - 红粉带 · 含糊素明白的 ACCRETED TO F

INCOME AND ADDRESS OF -多糖烯水-中古石田 - 存根調田 町合家道・石具・営業・営業・学業業的構成

255, 14, 20, 22, 11 INCOME NAME OF TAXABLE PARTY. OWNERS IN COMPANY DESCRIPTION OF THE PALATE THE MARKET MARKET April 1 (1977) 1210

AL 40 CH 18-1 Fish Burger (Round)

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Taiwan tilaga

NAME OF TAXABLE PARTY OF TAXABLE PARTY.

Phillips laboration the Corner Prompton NATIONAL STREET, STREE



LOPT

BAKANAJ

ARE

Tilapia Sausage

US\$ 14 per 600g

Tilapia Omelet

理系列

E

画王子焼

調鱼

台灣鯛魚 黃金蛋皮 × Tilapia Egg



Roasted Tilapia Fillet

鯛魚翅 (Tilapia tail fin)



US\$ 14 per 50g

需冷凍

IV. Whole Fish Utilization: The Chinese Taipei Experience

- Whole fish utilization (zero waste) is being applied in numerous aquaculture species in Chinese Taipei.
- Two thirds of tilapia production went to processing plant in Chinese Taipei.
- Logistics: An improved live fish transportation system is used to reduced the death rate and maintain the freshness.
- Diversification of Products: New and value-added tilapia products were created to meet the market demands.
- Zero Waste Processing: Innovative technologies are used to extract valuable substances from fish processing wastes to produce fishmeal, fishoil, gelatin and collagen etc.

Live Fish Transportation

The state

南鉛車體公司

Processing Flow of Fillet and C.C.Ps.



Yields of Tilapia Products

Product Type	Yield	
Whole-round	98~100%	Subject to fish size
Gilled & gutted	84~86%	Subject to fish size
Regular-skinned fillet	33~36%	Subject to fish size
Deep-skinned fillet	31~34%	Subject to fish size

Collagen

Fish Scales Collagen Cream 魚鱗膠原蛋白積緻霜

2402401

Gelatin





$\overline{\mathbf{v}}$

Byproducts - Tilapia Leather





Tilapia skin furniture from Brazil



Source: Fitzsimmons, Kevin, Market Stability Why Tilapia Supply and Demand Have Avoided the Boom and Bust of Other Commodities, Tilapia 2015, Kuala Lumpur, Malaysia, April 2-4, 2015.

Tilapia scales for flowers and skins for shoes





Source: Fitzsimmons, Kevin, Market Stability: Why Tilapia Supply and Demand Have Avoided the Boom and Bust of Other Commodities, Tilapia 2015, Kuala Lumpur, Malaysia, April 2-4, 2015.

Public-Private Partnership in the Tilapia Industry in Chinese Taipei: the Case of Koufu Fisheries Cooperation





V. Concluding Remarks

- A serious concerted effort by all parties is necessary to significantly reduce the waste and to fully maximize the contribution of aquaculture sector.
- It would be beneficial to create value-added and/or high-valued products in applying new innovation and improved technology.
- The experience from Chinese Taipei would be a model to consider.

One of Chinese Taipei's Environmentally Friendly Tilapia Farms



Eat More Tilapia!