New agriculture business model in Taiwan

OPINION ARTICLE

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Abstract

We offer an integrative introduction, analysis, and commentary for the new agribusiness models (mainly for crop production) in Taiwan, an important economy in Asia. Taiwan's economy has been relying heavily on agriculture-based business, even against the fact that its high-technology industries occupy major media explosion opportunities. We start with the introductory discussions of Taiwan's agricultural backgrounds and development. Then we review and analyze the developing agribusiness models at macro and micro levels. Based on those analyses, we propose promising directions for future studies and agribusiness practices.

Keywords: agriculture, agribusiness, business models, Taiwan

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1. The context

Taiwan has its main income in agriculture and allied activities. Generally, 90% of the Taiwan population is farming rice, sugar, camphor, tea, and other crops. After 20 years, it can be seen that the government of Taiwan aggressively pursues industrialization which results in agricultural export of the economy to fall behind the agricultural imports. Rice is considered as the most valuable crop in the economy followed by the sugarcane, betel nuts, watermelon, tea, mangoes, pears, pineapples, grapes, etc. In late 1998, it has been found that there were nearly 178,000 hectares of land which was devoted for vegetable cultivation and more than 100 types of vegetables were being yielded in Taiwan (Mao and Schieve, 1995).

In such regards, the nature of this article is to share observations but not a full theoretical paper. What we wish to achieve is to pace through the updated and the broad but diverse threads of information regarding the current development of agribusiness model in Taiwan, which fits the theme of this special issue well. This paper contributes by identifying (and providing information for scholars in other economies) the current business models that are being followed in Taiwan and also the future implications of the new models that will help the economy in the future.

1.1 Types of agricultural production in Taiwan and consumption level

The agriculture sector of Taiwan has faced an enormous change in recent years. The reasons for such changes include the necessary response to economic downturns, fitting new employment requirements in agriculture sector, re-positioning for global competitiveness, new consumer's living concepts and trends, and the need for a technological upgrade to increase efficiency and effectiveness beyond traditional ways (Han and Hou, 2016; Lin, 2019; Su, and Wu, 2015; Yang, 2019). It has also been seen that there was a major pressure as a result of rapid economic development and increasing labor costs in recent decades (Ka, 2018). In 2013, it was found that there were four main types of agricultural produce sectors in Taiwan: (1) plant crops of 47.88%; (2) fishery 20.7%; (3) livestock of 31.6%; and (4) forest of 0.09%. Rice is the main crop that is harvested in the economy and it is the most valuable crop of the economy. Taiwan has been successful in fulfilling its commitment to the World Trade Organization by opening its market and reducing protective trade measures. Along with rice, Taiwan produces betel nuts of nearly 165,000 tons, the second most valuable crop after rice. Considering fruit, Taiwan has invested nearly 2.68 million tons of fruits and contributes nearly US\$ 3,452 million to the economy (Commodity.com LLC, 2019). Vegetables contributes nearly US\$ 170 million of the total value. Tea contributes US\$ 6.92 billion followed by flowers US\$ 16.52 billion, livestock and poultry US\$ 150 billion, and fisheries US\$ 54.5 billion. Along with this, there are fast-rising specialized (knowledge-intensive) industries such as the mushroom and orchid cultivation has also been boomed. Taiwan is a labor-intensive industry economy where over 20% of the people living on the land area is under cultivation. However, agriculture of Taiwan is characterized by terracing, irrigation, multiple cropping and extensive use of fertilizers. Also, the farms where people cultivate are small which can average as 2.7 acres of cultivable land per family (FFTC, 2019a).

1.2 Economic setting in Taiwan

Taiwan has been one of the chief producers of computer technology competing with the other developed countries of the world (Lee, 2019). Increasing funded resources have been allocated to agriculture sector which can be able to overcome the hurdles and promote sustainable development in the sector. This will also cover insurance facilities for the crops that are being produced which will act as a major benefit at the time of drought and crisis. To deepen agricultural ties with its Central American ally Honduras, president of the economy has been adopting several ways to promote the agricultural cooperation regarding Honduras's coffee and avocado industries (Ministry of Foreign Affairs, 2019).

After 1960, Taiwan has experienced a major economic and industrial development which can be called as reforms and that has resulted in the rapid development of the society and economy. This has resulted in the

great economic achievement from the 1970s to 1980s and allowed Taiwan to rank among the developed countries in Asia (Ministry of Foreign Affairs, 2018). Since the 1980s the economic structure gradually shifted from a labor-intensive industry to a high-tech intensive one and was considered as one of the vital economies in the Asia. However, affected by the financial grim in the European countries and also the USA as Taiwan's major international business locations in the year 2018, the economic growth of Taiwan was 2.6% and the gross domestic product (GDP) was around US\$ 589,369 million. The average per capita income was US\$ 60,039 million and in terms of the consumer price index, it decreased by 0.05% from the previous year. The employment situation can be trailed as, average people employed at 11.48 million and the average unemployment rate of the economy was 3.66% (FFTC, 2019b).

1.3 Macro-level impacts on agriculture

The macroeconomic impact on agriculture stimulates a major economic growth in the economy (Akers, 2019). It can be said that agriculture has a greater impact on the economy of Taiwan. The unemployment rate was 3.74% in June 2019 that has diminished little from 3.74% (Rabushka and Kress, 2019). This shows that at present a greater number of people have jobs and a lower unemployment rate improves the efficient use of resources and equipment which can be beneficial for the Taiwanese economy. As the main source of income in the economy is agriculture, it can be said that more people have been involving in agriculture. The economy of Taiwan has ranked 22 in terms of purchase power parity. The economy is ranked in the 18th spot in terms of GDP. Taiwan is a member of the Asian Development Bank and the World Trade Organization and also Asia Pacific Economic Cooperation. This shows that the Taiwan has been widely integrating with world's economy (Tambunan, 2012). However, recently the economy has stagnated. The export of the economy is stagnating and also the wages of the worker has been low which signifies that they are not paid sufficiently by taking consideration with the cost of living in the economy. This has also tremendous effect in the agriculture of the economy as the young people are not eager to come in this sector and the agriculture sector is lacking young people with creative minds. In terms of GDP, it has increased from 53,046 million Taiwan New Dollar to 55,600 million Taiwan New Dollar (Open Access Government, 2019). This has been originated from forestry, agriculture, animal husbandry, and fishing. However, change in macroeconomic policies can affect the performance of the agricultural economy. The higher the economic growth, higher will be income, job among people and hence demand in the world economy. The agriculture sector is the major sector that has been adding value to people all over the economy in Taiwan. The economy has a greater prospect if it can apply certain business models in agriculture for better growth and development.

2. Business models

Business model is defined as the successful operation of the business and is able to identify and intended customer base, products and wide detailing of the finance involved. The business models are created by the organizations so that they can deliver and capture certain values in terms of cultural, social and economic context (Chesbrough, 2010; Cucagna and Goldsmith, 2018). For business models in agriculture sector, it is also fundamental for agribusiness' success, especially in transitive periods (Gunderson *et al.*, 2014; Widmar *et al.*, 2015). Taiwan can follow a certain agricultural business model to transform its agriculture sector while enhancing profitability and reducing the risk.

2.1 Basic service delivery model

The model can be named as a basic service delivery model. The model can focus on the small farmers and the landholders who are suffering from low incomes and low productivity. Several companies and non-profit organizations have the model which can provide service and input to the customers and the financial institutions like a bank or any other donor can also take part in these models and generate funding. In the service delivery models, it acts as the supply chain structure that generate services like training, accessing input, financing to the farmers and enhancing performance and also sustainability. As the way of value creation and capture have been dramatically changed, Taiwan can follow this model to continuously re-

examine its present agribusiness strategies. There will be a professional service delivery to the farmers by creating a supply chain base. As the market in Taiwan is less developed than the developed countries, and there is a less robust structure in the public transport and service delivery system (Hussain *et al.*, 2015). The sustainable trade initiative will help in supporting the supply chain managers in the optimization of the service delivery to the suppliers. The focus will be on three different levels of service providers: (1) the investor; (2) the service provider; and (3) the farmer. These three levels have been chosen as the sustainable model needs all these three main factors for receiving a return on the desired investment. To benchmark different cases, a period of eight years has been taken although there may be short term cases or much longer period of investment (Liu and Wu, 2014). The analysis will not calculate any social benefit as there is no qualitative data involved in the model. Hence this is one limitation in this model and needs to be implemented as soon as possible. That will create better communication and capturing the level of impacts. The aim of the model to generate and improve the condition of the farmer by enhancing their yields and quality of the farm of production. The basic service delivery model will create value at the level of the farmers as an investments average and the profitability will be increased substantially. Also, through the model, it will be essential to rejuvenate the entire system of agriculture.

2.2 Contract farming

Contract farming involves pre-agreed supply arrangements between the local producers (farmers) and buyers. Through this model, the farmers can grow and deliver their products at certain quantities and qualities on a specified date and can exchange for upfront inputs like credits, fertilizers, seeds, pesticides, and some technical advice. The specific feature of the partnerships between the small landholders and agribusiness firms is dependent on certain aspects like availability of institutes to support in terms of production, the commodity being produced, the resource base of the producers, and the capacity of the agro firm. There are several kinds of contract farming like plasma-nucleus partnership, subcontracting, harvest and pay, operational cooperation (KSO), lead concessions. Taiwan can adopt any business contract modeling. In plasma-nucleus partnership, the agro-business often generates inputs like seeds, capital, fertilizers, pesticides and technical expertise people to the farmers or also called as farmer cooperatives (Fung *et al.*, 2016). The small landholders involved in this arrangement need to produce the required commodity at the required quality, quantity, and price. Taiwan can also go for subcontracting which is an agreement between the agri-business and third party in the food chain like the supermarket for the former and the supply commodities to the latter. Under the arrangement, the agroindustry firm will require the production of the agricultural harvest to the smallholder farmers based on pre-agreed quality, quantity and price. Here the firm encourages the farmers to cooperate in producer organization and supplied technical assistance and also credit while negotiating with the prices along with the farmers transparently.

3. The innovative business model

Taiwan needs to create synergy by integrating industry resource integration. It further provides counseling to push forward agri- and aqua-special zones for safety management. As an innovative marketing strategy planning and also there will be an agricultural production grouping zone that will facilitate the local farmers' association for making certain deals to grow their fruits and vegetables and other crops. The effort that has been created by producing standardization goods and services will lead to an integration of production that will start with contracting production for giving a stable output. Innovation will be made on every field of agro activities from fisheries, livestock industries with specialties (Schaltegger *et al.*, 2012). The young manpower for agricultural innovative capabilities is essential to remove the gap and barrier in the Taiwan agriculture industry. The current challenge that is faced by Taiwan is the gap of workforce invested in the industry and enlarging the young people to join the agricultural market. Thus, the new model tends to have young manpower in the industry which will insert new thinking and creative mind to develop the sector. The government of Taiwan will tend to adopt this model and provide assistance to the training to the young people. This will thus help in building the young generation as the backbone of agriculture. Further, the model will also promote agriculture value-added policy for establishing any export-oriented innovative

value chain. As this model need to operate by the government of Taiwan, they also need to develop their research and technology field and give more emphasis on the agricultural biotechnology. The model plans to launch agricultural biotechnology park, integrating with the agricultural laws and policies that are feasible for the economy. It also aims to develop the excellence and best techniques in the economy. This will also cover ornamental fishes, agriculture products, horticulture, livestock, etc. The e-commerce sectors play an active role in selling the products directly to the consumer. The plan will also incorporate tie-up with several e-commerce industries for successful selling of the agricultural perishable goods to the customers (Ministry of Foreign Affairs, 2019).

3.1 Impact of the business models in the agriculture sector of Taiwan

The business models that have been suggested to develop agricultural development will create a major change in the process of farming and investing. The basic service delivery system will be able to create a framework through which there will be a systematic data-driven approach. Further, individuals will be able to deliver and make a challenge simultaneously. Modern agriculture in Taiwan will help to be characterized by a professional delivery system in supply chain management. The value chain will be tremendously developed. As there will be a value chain investor who will generate fund to the service provider. The service provider will provide training, financing, and inputs to the farmers. The farmers in return produce their goods, increase their production by acquiring the latest technology and it will also be sustainable agriculture.

3.2 Farmers associations

Taiwan not only relied on technological progress to resolve the problem of agriculture. Further, the agriculture development of the economy is also due to the different association of the farmers known as the farmers' association. The association is cooperative and also multipurpose. The primary goal of the association is to help the members to solve any problem of farming, marketing, and financial problems. This also serves the gap between the farmers and the government. Presently there are 291 farmers association in the economy which operates at three-level provincial, city and township. Paddy rice is considered as the most crucial food crop in the economy and the economy has reliable water supply which is essential for the production. There is a certain irrigation operation that helps to maintain the orderly distribution of water and assisting government planning and implementing 16 irrigation farmer's association. Further, there are fisherman's association and fruit marketing cooperatives (Miranda *et al.*, 2019).

3.3 Major market identification

Taiwan economy has been increasing in terms of market share and employment growth as there has been a rapid shift with globalization and rapid economic developments. The government of the economy has also increasing assisting the sectors of the economy to boost the industrial output and dealing with the forthcoming challenges. In the agricultural scenario, a knowledge-based restructuring model has been implemented that has created growth in the e-commerce region of the company. With such landscape development, the agriculture sector in Taiwan has unlocked several domestic and international markets.

Trade liberation policies undertaken by the government has led to increasing export opportunities for Taiwan's farmer. Measures taken have increased volume and value of the exports under such trade regiment. Such measures assisted in participating in the international target markets, organizing the domestic food market and sales promotion for seasonal fruits and vegetables. Taiwan's agricultural exports globally have also increased majorly to countries like China, US, Japan, Hong Kong, and South Korea. These exports include fresh fruits such as pineapple, mangoes, guavas, live plants, and other agricultural products. Development of such exporting markets forced the local cultivators to produce more of exporting products and use advanced horticulture methods to meet up the local demands. Local growers have also flooded the domestic market with such products since overproduction of these products has created an excessive supply. As an increasing number of Taiwan's farmer cultivate through the organic methods, the demand in the global market has inflated.

Apart from the cultivation of fruits and vegetables, Taiwan is also known for its export in sugarcane. Though price fluctuations and competition from imported sugar has presented a serious challenge to the economy's sugar industry, however, the industrial operating in this sector has met new developments by investing in biotechnology, land development, and overseas diversification to remain competitive. Taiwan is also known for its production of tea, flowers, livestock, fisheries that form a part of the overall exporting commodities. With free trade agreements with few countries with constant up-gradation in the field of horticulture and organic cultivation, Taiwan has unlocked major markets to supply its fresh agricultural products. As the economy is still in a developing stage, the raw materials to make the cultivation possible is present at a reasonable rate. The target market for the economy has been the South Asian dominant countries such as China, Japan, and Hong Kong which has a high demand for freshly produced fruits and vegetables. Apart from the South Asian region, the economy has also deep trade relations with the US that provides a high demand for Taiwan's agricultural market. Taiwan's potential target market does not only consist regions of South and Southeast Asia, but with growing trade relations by bilateral and multilateral trade talks and unions, Taiwan is set to have a high demand market for its products.

3.4 Changes in agriculture business in recent years

Taiwan's growth rate since the 1960s has dramatically declined and transformed into an industry-oriented and export-led economy. The agriculture sector which was one the strength of the economy has seen a moderate decline in recent years. Like China, Japan, and South Korea, Taiwan was once a high exporting economy of agricultural products, however with an increase in technology usage globally the economy has shifted its interest to technological and gadget products. Taiwan has been producing more industrial and technology output than agricultural products. This paradigm shift has been a result of high demand in the global market and the expansion of the companies across borders (Huang, 1993).

As Taiwan's agriculture sector was facing heavy pressure with a decline in the domestic market and bad image in the global market, the government took countermeasures to control the sharp decline which impacted the agriculture industry of the economy for years to come. The structural change of the economy and making a balance across the technology industry and agriculture industry has been made possible by the evolution of agricultural policy and programs and focus on organic growth of the products. Over the period central gravity of Taiwan's economy was mainly dependent on the agricultural production, however, with expansion plans, the economy changed its economic development rate in the past few decades. Agricultural contribution of the economy to the net domestic product was constantly decreasing from 30% in the 1960 decade to 6% in the 1990 decade. However, with the government's intervention and creation of opportunities, the agricultural surplus increased two-fold (Lin *et al.*, 2017a).

Taiwan regained its agricultural market share and began exporting which assisted the economy to earn foreign exchange earnings. Taiwan's agricultural exporting products increased in the form of sugar, rice, fruits, and vegetables. The government's extensive reforms have created many opportunities for the agriculture sector of the economy. Changes in the agricultural unit of the economy include demolishing of the laws that created hindrance for farmers to reach the market, development of organic farming, removing barriers to entry for new industries, education to the farmers and initializing growth in the domestic market.

3.5 Impact of development in an agricultural field on the economy

Agriculture is the backbone for any developing economy since pre-dominantly such countries mainly rely on their agricultural products for exporting and fulfilling the domestic demand. Developments in the agricultural field provide an opportunity for export to the developed nations that mainly produce technological or industrial-based equipment. In the case of Taiwan, which was predominantly an agricultural producing nation, the economy has faced certain transition with growth in technological advancement and globalization. The growth in the technological field was mainly fueled by the demand in the overseas nation. This resulted

in the decline of agricultural production since the economy focused on earning its economic growth from such industrialized products (Lin *et al.*, 2017a).

3.6 Environment

Taiwan has been an economy with enriched agricultural supplies and favorable atmospheric conditions. Environmental conditions of the economy have supported the agriculture industry of the economy. With the help of favorable weather conditions, Taiwan has been able to produce organically grown fruits and vegetables. The environmental advantage for the economy has assisted to prosper in the field of agriculture. With the support from the government, the economy has boosted its sales in the form of exports since the economy has developed by upgrading the laws and reformed the current agricultural methods by introducing a modern and more civilized form of agriculture (Huang, 1993).

3.7 Science and technology

Science and technology play a crucial role in the agriculture industry. The farmers in the past in any economy faced several hardships for farming their piece of land. At present, the farmers are using global positioning system (GPS) to improve their crop production. The evolution of technology in this field has largely impacted the people of Taiwan. The farmers of Taiwan are using several farm machineries and are able to work at a faster pace than before. In the year 2018, the government of Taiwan has been trying to promote sustainable and eco-friendly technology for agriculture and farming. The economy has been opting for importing energy for international competitiveness and renewable sources of energy. To share their outstanding research and development, recent tools, equipment, and excellent products have been constantly developed to save labor cost domestically. In the recent year, Taiwan has developed nearly 62 agricultural pieces of machinery which are divided into five major categories like special crops and tea, flowers and seedlings, vegetables, fruit trees, rice and miscellaneous grains (Wang, 2016). This is coupled with demonstrations, online introduction and several promotional activities like pesticide application, transplant, harvesting and cultivation to present the achievements that have been adopted by Taiwan while opting for smart agricultural development. Further, the council of agriculture in Taiwan welcomes the agricultural technology not only from domestic but also from other countries by promoting bilateral exchange and cooperation in innovative agricultural technology to improve product quality, efficiency, production, and output.

3.8 Further scope of development in an agricultural field in Taiwan

Taiwan's history portrays that the economy's agricultural revolution has been possible by introducing new and efficient methods of farming and assistance from the government in the form of developing of new markets by forming trade relations with other countries. The further scope of the development in the field of agriculture in Taiwan includes more technologically advanced equipment that reduced the waste that is generated in the form of by-products and reducing the man-made efforts. The economy has continuously evolving and grasping new markets to export their products. As the economy is already increasing the field of technology which is mainly done in the field of individuals or industries, however with careful planning the industries and the agriculture unit can be combined to produce more premium and easier materials. The quality of the vegetables cannot be controlled since the syncretization of the fruit may lead to the creation of some kind of diseases, hence careful measures need to be undertaken to combine the force of technology and agriculture.

The future scope of the agriculture industry does not function in exclusivity, but it includes support from other segments as well. Technology does not necessarily harm the original fruits and vegetables but with careful synchronization, the technology can assist in more enhancement and better-quality production. After the land reform, the economy of Taiwan was principally agricultural. 61% of the population was employed in farming and agricultural activities and 36% of the domestic product was contributed by the agriculture itself. As land is the basic problem in agriculture, land reform was initiated to remove the obstacle faced by

the vast majority of people as the land was concentrated into the hand of the fewer people of the economy (De Clercq *et al.*, 2018). The first land reform was completed in 1949 and it is followed by subsequently after every four years. Agriculture has itself transformed substantially from subsistence farming to commercial farming. Labor intensive farming has reduced vastly to capital-intensive farming. Further, the reform in agricultural development has also made desirable improvement and lean management of labor of agriculture sector. In the future, smart farming is the only key in the economy. The farmers in the modern generation in the economy have the scope to utilize the technology successfully so that they can enhance the quality and quantity of the agricultural products. They have access to soil scanning, GPS, data management, internet and other technologies that have increased the production of goods manifold (Ou, 2012). Using farming techniques, farmers can monitor the needs of each animal and can also adjust their nutrition correspondingly by preventing diseases and enhancing the herd health. The agricultural sector aims to optimize production to feed the growing population in the world. Real-time information also plays an active role in harvesting and planting crops and it can help to develop an insight into the commodity market (De Clercq *et al.*, 2018).

Taiwan can become the world's largest food producer in the future. The terrain and climate of the economy are stable to produce all kinds of agricultural products. In the coming decades for feeding the growing population of the world, Taiwan has automated, vertical farms with improved yield and lower consumption of water. Internet of Things can play a major role in the future of agriculture along with the business models (Lin *et al.*, 2017b). Agriculture is all about technology and switching Taiwan's traditional agriculture to smart agriculture will help in creating thousands of jobs in the coming years (Lin *et al.*, 2017a). Artificial intelligence can play a vital role here along with modeling technique, a new approach to farming and computer-controlled fertilizing and irrigation. For changing the present system of irrigation and farming, the change will be initiated soon so that the young generations are aware of the vast change in this sector and take an interest in agriculture and farming. This can be called an agriculture 4.0 smart agriculture method. Taiwan is uniquely able to deliver the complete supply chain for the projects and agriculture industry by adopting the earlier mentioned business models (Lin *et al.*, 2017a).

4. Conclusions

The project gave a detailed analysis of the agriculture sector of Taiwan. It has been found out that agricultural Taiwan has nearly all skills and component to become the fastest and major producer of agricultural products in the future. The business models that have been discussed can generate a major benefit for the people of the economy and also to the people outside the economy. Technology and research and development are considered as the crucial factor that the government of Taiwan need to develop. Perhaps, it can also be said that the information technology department can act as a crucial thing for developing the agriculture sector. The council of agriculture also needs to take serious procedures to improve this sector. To conclude, it can be said that Taiwan is compelled to face all kinds of impacts and serious challenges that are faced due to the global economic crunch and extreme weather and climate change. The economy will adopt some business agricultural models that can help to successfully launch the 4.0 smart agricultural model. However, the people of Taiwan must be aware, and the young generation must actively participate and try to contribute to the economy.

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