

Comprehensive Agricultural Policies of Taiwan

Hwang-Jaw Lee, PhD

Agriculture in Taiwan

Taiwan is located in the subtropics mountains and rugged hills cover two-thirds of the land, so only about 830,000 hectares of land are suitable for agriculture. The average farm covers 1.1 hectares, thus the agricultural sector is largely composed of small farms. However, Taiwan is working to develop its agriculture by introducing advanced technologies and modern equipment. Taiwan's agricultural products are very diverse, and output is high. The agricultural sector, moreover, is precisely what laid the solid foundation for the soaring economic growth that Taiwan has enjoyed in recent decades. Agriculture plays an extremely important role in providing food, supporting rural development, and contributing to environmental conservation.

1.1 Agricultural GDP

In the past four decades, from the rapid economic development, the GDP (Gross Domestic Production) of Taiwan has grown significantly. Comparing all industries, service industry has the highest contribution to the overall GDP due to its fast growth, while the agriculture industry's contribution has declined for several decades now. From 1981 to 2001, the GDP contribution declined from 7.33% to 1.90%; in the past decade, the GDP contribution has been maintained between 1.6% and 1.8%. Table 1 shows the GDP contribution for the past 4 decades.

Table 1. Agricultural GDP and its share

Unit: Billion NT\$

Categories	1981	1991	2001	2011
National GDP (A)	1,811	4,958	9,930	13,745
Agricultural GDP (B)	133	182	189	241
% (B/A)	7.33	3.68	1.90	1.75

Source: Directorate-General of Budget, Accounting and Statistics (DGBAS), Executive Yuan, ROC (Republic of China)

1.2 Agricultural population

The population of Taiwan over the past four decades has grown 27%, from 18 million in 1981 to 23 million in 2011. The agricultural population has

decreased from 5 million to 2.9 million, a 42% decline. The share of agricultural population relative to the overall population has declined from 28% to 13%. See Table 2 for details.

Table 2. Agricultural population and its share

Unit:1000 persons

Categories	1981	1991	2001	2011
Total population (A)	18,136	20,557	22,340	23,055
Agricultural population (B)	5,101	4,206	3,783	2,962
% (B/A)	28.13	20.46	16.93	12.85

Source : Ministry of Interior; DGBAS; Agriculture and Food Agency, COA, Executive Yuan, ROC

With the fast urbanization, young generations of farming communities have moved to the cities and have been employed by other industries, and the labor structure has also been affected by an aging population. Among the 1.1 million agricultural population during 1991, 15~34 age group: 22.3%, 35~64 age group: 72.8%, and the over 65 age group: 4.9%; by 2011, the population has declined to half million, the 15~34 age group: 10.2%, the 35~64 age group: 72.7% and the over 65 age group was 17.1% (See Table 3 for details). The agricultural growth has been hindered by the declining of agricultural population and the aging population. Intervention must take place to ensure agriculture productivity and future industry growth.

Table 3. Agricultural employment number by age group

Unit: 1000 persons, %

Categories	1991	1996	2001	2006	2011
Total	1,093	918	708	555	542
Age Group (old years)					
15 ~ 34	22.3	17.7	13.9	9.7	10.2
35 ~ 64	72.8	74.8	75.3	74.0	72.7
Over 65	4.9	7.5	10.8	16.3	17.1

Source: DGBAS, Executive Yuan, ROC

1.3 Farm household and size

Looking at the farm households over a four-year span, through active promotion, the number of farm households has increased during 2010 from a three-year decreasing trend. The number of full time farm households has

increased by 2.3% between 2009 and 2010. Due to urbanization, the total hectareage of cultivated fields has been declining steadily. The average hectareage of farm households has been consistent at around 1.1 hectares. The number of farm households with over three hectares cultivated fields has declined. The detailed data of farming household and farm size is listed in Table 4.

Table 4. Cultivated fields, number of farm household and farm size

Categories	2007	2008	2009	2010
Cultivated fields (ha) (A)	825,947	823,364	815,462	813,126
No. of households (B)	751,338	748,276	744,147	776,725
Full-time (%)	21.5	21.7	21.9	24.2
Part-time (%)	78.5	78.3	78.1	75.8
Average farm size (ha) (A/B)	1.099	1.100	1.096	1.047
Farm size over 3.0 ha (%)	2.90	3.47	3.66	2.35

Source: DGBAS : Agriculture and Food Agency, COA. Executive Yuan

1.4 Agricultural production and composition

Table 5 shows the value and composition of agricultural production. In the past four decades, based on the current price, the total agricultural production has increased to about double, from NT\$238 billion to NT\$475 billion. The scale of composition change has been minor. The major changes in 2011 were increase of livestock production and decrease of forestry activities.

Table 5. Agricultural production values and compositions

Year	Total Values (million NT\$)	Compositions (%)			
		Crops	Forestry	Fishery	Livestock
1981	238,467	46.23	1.95	21.11	30.71
1991	323,336	45.69	0.40	25.83	28.07
2001	352,690	45.58	0.17	25.55	28.70
2011	475,476	44.17	0.08	22.27	33.48

Source: COA, Executive Yuan, ROC

1.5 Agricultural products

The major changes of agricultural products over the past four decades were: reduction of rice and coarse grains; and increase in the production of fruits and vegetables. These changes have been a reflection of market demand and competition which occurred internally and externally. Table 6 shows the detailed composition of agricultural products.

Table 6. Values of crops production and their compositions

Unit: Million NT\$; %

Year	Total Values ^{1/a}	Composition (%)					
		Rice	Coarse grain	Special crops	Fruits	Vegetables	Others
1981	110,235	42.1	7.8	12.3	15.9	21.3	0.8
1991	147,735	26.2	8.8	9.6	30.5	22.2	2.7
2001	160,759	20.4	4.6	6.7	36.2	24.8	7.3
2011	210,012	18.2	4.3	5.8	35.4	28.8	7.5

^{1/a} values based upon current price
Source: COA, Executive Yuan, ROC

1.6 Farm household income

Table 7 shows the income for both farm and non-farm households. The farm households income over the past four decades has increased significantly in current price. The farm household income of 2010 has increased by 260%; the increase of non-farm household income was below the farm households. The per capital income held the same trend; the per capita of farm households has increased by 470% while the non-farm households has increased by 410%.

The average actual agricultural income for farm households was only around 22%, the other 78% of the farm households income came from non-agriculture sectors including secondary business salary, net business revenues, property income and transfer income, etc. If the secondary business provides better income, then it is predictable that more farmers will abandon their primary businesses in order to improve their income.

The income of farm households has increased decade by decade and to sustain the growth, diligent efforts must be planned and executed accordingly.

Table 7. Income of farm and non-farm household

Unit: NT\$

Year/categories	1981	1991	2001	2010
Per Household income ^a				
Farmers (A)	244,424	572,269	881,298	884,547
Non-farmers (B)	318,808	736,750	1,136,274	1,142,343
% (A/B)	76.7	77.7	77.6	77.4
Sources of income				
Agricultural income (D)	64,457	122,360	163,158	193,133
% (D/A)	26.4	21.4	18.5	21.8
Per capita income				
Farmers (E)	43,882	124,136	224,249	248,468
Non-farmers (F)	69,761	180,576	320,981	353,667
% (E/F)	62.9	68.7	659.9	70.3

^a/a income values based upon current prices
Source: DGBAS, Executive Yuan

Agricultural development in Taiwan has taken a unique path. In the early years, the government carried out land reform to provide “land to the tiller,” and then made policy adjustments as agriculture progressed, seeking at first to spur greater productivity, and then to develop exports of both raw and processed agricultural goods. These developments, in turn ushered in an era of rapid economic growth. Taiwan’s success in the development of small-scale agriculture had become a model for developing economies worldwide.

The core principles of “healthfulness, efficiency, and sustainability” form the backbone of Taiwan’s agricultural policies. Taiwan will make the best of technologies and its geographical location for the benefit of farmers, consumers, the environment, future generations, and the earth. Rooted in the present and looking into the future, we seek to build a modern agricultural sector with a strong global presence.

Background of current agricultural policy

Agriculture is a biological industry, and an important business to support people's livelihood; its development is not only limited by nature, but also influenced by the change of social environment, as well as trends of economic and trade system. In the past decades, the following multiple factors created an impact on Taiwan's agriculture developments.

- Highly liberalized economy with rapid regional economic integration;
- Fast advancement of key agricultural and related technologies, leveraging high tech for agriculture has become a trend;
- Frequent weather related disasters which threatens agricultural productivity;
- Increased focus on food quality and safety;
- Declined agricultural human resource due to urbanization.

Facing the challenges of new environment, leverage industry value chain to expand the breadth and depth of agriculture to replace the traditional thoughts of production-oriented agriculture becomes critical. To ensure a healthy, efficient and sustainable agriculture for all citizens, it is important to develop a holistic plan and connect the plan with human, earth, water, and industry when implementing agriculture policies. Goals of agriculture for all citizens are:

- Farmers – profits, efficiency and welfare.
- Consumers – freshness, quality, safety and healthy.
- Environment – landscape, energy-saving, sustainability.
- Citizens of the World – clean environment, harmony and green energy.

Based on the 'Healthy, Efficient, and Sustainability' agricultural concept, several initiatives have been outlined and executed over the past few years, such as:

- In 2009, plans to support "Superior delicate agriculture – Healthy and Excellent Program" has been established. (精緻農業健康卓越方案)
- June 2010, Conference was called to address agricultural adjustments for climate change.
- August 2010, "Rural Regeneration Act" (農村再生條例) was promulgated.
- January 2011, a conference was conducted to address overall agriculture and land usage. The goals were to establish long term recognition of agricultural policies, plan to set up farmers' academy, and phased implementation plan to adjust agriculture structure and rural rejuvenation.
- In 2012, a program titled "Golden Decade-LOHAS Agriculture" was carried on. (黃金十年 - LOHAS 農業).

Mission

Agriculture is the foundation of the development of a country. To ensure a sustainable development of agriculture, the focus needs to be diverse on several areas: food security; eco-system; landscape; culture; and shaping LOHAS (Lifestyles Of Health And Sustainability) agriculture, guiding agricultural policies and programs towards to the acceleration of agriculture structural adjustments; raising the industry's competitiveness and leading the internationalization of Taiwan's agriculture; revitalizing the use of agricultural resources; and ensuring sustainable development.

To enable Taiwan's agriculture to become a localized life industry and a global green-gold industry, agriculture administration needs to drive the structural improvement, scalability and human resources. These changes will enable the competitiveness of Taiwan's agriculture. The changes can be driven by two major categories:

A. Policy driven

- Creating and deploying new agricultural policies which work for the environment we are facing and for the future.
- Creating initiatives or programs to enable and promote agriculture.

B. Agriculture industry

- Combining primary, secondary and tertiary industries.
- Encouraging cross-industries cooperation to revitalize resource utilization.
- Establishing value chain of agriculture.
- Promoting the internationalization of recreational agriculture.
- Connecting with international standards with domestic safety certification of agriculture products.
- Create business opportunities and values by fully leveraging ICT and green technology.
- Building new development environment.
- Expanding export of innovative outputs in agricultural Science & Technology.
- Migrating agriculture from the existing legacy operation to green eco-industry and becoming service oriented.

Policy implementation of LOHAS agriculture

Facing the challenging subjects, the effort to accelerate the structural change of industry, create better agriculture environment, improve operational efficiency, attract younger work force, revitalize utilization of resources and promote sustainable agriculture, becomes a must.

In the initiative of LOHAS, it recognizes that to drive the required industrial focused changes, agriculture industry needs to become 'multi-functional' in order to become competitive, and addressing all the agriculture associated subjects such as: food safety; eco-system; landscape; and culture aspects. Rational utilization of natural resource (water, soil) and improvement of life quality of rural areas are critical factors for agriculture to become competitive. Initiatives of industrial development and rural rejuvenation need to be integrated with LOHAS to ensure thoroughness. The detailed programs for policy deployment of LOHAS Agriculture and the framework of LOHAS Agriculture are summarized as follows:

Goals:

1. Shaping agriculture into a vigorous LOHAS farm industry that is highly competitive, has a younger workforce, and provides steady incomes;
2. Promoting the revitalization of farm communities, to create a new image on farm villages which is eco-friendly, scenic and; LOHAS
3. Emphasizing the multi-functional value of agriculture and developing sustainable agriculture.

Strategies:

- 1. Raising the industry's competitiveness and leading the internationalization of Taiwan's agriculture**
 - 1.1 Leverage information technology to enhance early warning mechanisms to stabilize agricultural production and marketing, and promote cross-field cooperation to speed up the establishment of industry value chains
 - 1.2 Set up an agricultural Science & Technology research institute to promote innovation, R&D and industrial development. Combine with leading eco-friendly concepts and green energy to drive high-efficiency, energy-saving agricultural operation.
 - 1.3 Strengthen global deployment of agricultural products, promote

internationalization of recreational agriculture, grasp the benefits of economic cooperation (ECFA) with China and cross-strait direct flights to enter new markets and create new business opportunities, and protect agricultural Intellectual Property Rights (IPR) and Plant Variety Rights (PVR).

- 1.4 Participate in international and cross-strait economic and trade negotiations, make careful preparations for agricultural negotiations and responsive policies, and effectuate adjustments to the structure of agriculture. Secure near term benefits, and long term sustainable operation of Taiwan's agricultural industry.

2. Adjusting the structure of agriculture, and integrating the value-add development of resources

- 2.1 Set up a retirement system for aging farmers, and support the "small landlords, big tenant farmers" approach to promoting economy of scale; foster and mentor new-generation of agricultural operators; and promote farmers' academy to raise the quality and operational efficiency of agricultural manpower.
- 2.2 Combine industrial development with farm village regeneration, set up special production zones, strengthen cluster effects, and raise the living quality of farming villagers as well as improve environmental quality of farm production.
- 2.3 Plan and establish farmers' income support measures, promote agricultural insurance, conduct agricultural natural disaster relief, and maintain the income level of farmers.

3. Ensuring food security and strengthening safety of agricultural products

- 3.1 Raise the domestic food self-sufficiency rate, and set up diverse food safety mechanisms.
- 3.2 Promote the pursuit of higher-end output in traditional farming, expand labeling of origin, and shape local brand features; promote local production with local consumption, diverse marketing of agricultural products, and develop new demand for local food materials.
- 3.3 Promote traceability of agricultural products, organic agriculture, Good Agricultural Practice (GAP), certification standards, and other safety verification marks, and gradually align with international standards; and promote reasonable use of fertilizer and environmentally friendly

agriculture.

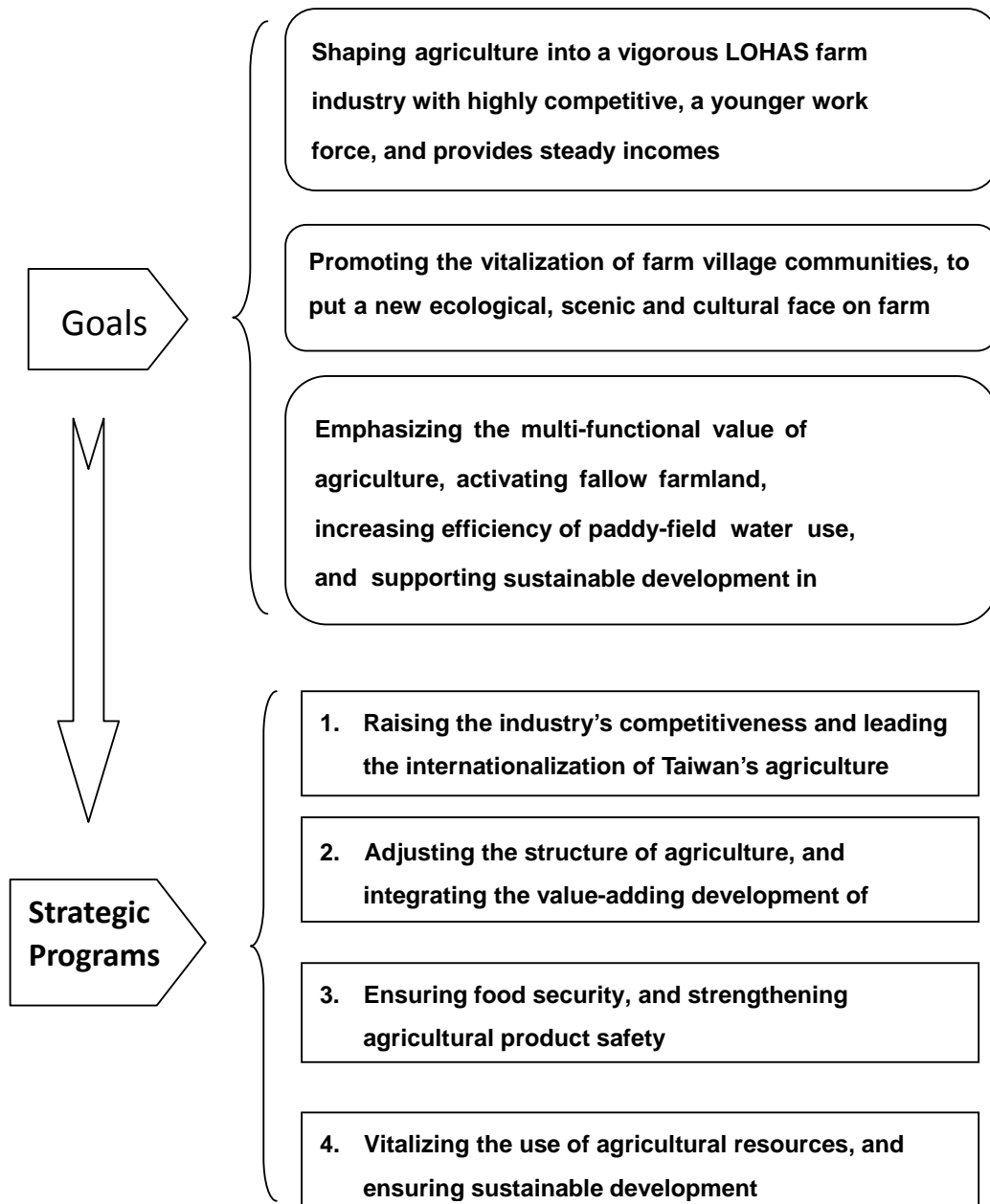
- 3.4 Promote seamless management systems for agricultural product safety, and enhance animal and plant quarantine and testing efficiency.

Providing safe and quality agricultural products to consumers, needs to be done from the very beginning of the agricultural products cycle.

4. Vitalizing the use of agricultural resources, and ensuring sustainable development

- 4.1 Adjust tillage systems, reduce fallow area, activate multi-use for fallow land, and encourage planting of import-substituting crops and local specialty crops.
- 4.2 Conserve valuable farmland, enhance farming use of the farmland, prevent re-zoning of farmland, and maintain a healthy environment for farming.
- 4.3 Promote golden corridors, and develop high-efficiency, energy-saving and water-conserving farming in severely subsidized areas along the Taiwan High Speed Rail; carry out rational planning of agricultural water use, and optimize the functions of “san sheng” (production, living and ecology) and disaster prevention in farm use of water resources.
- 4.4 Strengthen the conservation of marine fishery resources, and guide the industry toward sustainable operations.

Framework of “Golden Decade – LOHAS Agriculture”



Measures

Agriculture in Taiwan has been under siege due to industrialization. In some aspects, industrialization has propelled agriculture industry with enormous growth, such as, improvement of farming machinery and improvement of products (both variety and quantity). But in other aspects, due to the loss of young workforce, the growth of agriculture has reached a plateau, with a declining trend. The loss of young workforce is attributed to the rapid growth of the cities which has attracted many young rural workers to the cities and the income gap has been widened between urban workers and rural workers. Moreover, administration needs to widen the focus at the global level in order to effectively drive the development of agriculture and fully take advantage of liberalization of trade and economy.

To increase the profitability and competitiveness of agriculture industry, Taiwan government has proposed a series strategic policy and measures, some of the measures are introduced below:

1. **Providing service oriented system** (建構農業雲服務體系)

The goal is to build a modernized system with leveraging cloud computing technology, that satisfies the needs of customers, service to farmers, and deployment of policy. The system design can start from following service categories:

- Core of agriculture
 - Production
 - Leisure
 - Investigation
 - Information
 - Communication
- Service to food traceability
 - Local beef
 - Organic food certification
 - CAS premium product
 - Origin of tea products
 - Food safety

2. Promoting ‘small landlords, big tenant farmers’ program

(推動小地主大佃農計畫)

This measure was designed to encourage the aging farmers to lease their idle fields to organized agriculture agencies under a long-term agreement. This policy will be beneficial to restructure the agricultural labor pool and will provide the aging farmers a way to make profit from their idle lands during retirement as well as land-owners without intention on farming. At the same time, government will provide counseling and assistance to the new agriculture operators in order for them to build their operations with new equipment, leading technologies and advanced operation concepts.

In this measure, the farmers who lease out their idled fields are considered as the ‘Small Landlords’; the organized operator is considered as the ‘big Tenant Farmer’. This policy is designed to fully utilize natural resource, enables a comfortable retirement of aging farmers, develops new workforce, and upgrades the agriculture operational efficiencies.

3. Establishing Farmers’ Academy (設立農民學院)

Another measure is the establishment of ‘Farmers’ Academy’. This is the training school for the farm communities.

The goal of the Academy is to educate and nurture the best quality farming professionals. The Academy needs to develop a system which leverages R&D and education, integrates with existing agriculture operations to provide practical training for farming professionals.

The program involves different levels based on experience level, and different subjects based on farmers’ interests. The classes start from classroom learning; then moving into the fields; training programs with experimental farming ranches are organized as well in order to develop niche skills or specialties or general skills.

On top of the technical skill development, the Academy also provides classes for operation and management. These classes are designed to help the farming communities to better operate and manage their investments. Long term consultation is also provided after graduation.

This approach supports the basic belief that education is the foundation of agricultural development. Farmers who graduate from the Academy will not only have good knowledge, skills to carry on with their

endeavors; but also have a support system, a helpful community to help them for further developments.

4. Establishing agricultural science & technology institute (設置農業科技研究院)

An organization to drive agricultural innovation or refinement is needed. Taiwan has transformed the existing 'Animal Technology Research Institute of Taiwan' to 'Agricultural Science & Technology Institute'. The main purpose of this organization is to seek opportunities to build a competitive agriculture industry. This organization is to:

- Not R&D focused, leverage and integrate R&D results (from R&D center) with existing operation.
- Industrialized agricultural technology and commercialize agricultural products.
- Consolidate or reform related technologies.
- Emphasis on integration of new innovative technologies with industrial resource.
- Drive overall management of intellectual property.
- Further develop premium products
- Develop a center of excellence for innovation.
- Assist agricultural enterprises to grow.
- Deploy and execute policy related programs.

5. Implementing rural regeneration program (落實農村再生方案)

'Rural Regeneration Act' was formulated and announced during August of 2010. A funding of NT\$150 billion was proposed and budget will be provisioned with administration in the coming 10 years. The main focus of this program is to revitalize rural development, with goals to promote agricultural population, create employment opportunities, enhance agricultural income and improve the quality of farming communities.

6. Establishing golden agricultural corridor (建置農業黃金廊道)

Toward the goals of "new technologies, new farmers and new industry", the Council of Agriculture (COA) has plan to invest a total of NT\$3.3 billion (US\$110 million) over 2013-2020 to create an agricultural corridor for the

west side of Taiwan. Few high level focuses are listed below:

- Prevention of landslide.
- Creation of water-saving agricultural production zones; maximize use of agricultural resources.
- Strengthen the application of water-conservation technologies and information.
- Expansion of the scale of farm operations; attract new generations of farmers.
- Development of leisure agriculture tourism.
- Sophistication of traditional products.
- Diversified marketing strategies.
- Incentive program for water-efficient production.
- Deployment of solar and green technology R&D.

Conclusion

Agriculture is one of the core elements of a country. The function needs to be adjusted according to its development. The legacy function, as “food provider” from basic farming, has been transformed into an organized multi-function industry which needs to consider international economy and trades, needs to influence administration on agricultural development, needs to consider food safety and eco-system conservation, needs to focus on rural village development, and needs to build sustainable operations. All of these require significant efforts in order to sustain the industry itself and the country.

Transformation of Taiwan’s agriculture is a journey, and the total effort to reach the destination is still a long way ahead. Maintaining current level is not acceptable, in order to move forward through the journey and develop a new era of prosperity, Taiwan needs to further develop her advantages to meet the challenges, and leverage it as the foundation to develop more opportunities for future growth.