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Agricultural Extension Services and Innovation Adoptions in Taiwan[1]

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Introduction

Agricultural extension is actually a type of industry that manages changes. Agricultural producers, agri-business enterprises, farmers' groups, and consumers are the clients and target markets of such an industry. Agricultural extension, however, differs from industries that manufacture products as their main purpose. Instead, it is an industry that aims to change the behaviors and attitudes of its clients and target markets. It mainly intends to enable its clients and target markets to realize, control, and then implement changes. By so doing, it helps them obtain a sense of satisfaction which comes from their self-realization and achievement.

In addition to the interests of farmers and other target markets, agricultural extension as an industry also involves changes in human beings' attitudes and thinking. It is apparently more difficult to manage the attitudes and thinking of people in an open society than in a closed society. That is because managers or decision-makers cannot enforce a change by merely issuing an executive order simply for their convenience. To be efficient and effective, they must use methods such as extension education, organization, management, and psychology to carry out their policies. This provides a good explanation of why agricultural extension services are gaining more attention in Taiwan's open society.

Background of the Agricultural Extension System in Taiwan

Even though Taiwan is a small country, its economic development is considered that of a newly industrialized nation, while its agricultural sector is classified as that of an advanced nation.

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Taiwan has reason to be proud of its overall economic performance. Agricultural extension improvement is one of the promising areas. In the past 5 decades, the government agricultural agencies have launched many various strategies and measures to improve our extension system, and the encouraging results have apparently been accepted by the government and the public. Some of what Taiwan has already learned can be useful to other developing countries by allowing them to reduce the costs of trail and error when they face similar stages of economic development.

A country at a different stage in its agricultural development will face different problems. And there is no a panacea for curing these problem. One must observe the paths of others and think about their own specific environments including social, political, and economic resources before adopting various proper measures to deal with them. This is the most appropriate and effective way to follow in the paths of others. There are several major factors which contributed to the development of agriculture in Taiwan, which are described here.

A. Technological innovations

Technological innovations have been a key factor in improving agricultural productivity. In the early stage, emphasis was placed on the development of labor-intensive technologies and biological technologies such as improving crop varieties, applying chemical fertilizers, controlling pests and diseases, and promoting multicropping systems. To cope with rural labor shortages and high wage rates, intensive efforts have been made to develop labor-saving cultivation methods, to speed up farm mechanization, and to promote the use of integrated farming techniques.

B. Farmers' organizations and agricultural extension

There are four kinds of farmer's organizations in Taiwan. The most important one is the farmers' association. Its major services are extension of farm credit, agricultural marketing, and the supply of farm inputs. Other farmers' organizations include irrigation associations, marketing cooperatives, and fisherman's associations. The irrigation associations were organized to operate irrigation facilities and to maintain orderly water distribution.

Most marketing cooperatives in Taiwan are engaged in the marketing of fruit. The fisherman's associations are multiple-purpose cooperative organizations for fishermen. Farm extension services are provided by the farmers' associations in close cooperation with district agricultural improvement stations and agricultural colleges. With the support and guidance of the government, the services of farmers' organizations, including agricultural extension, have greatly improved.

C. Investment in rural infrastructure reconstruction

The objectives of rural infrastructure reconstruction are to provide good working conditions and to efficiently utilize Taiwan's limited land and water resources. Large-scale investment in irrigation and drainage, flood control, soil conservation, land consolidation, farm roads, reforestation, and fishing harbors has not only contributed to increased agricultural output, but has also reduced the damage caused by natural disasters.

D. Provision of modern inputs to the agricultural sector

Modern inputs are required for increasing agricultural production. The major modern inputs include chemical fertilizers, agricultural chemicals, farm machinery, feed, and seeds of improved varieties. The bulk of the chemical fertilizers required for farm production is produced by the Taiwan Fertilizer Co. and distributed through the Provincial Food Bureau. Other inputs are distributed through commercial channels and farmers' associations. Because of advantages of mass production, farmers can obtain these inputs at reasonable prices. To accelerate agricultural mechanization, a subsidy is provided to farmers for purchasing newly developed farm machinery.

E. Improvements in agricultural marketing techniques

The importance of marketing has increased as farm production has become commercially oriented. Major improvement measures include the construction of wholesale markets and marketing facilities, the promotion of cooperative marketing, innovations in grading and packing, the facilitation of marketing transactions and techniques, the establishment of an integrated market information system, and the modernization of the food processing industries.

Extension Organization and System

In Taiwan, the extension system is a unique kind of partnership among the government, farmers' associations (FAs), colleges of agriculture, and farmers, which provides services and education designed to meet the needs of the farmers.

Since 1981, the research/teaching/extension-embodied educational system has been established particularly after extension work from professors of six colleges of agriculture began to participate. The relationship between the colleges of agriculture and the seven District Agricultural Improvement Stations (DAISs) is strong in order to provide better technical support and assistance to county farmers' associations and township farmers' associations as shown in this chart. At present there are extension professors majoring in different agricultural fields from six colleges of agriculture and fishery in Taiwan to provide advisory services to six designated regions. The lectures, visits, technical services, group

discussions, and answer-by-phone services are the most popular tools adopted by extension professors to channel required new skills, knowledge, and concepts to farmers. The District Agricultural Improvement Stations and Agricultural Research Institutions play important roles in providing technical support to this extension work.

The principal governmental organization overseeing agricultural development is the Council of Agriculture (COA) under the Executive Yuan (equivalent to the cabinet of the federal government). Although the Executive Yuan is discussing the possibility of upgrading the COA to a Ministry of Agriculture, within the COA, the Division of Agricultural Extension is responsible for initiating and planning agricultural extension education programs. The DAISs and various Agricultural Experiment Institutes will still play important roles in providing technical know-how and act as constructive units to farmers, as well as extension agents for the FAs.

At the present stage, the main features of extension work in Taiwan can be described as follows.

1. Extension work is carried out by the three levels of farmers' associations, in cooperation with the District Agricultural Improvement Station, and extension professors of colleges of agriculture, under the supervision and guidance of different levels of government.
2. Each township farmers' association (FA) provides extension services to its members in that township. Every farmer can apply for membership regardless of his or her age, sex, race, or business.
3. The scope of the extension service is practically unlimited.
4. All FAs teach and assist farmers in order to improve their livelihoods and to develop the rural economy.
5. The extension work carried out by FAs includes providing practical methods, results, and demonstrations, conducting different farmers' group meetings to provide technical advice, and implementing government-supported projects and services.
6. Funds for extension services come from the previous year's net profits of each FA, i.e., 36% of it. In addition, it is partly funded by the central, provincial, and county governments. But the subsidies are allotted on the basis of special needs arising from certain programs, projects, areas, crops, or other special problems.
7. Funds allotted for the extension service of an FA should not be used for non-educational activities, such as the purchase of souvenirs, agricultural chemicals, etc.

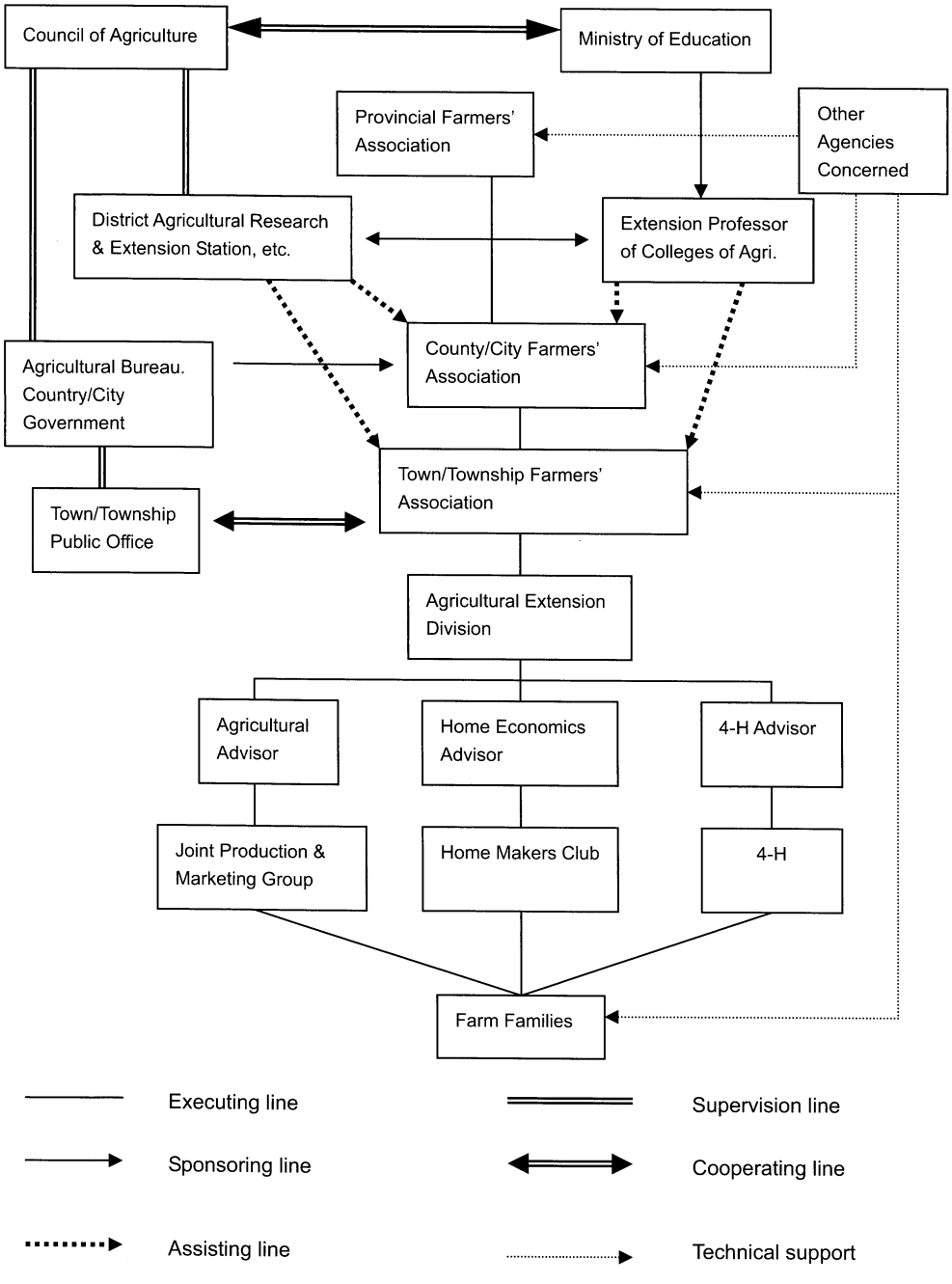


Figure 1. Organizational chart of the agricultural extension system in Taiwan

After 4 decades of interactions with FAs, farmers understand and have adopted modern techniques, and now enjoy their benefits. In Taiwan's case, the evidence is obvious that rapid educational development has played a crucial role in the rapid economic growth achieved.

The problems of the current agricultural extension system in Taiwan can be summarized as follows.

1. Shortage of qualified extension manpower

For years, the revenue of the credit department of FAs has become the major indicator of the success of an FA's management. Extension work has been only part of an FA's business. Unavoidably, the work was not given a high priority among most of their businesses due to the profit-oriented concept of management. According to many studies (e.g., Wu and Tsai, National Taiwan University), more than 60% of extension workers or advisors in FAs devoted only part of their efforts to work directly related to extension. This situation is the same in most District Agricultural Improvement Stations. Researchers and subject matter specialists in the stations tend to confine their interests to research-oriented work. Furthermore, the rate of job change of extension workers in extension-related agencies has been shown as high as 15% annually.

2. Unstable sources of extension finances

In recent years, FAs and other extension-related agencies obtained most of their financial assistance from governmental budgets under various agricultural development projects. On the other hand, the yearly net profits of FAs made available for extension work have declined due to heavy competition in financial markets and inefficiencies of their business. Furthermore, gaps in net profits among FAs have also gradually expanded. The sources of extension finance have become unstable and limited. Therefore, it is very difficult to plan a long-term project especially for agricultural extension work.

3. Abilities to cope with changing agricultural and market environments

The globalization and the free trade of agricultural products, consumer-oriented concepts of production, and management have been considered crucial points of agricultural policy making. Facing the pressure of an open-door policy to international markets, the agricultural sector has already seriously suffered from this pressure. As the agricultural administration has yet to come up with effective policies to handle the situation, how can we expect extension workers to deal with this and help farmers solve these problems. Technology and practices for the adjustment of changing agricultural and economic environments are badly needed in agricultural extension work in the years to come.

4. Restructuring of the Agricultural Extension System

With the streamlining of the Taiwan Provincial Government, the function of the Provincial Department of Agriculture and Forestry (PDAF) will be adjusted; the DAISs and

other Agricultural Experiment Institutes will also be reallocated or consolidated into different sectors of the government. Farmers' associations at various levels are also facing restructuring. Their function and role in providing agricultural financing and agricultural extension are still being actively debated. Whether the Agricultural Extension Act will be submitted to the legislation and how the system should be configured are currently being discussed. Also the decision as to whether there will be a new Ministry of Agriculture established still depends on many uncertain conditions.

A Perspective into the Development of Agricultural Extension

In the face of the changing agricultural strategic environment, we apparently can not ignore future problems if we expect to efficiently achieve the goals of agricultural extension. Although the future is unknown, we can use our perspectives to create some tools which can lead decision-makers and institutions wishing to seek changes to design goals and far-sighted views for organizations and individual farmers. Such an approach will help them go beyond the restraints stemming from traditions, history, and current trends.

A perspective can be defined as a combination of future directions and goals expected from an organization and its members. The value of an organization's perspectives is aimed at providing important guidance for the organization to develop future strategies. Individual perspectives, meanwhile, can serve as a pivotal basis for the development of organizational human resources in the 21st century. Planning, thinking, and the formation of a perspective are indispensable processes for agricultural extension that are based on technologies and their applications. In view of the present and future competitive environments of the agricultural sector, agricultural extension in Taiwan in the 21st century will face the following challenges.

1. There will be limited room for upgrading the competitiveness of agricultural management. Expected effects from measures taken with regard to farmers' services which are mainly designed for cost reductions will weaken.
2. Problems of overlap will emerge between resources of different organizations of farmers' services. The supply will outstrip the demand in organizations and manpower of farmers' services due to decreases in the employed population.
3. Farmers' habits of relying on others will still remain strong. Their sensitivity to rapid changes in the external environment has yet to be improved.
4. Farmers still tend to pay more attention to improving their skills and management abilities, due to the production-oriented policies enforced on them from past services. Their knowledge of democracy, in contrast, is insufficient. Efforts to train

greater numbers of talented people in rural communities, therefore, have yet to be strengthened.

Faced with the unlimited expansion of the information industry and the rapid growth of technology in the 21st century, perspectives embraced for agricultural extension should not just be a reorganization of past visions, a continuation of present goals, or a response to impacts from the outside world. Instead, we must look to the creation of new methods, new knowledge, and new ideas, and then build new structures and perspectives for agricultural extension through the further combining, eliminating, reorganizing, and sharing of resources available in the present.

The focus of the resources and perspectives of Taiwan's district agricultural improvement stations is no longer placed on any single subject or demonstration farm due to changes in the demands of farmers and the market as well as the environment since the 1980s. In addition, the focus of technological innovation, and management and education systems for agricultural extension education is no longer an operation between different subjects. Furthermore, agriculture-related colleges have become a subsystem for agricultural extension education. Because of these factors, the focus of resources and perspectives of district agricultural improvement stations have expanded to cooperation and interaction. Regional agricultural improvement stations should even assume responsibility for the reorganization and integration of the transformation and diffusion of technology newly developed in a district in the face of new challenges and the government's movement for organizational restructuring in the 21st century. They have thus become a new agricultural technology center for applied agricultural science and technology, communications, and human resource development in a district. This is a result of interaction and cooperation between different institutions and systems. The basic structure of a new district agricultural technology center includes the following.

1. It combines agricultural technology, education and training, and communication services in a district into an integrated service.
2. It forms an alliance between agricultural professionals and organizations aimed at organizational and human resource development.
3. It builds a linkage between technology application and evaluation, agricultural technology, communications research and development, and facility planning so as to examine and evaluate related R&D and educational training.
4. It uses cross-agricultural technology strategists as a unit for the formation of perspectives and a structure for arbitration.

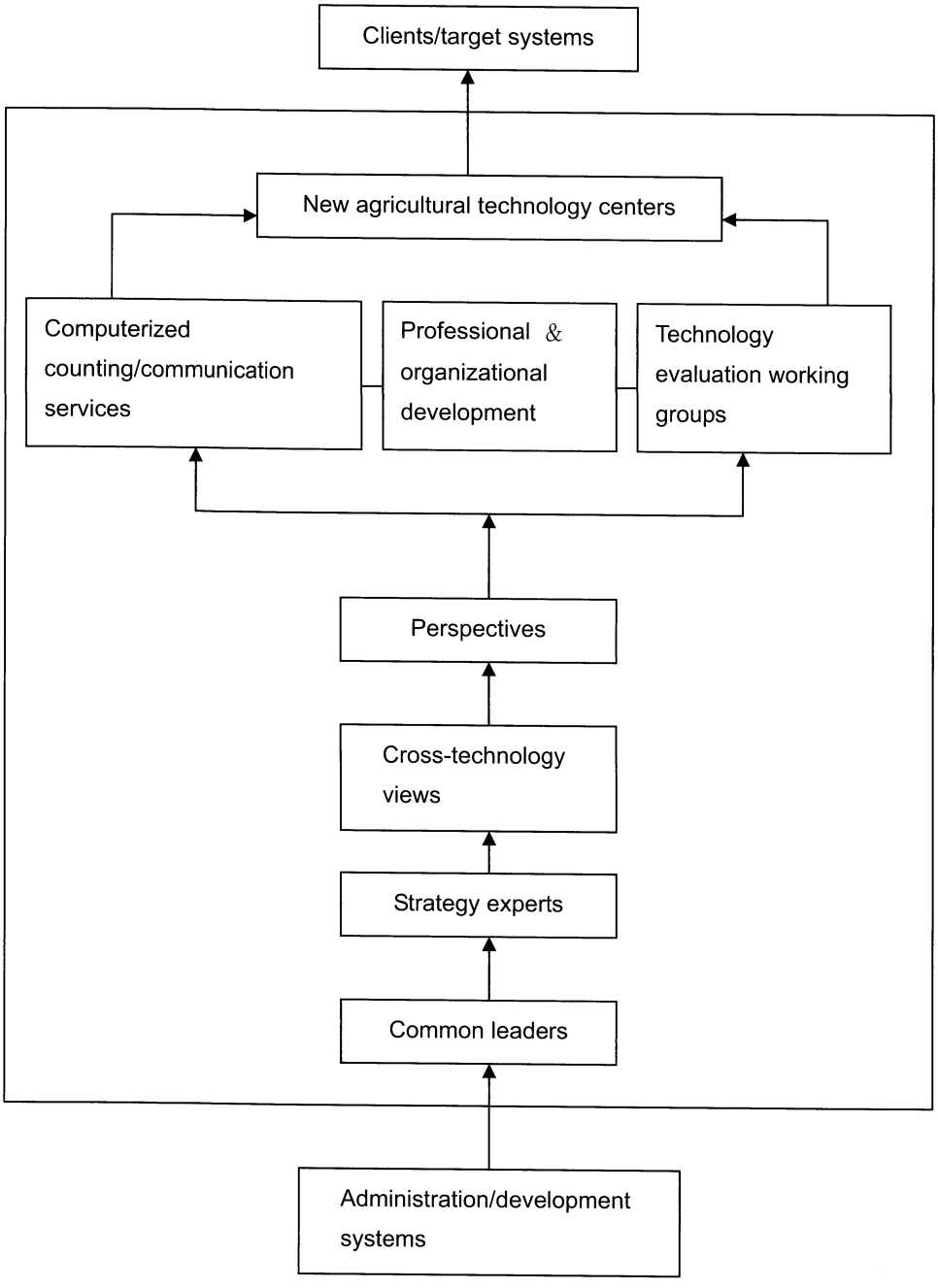


Figure 2. Conceptual structure of a new District Agricultural Technology Center

Figure 2 is a conceptual structure for building a new district agricultural technology center. In the structure, strategists act as a scanning mechanism to inspire innovative ideas and guidance for the future. It is expected to build different environments that can help achieve the goals of agricultural extension.

With her endeavors over more than 4 decades, Taiwan has accumulated many achievements of remarkable agricultural technology research and outstanding agricultural experiment and research talents. These have provided a strong foundation for the continued development of future agriculture in Taiwan. The fruits of agricultural research have come from research efforts of domestic agricultural experimental and improvement institutions, the sharing of other experimental and research results, and the purchase of achievements from domestic and foreign experimental and research institutions. These experimental and research achievements include basic and applied agricultural science and technology as well as humanities and social sciences such as information, management and extension education. Moreover, private research institutions and agri-businesses have made significant contributions to the research and development in this regard and have also achieved remarkable results.

In view of the agricultural technological experimental and research achievements, in fact, Taiwan already has the ability to produce a model for the formation of an agricultural information system. Despite that, those experiment and research achievements have not been integrated together. On top of that, the experimental and research results cannot be directly acquired or used by farmers or agri-businesses. A gap exists between experimental and research results and their applications.

In Taiwan's agricultural information system, there are two missing links which remain to be filled in. One is a mechanism which can form perspectives for farmers' services and then manifest them into goals and strategies. The other is a mechanism that can integrate, eliminate, transform, and diffuse emerging agricultural technologies. These two mechanisms constitute an important part of the infrastructure for agricultural extension. Their implementation will require special people and institutions, if any significant effects in the integration of resources are expected to be achieved.

After building an agricultural information system, therefore, Taiwan still has to plan and build a complete system to implement the program. Based on agricultural knowledge at all levels, the system has to design institutions that can serve to carry out such work as dissemination, management, and services.

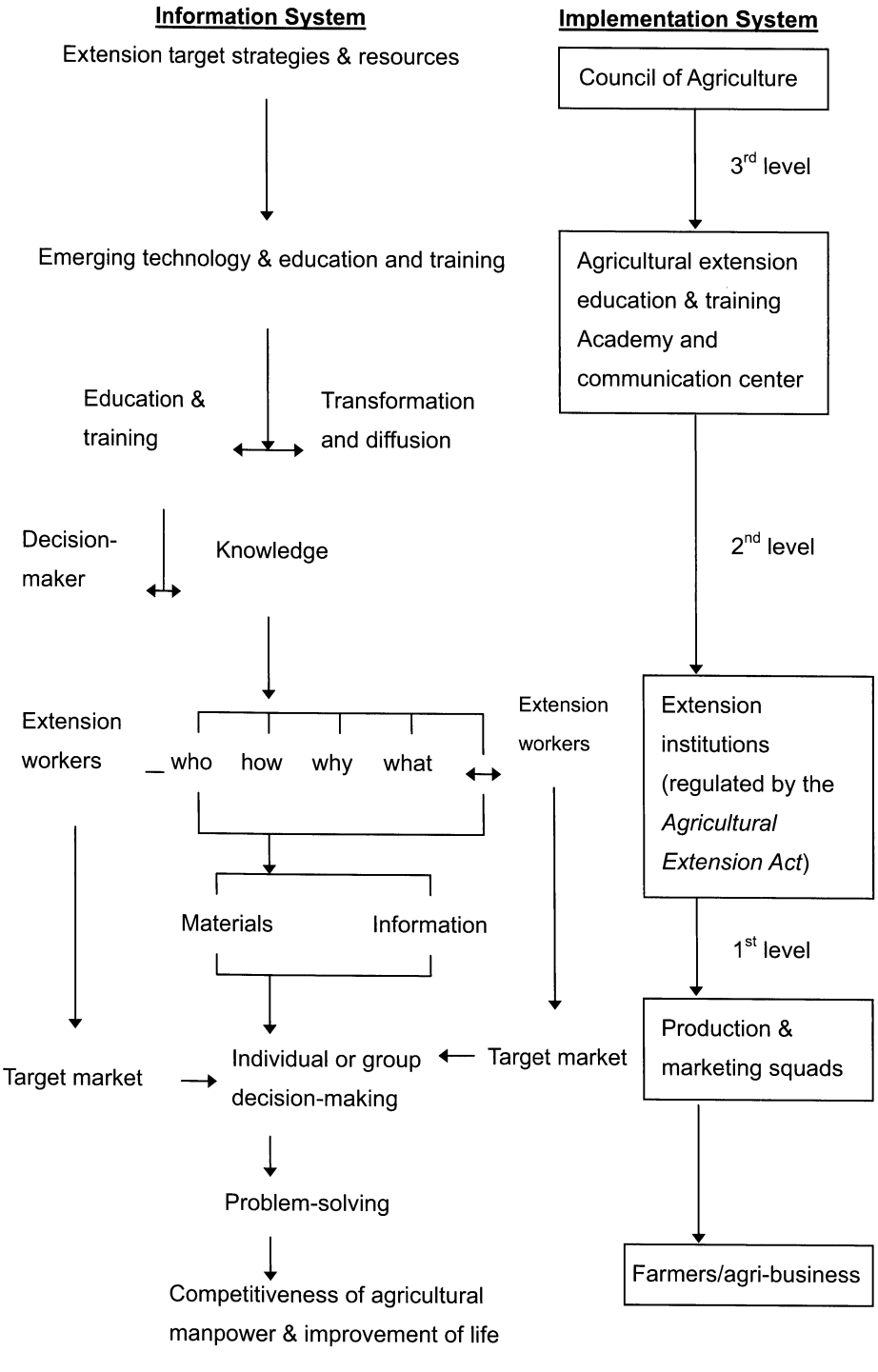


Fig. 3. An integrated structure of the agricultural extension information system

Figure 3 is a conceptual structure for building an integrated system for agricultural extension in Taiwan. This structural chart includes an information system for agricultural extension and an implementation system. The information system includes goals, strategies, and resources, emerging technology and education and training, transformation and diffusion of emerging agricultural technology, knowledge (know how, know who, know why, and know what), materials, and information. The Council of Agriculture act as the implementation system in response to the information system of extension goals, strategies, and resources.

The implementation system for the transformation and diffusion of emerging technologies and education and training is formed by the Agricultural Extension Education and Training Academy and is an affiliated communication center. It is placed in the center between the agricultural extension information system and the implementation system, under the direct jurisdiction of the Council of Agriculture. District agricultural improvement stations and agricultural skill and art centers form its branches. According to the planning of this academy and center, it will be in charge of professional education and training and technology dissemination. It will also be responsible for the transformation and dissemination of emerging agricultural technologies as well as related education and training.

Conclusions

Traditionally, agricultural extension has mostly been focused on the accumulation of economic capital and the enrichment of life. As a result, the accumulation of cultural and natural capital has been overlooked. The first formula for a mature industry that will adapt itself to changes is to provide products and services at the demand of its clients and respond swiftly to changing situations. The second formula is to produce required products and services at delivery points and make every effort to move production sites to places close to clients so as to gain more competitive predominance. To provide services or higher standards and quality, however, it will have to rely on computerized networking of information that is available for direct saving and retrieval of data. The networking of organizations, enterprises, and extension institutions, and the integration of their coordination, cooperation, and collaboration, therefore, have become the third formula for a mature industry that is to adapt itself to changing environments.

In the face of changing strategic environments in the 21st century, an industry should strive for sustainable growth as a primary consideration of its goals and use different methods of integration to seek and utilize resources. Meanwhile, the government should play a role in creating and providing good opportunities and conditions for the development of organizations and individuals.

Agricultural extension is an industry that manages changes. The government and extension institutions must not shirk their responsibilities in this regard to manage this industry well. In the global village of this new century, agricultural extension should be directed at building and diffusing an information system featuring culture, humanities, and nature. Agricultural extension must be closely linked with ecosystems and society. We should first begin by identifying ourselves with our own society and through further exploration of our lives, culture, and environment, in order to build a personality of Taiwan for the new century that boasts of selfconfidence and true love.

Most of all, we must go beyond traditional thinking and ponder problems with an open mind for global development as a whole.