Skill Development for Agricultural and Rural Development in Asia: Empirical Lessons from Family Farming and Agricultural Extension Workers in Japan and Bangladesh

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1. Introduction

Who has shouldered farming in Japan? The answer can be "family farming". Who will shoulder farming in Japan? Is it still "family farming"? Is "family farming" sustainable? If "No", who is it and can replace "family farming? Despite of policy efforts so far by the Japanese government, the agricultural structure has not been improved enough in Japan. In the serious context of depopulation and aging in rural communities as well as the low profitability of farming, agricultural policies have been unstable/uncertain and at the crossroad.

Now the driving force of agricultural policies is directed to the scale expansion/enlargement of farming business and the juridical person. How can such development be pushed forward by whom? In general, it is said to be achieved by (a) individual or (b) organizational (community-based or group-based) methods. So as for juridical persons and individual family farming to sustain their farming, they are required to acquire an entrepreneurship rather than to be a simple farm manager like having been pointed in the past, on one hand. The entrepreneurship must be accompanied by (a) specific skill and (b) business management ability as requisites. On the other hand, so as to motivate and encourage family farming and juridical persons to develop skills, agricultural extension workers have the game in their hands. It is needless to say that agricultural extension workers themselves have to develop and improve skills so that they can meet the farmers' needs.

Thus, based on three case studies so far, the present paper aims to explain:

a) characteristics of the empirical skill development at family farming in Japan;
b) determinants to skill level of agricultural extension workers in Bangladesh; and
c) perception gap in farming information needs among farmers and agricultural extension workers in Japan.

Then, the present paper tries to discuss on how to improve the current skill development system, focusing on OJT (On the Job Training), Off-JT (Off the Job Training) and partnership among actors.

2. Framework of Farmers' Skill Development

Farmers' skill development is not monotonous. The process is closely related to the life cycle of farmers. So as to develop skills, chance and opportunity must be provided properly at each stage of the life cycle. In general, from the viewpoint of acquiring skills the life cycle consists of the following 4 stages:

a) before being newly engaged in farming: non-farm job, training at other farms;
b)after being newly engaged in farming until management transfer to a successor: apprenticeship at own family farming (Parents train their successor at family farming. It is an advantage of family farming that learning/acquiring skill is costless, especially particular knowledge to own farm); and
c) after management transfer (a successor becomes a farm manager): expand the domain of skills to the business management.

Especially, in the period of apprenticeship (worker rather than manager) trainings are externally provided by the agricultural extension office, agricultural cooperatives (especially, production group), seed company, agricultural machinery company and marketing traders.

Meanwhile, farmers' skills can be classified into (a) labor ability and (b) business management ability. Majority of them are acquired through the informal OJT (learning by doing) while partly through the formal OJT (example: school education) and non-farm job. These skills can be internalized to farm management through accumulating experiences and empirical knowledge. Furthermore, so as to extract intellectual specific skills, Off-JT is indispensable to theoretically reviewing the accumulated experiences and learning the concerned theories at the off-farm. On the other hand, so as to enrich skills, is important the combination of routine (usual) works and troubles (unusual works) in the process of skill development. In this case, various experiences in dealing (coping) with changes and troubles are needed but the simple repetition of similar experiences results in the narrow range of skills. It is said that such opportunities/places to deal with various changes and troubles can be provided by diversifying crops as well as farming system. Therefore, skill development can be easily examined through the management development of family farming.

So as for individual family farming to implement (facilitate) various management development in response to changes in external conditions, farm manager himself/herself has to have acquired production skill and business management skill at the higher level. So as to standardize skills at the higher level, it is needed to clarify characteristics of farmers' skill development under their dynamic management development.

3. Skill Development of Family Farming in Japan: a case of horticulture

Based on a case study of 23 full-time horticultural farm households in Wakayama Prefecture, characteristics of skill development in the process of management development are discussed.

Farming system recommended by agricultural cooperatives and agricultural extension office is an advanced farming system, of which the core enterprise consists of growing crops or promoting crops (for example, flower, vegetable and fruit: being commercialized and competitive in the market). It aims at (a) attaining a viable farming income and (b) realizing an optimum use of management resources. As to the development in farming system, the enterprise structure is an interesting aspect to be examined. In the horticultural farming, the life cycle of goods is short and breeding is competitive. Therefore, farmers (producers) have to always keep it in mind to timely (not get behind) reorganize crops (the structure/combination of crops) in response to changes in consumption and taste in the market. As a matter of fact, farmers undertake actions like:

(a) not only increase the cropping ratio by introducing a winter crop etc.;
(b) diversify enterprises: introduce new enterprises; and
(c) diversify crops: change varieties or introduce new crops within an enterprise.

Economic and technical cost, that is a viewpoint of managerial assessment, depends on the similarity in production (technology/management) and marketing between a new crop (enterprise) and existent crops (enterprises). In terms of economic/technical cost, (b) is larger than (c). A few examples of management development are concretely introduced below.

Case 1 (vegetable 75a + flower 31a: 1.8 full-time family labors, employ 310 mandays.)

He is faced with the injury by continuous cropping and overworks in green-house farming

→ Instead of the pulse enterprise, he has introduced the flower cultivation as a new enterprise.

→ As a result, harvesting hours per day is shortened and labor distribution is flexible.

Due to change in the market demand and to improve the labor distribution

→ Introduce newly two flower crops (diversify the flower enterprise and level up production skill)

In the vegetable enterprise, the preparatory work for harvesting and shipment is troublesome.

→ Reduction of watermelon and lettuce crops (in terms of acreage)

→ Instead, introduce the broccoli crop

Case 2 (vegetable 25a + flower 16a + paddy 170a: 2.8 full-time family laborers)

Open field cropping and green house cropping enable year-round shipment of a flower. However, he has suffered from the disease damage and the low profitability.

→ Stop the flower cropping and instead introduce the sweet pea cropping (advantage: long shipment and stable profitability) and the sunflower cropping (extensive crop and long shipment)

Shortage of laborers

→ Reduce the acreage of sweet pea crop

Consequently being able to adjust the labor distribution of farm management as a whole

→ Expand the acreage of sunflower crop

In the vegetable enterprise, there is a problem of securing an income in the summer season.

→ As a succeeding crop to the open-field pea crop, he has introduced the rain-cover tomato cropping.

Including the other cases, as an overall result, 3 farm households practiced the diversification of enterprises and the diversification of crops within an enterprise; 2 farm households only the diversification of enterprises and 15 farm households the diversification of crops within an enterprise. In another aspect, their management development can be classified into 4 types of diversification:

a) 8 farm households: add green house vegetable cropping to open-field vegetable cropping or change the combination of crops in green house vegetable cropping.
b) 4 farm households: diversify the flower enterprise by introducing new crops (varieties) that have new demand or stable demand.
c) 9 farm households: practice the diversification in the vegetable or fruit enterprises.
d) 5 farm households have introduced greenhouse flower cropping in addition to fruit enterprise or open-field vegetable enterprise.

Such management development is attributed to the following problems/issues or motivation (objectives):

a) Injury by continuous cropping (replant failure) and disease/insect damage as a problem of cropping technology
b) Labor distribution, labor competition and profitability

So as to solve such problems, they have practiced a) to reduce the labor-intensive pea cropping, b) in the winter season, the labor-intensive lettuce cropping is replaced with the broccoli cropping, c) in the summer season, the greenhouse tomato cropping is introduced so as to improve the labor use and d) new crops with different harvesting periods are introduced into the flower enterprise. It can conclude that individual family farming has improved the enterprise structure toward (a) less inter- and intra-enterprise labor competition and (b)

securing the year-round income.

Therefore, are found out the characteristics of management development from the viewpoint of skill development:

a) Continuity: skill development has been achieved by way of changing farming system and newly introducing growing crops with utilizing skills (soil damage control, timely work and labor distribution etc.) acquired so far through reducing the existent enterprise and replacing the existent crops.
b) Fixedness: There are a few innovations which result in remarkably restructuring production technologies and business management accumulated within farm management. Such innovations have not occurred successively (continuously). As a result, there is a limitation in sophisticating technologies due to the absence of innovation introduction.
c) Narrowness: In the aspect of introducing a new enterprise or diversifying crops, farm households have hardly practiced Off-JT positively. Therefore, farm households have depended highly on OJT due to underdeveloped external conditions which provide with the opportunities of experiences.

4. Skill Development of Agricultural Extension Workers in Bangladesh

Based on a case study (sample agricultural extension workers: 90 persons) in Kishoreganj District, many agricultural extension workers have an educational certificate such as SSC (secondary school certificate) or HSC (higher school certificate) + Agricultural Diploma. This agricultural diploma is attained at Agricultural Training Institute which conducts pre-service training for diploma level agricultural technicians. Due to lack of higher education most of agricultural extension workers are unable to provide advanced technologies to farmers in an understandable way. Therefore, the in-service training is essential to improve their extension skill levels. One of characteristics in skill development is a practice of T&V (Training and Visit) at the field level.

According to the measurement[1)] of such extension skills as (a) communication-based skills (5 skills), (b) planning-based skills (2 skills) and (c) monitoring and evaluation skill (1 skill)[2)], the average levels is in the range of 59 to 67 (max. score: 100. observed range: 36 to 86). For the latter 2 skills, the average skill levels are comparatively low. It is seen that the extension skill levels are significantly correlated to their service tenure. The correlation coefficients are in the range of -0.474 to -0.365 at the 5% or 1% significant level, except one skill (0.581). However, applying the non-linear regression analysis based on the state of variance, the following are found:

a) except for the extension planning skill, all of the other 7 extension skills show a significant negative relationship with the service tenure.
b) on the 7 extension skills, the skill level increases up to 15 years service tenure and then

decrease up to the retirement age.
c) by contrast, the skill level of extension planning increases after 11 years service tenure.

Thus, under such growth curve of extension skill, what is the difference (gap) in skill level attributed to? The difference in skill level can be examined from the viewpoint of general skill and specific skill[3]. In practice, the significant general and specific skills can be identified by the Chi-square Test between the low skill level group and the high skill level group. The results are as follows:

a) difference in skill level is attributed to the acquisition of specific skills.
b) general skills have not acquired yet by all of agricultural extension workers.
c) therefore, difference in skill level is attributed to the breadth of general skills

5. Perception Gap in Farming Information Need

5.1 Farming Information Needs and Skill Development

It can be of importance that information on farming system is externally provided. It is because it is an opportunity to examine the rationality of resource use practiced by farm management and then find out non-used or under-used resources within the farm management. This is an opportunity to think and support the farming system in the future. However, the embodiment of such non-used or under-used resources depends on skills of farm households. To the continuity of skill development, the information externally supplied plays a complimentary role.

According to a case study on 23 horticultural family farming in Wakayama Prefecture, farm households use the information on farming system to set up target income (61%) and adjust labor distribution (57%). Farm households have selected crops so as to solve managerial problems/issues. In the respective aspect of management development, has been found the interaction between the accumulated skills and the perception of business management issues. In addition to such internal management conditions, the information collected through the informal network has supported the selection (new, change) on crop introduction by the farm manager. The information network structured by friends, training, production group, magazines/newspaper and extension workers. On the other hand, which information can they identify effective out of their accumulated experiences toward the management development? For such case, it should be understand that management policy prescribes the framework of management development, especially direction. For example, their concrete management policies are as follows:

a) income increase by the positive introduction of new crops (8 farm households);
b) minimize the income fluctuation (change) without a drastic change in enterprise structure (7 farm households); and

c) farming without overworking (9 farm households)

In addition, their main management strategies are as follows:
a) introduction of crops and technologies (9 farm households); and
b) intensification of facilities and capital (6 farm households)

Therefore, they are interested in farm management information mainly (a) production technologies/work system (12 farm households) and (b) marketing of products (9 farm households). Those who are satisfied with the present farm management information supply are less (just 16%). Though being the range of 40% to 68%, their information demand is biased to (a) new variety/breeding, (b) cultivation technologies and (c) agricultural chemicals/fertilizer. Their information sources are perceived to be agricultural cooperatives, magazines/newspaper and agricultural extension office.

5.2 Perception Gap in Farming Information Need

As a clue to management development including an objective of problem solution, farming information is helpful. In Japan, there are three actors of agricultural and rural development at the field level, that is to say farmers, agricultural extension work (by local government) and farming guidance (by agricultural cooperatives). So that skills can be developed efficiently, are farm information provided timely and properly with accuracy by the eligible?

According to a case study (on 13 farming information[4)] with a comparative importance for the management improvement and rural vitalization. Samples: 297 farmers, 101 agricultural extension workers and 49 farming advisors) in Yamaguchi Prefecture, all of three actors agree in the following perceptions: (a) farming guidance provides with production materials, land/labor force, marketing and local events; (b) agricultural extension work provides with trend of politics, economy and society; and (c) suppliers in charge of production technologies are vague. On the other hand, the perception gap among the three actors consists of 4 types:

a) farmer≠agricultural extension work=farming guidance: forecasting of disease and insect pest occurrence, community development/regional planning and financial/personnel management (3/13);
b) farmer=agricultural extension work≠farming guidance: management analysis and training for successors (2/13);
c) farmer=farming guidance≠agricultural extension work: community-based farming (1/13); and
d) farmer≠agricultural extension work≠farming guidance: book keeping (1/13).

Furthermore, from the viewpoint of perception gap between two actors the characteristics are as follows:

a) agricultural extension work≠farmers: forecasting of disease and insect pest occurrence, community development, book keeping, financial/personnel management and community-based farming (5/13);
b) farming guidance≠farmers: forecasting of disease and insect pest occurrence, community development/regional planning, financial/personnel management, management analysis, training for successors and book keeping (6/13); and
c) agricultural extension work≠farming guidance: community-based farming, book keeping, management analysis and training for successors (4/13)

It can be seen that there is a comparatively serious gas between 2 actors rather than 3 actors.

6. Conclusion

It is naturally reasonable that individual family farming has an interests to sophisticating technologies or systematizing works/operations so as to directly solve problems/issues identified through experiencing within own farm management. However, it is too early to understand that individual family farming has accumulated experiences efficiently. It is because none positively appreciates that they have received opportunities where they can convert their experiences in production and management to intellectual specific skills through theoretical reviewing. Individual family farming has less interest to such opportunities, besides less interest to management analysis and management planning.

Therefore, to facilitate skill development properly, agricultural institutions in the locality have to make efforts to enrich formal OJT and Off-JT by way of (a) making the valuable experiences of skillful farmers the local resources, (b) prepare the place/opportunity where farmers can share such local resources together and (c) furthermore, as a precondition, providing farm managers with opportunities to develop (cultivate) their own awareness ability on managerial problems/issues. Especially, it is an urgent preparation issue to establish a workshop beyond individual farm managements and practice OJT with skillful farmers in the locality.

At the grassroots where various actors are involved in development works, it is urgently needed to review the role sharing in farming information supply so that agricultural extension workers can manage their skill development efficiently. Besides, to agricultural extension workers in Bangladesh, though the skill development is progressed well up to 15 years service, afterward it is important to rethink the skill development system so that they do not lose the acquired specific skills and part of the acquired general skills. Namely, the rehabilitation in the latter part of service tenure is a key to sustain the skill development.

Notes

1) Agricultural extension skills of an agricultural extension worker are evaluated by 3 *upazila* agricultural officer (who are supervising the relevant agricultural extension worker), 3 skilful senior agricultural extension workers and 3 farmers from the jurisdiction the relevant agricultural extension worker.

2) According to Agricultural Extension Manual (1999), 8 extension skills used for agricultural extension workers' competence assessment are defined (1) working with group, (2) organizing and running a field day, (3) organizing and running a demonstration, (4) assessing farmers' problems, (5) problem census, (6) extension planning, (7) work planning and (8) monitoring and evaluation.

3) General skills refer skills on the usual operations performed by agricultural extension workers at the time of extension service to farmers. These are routine operations. General skills are acquired by attending Off-JT. Specific skills refer skills on the unusual operation performed by agricultural extension workers at the time of facing with problems during extension service to farmers. The concrete content of an extension skill are identified by interviewing 16 skilful agricultural extension workers. Such skilful agricultural extension workers are recommended by *upazila* agricultural officers.

4) 13 farming information consist of production materials, production technology, land/labor force, marketing, forecasting of disease and insect pest occurrence, trend of politics/economy/society, book Keeping, financial/personnel management, management analysis, community-based farming, local events, community development/regional planning and training successors.

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