

Rural and Agriculture Development in Regional Science

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Abstract This paper discussed the trends and the outlook of the study of rural and agriculture development in regional science, especially in Japan. First, the analytical approaches toward rural and agriculture development issues are introduced with some comments on the roles of entrepreneurs and knowledge creation in innovation, Secondly, the pioneering studies in rural and agriculture development in Japan based on regional science and their development to new theories are evaluated. In addition, future tasks in rural and agriculture development studies are given as follows. First, there is an issue of regional heterogeneity. Secondly, there is an issue of rural and agriculture development, amenity and quality of life (QOL). Thirdly, there is an issue of creating more effective rural and agriculture development models. Fourthly, there is an issue of how agriculture and rural areas are perceived. In other words, it is necessary to redefine agriculture from an ailing industry to a growth industry that continually creates innovations, and to redefine rural areas from a conservative and closed society to an open 'space' to create knowledge and innovations. More specifically, it is necessary to introduce an approach of strategic marketing planning and industry cluster strategy to the traditional regional economic development approach in order to create a new approach of strategic development for regional agriculture.

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1. Introduction

According to Kohno and Higano (1980 p.221), regional science is an “extremely transformative academic discipline which aims mainly to clarify regional issues through interdisciplinary collaboration and cooperation between many areas such as modern economics, engineering, economic geography, social science and public administration study from their own specialist perspective.” In contrast, according to Tsubouchi (1999), area study is characterized by (1) the fusion of studies of humanities and social science and (2) interregional comparison. On the other hand, regional economic development is, according to Stimson et al. (2006), “the use of economic processes and available resources in the region to bring sustained development to the region and desirable economic results, and to meet the concept of the values and expectations of the economic operators and residents as well as visitors.” Having outlined the characteristics and mutual relationships of the three academic disciplines, regional science, generally speaking, focuses on an understanding of the issues by theorizing and quantifying them to formulate a policy with a view to solve regional problems. On the other hand, regional economic development study is characteristic in attempting to capture the dynamism of regional development because regional issues and their characteristics change following the development of the region under review. In other words, it is a problem of efficiency in the optimum use of scarce resources and of equity in wealth distribution, which can be regarded as one of the very central issues in regional science (Nijkamp and Abreu 2009; Capello and Nijkamp 2011).

For the purpose of this paper, we define regional development study as the clarification of regional issues and their mechanisms, and a quest for policies for solutions from global perspective. In addition, this study positions rural and agriculture development study as one of the applied areas of regional development study, however, this does not mean a simple substitution of “region” with “rural and agricultural.” This is because rural and agriculture development study is expected to solve the issue of clarifying diversity and universality which is essentially combined in regional development study, while rural and agriculture development issues are heavily related to natural resources in the region such as ecological systems, society and culture. Therefore, rural and agriculture development study combines two aspects of (1) the clarification of local issues by approaches that are often taken in area study and (2) the refinement and theorization of analytical methods and the pursuit of measures to solve issues by approaches that are often taken in regional science.

2. Regional Science and Rural and Agriculture Paradigm

2.1 Shift in Reference Framework

In proceeding with the survey of rural and agriculture development study in regional science, the following perspectives are given importance. The first is the analytical approach toward rural and agriculture development issues. That is to draw attention in rural and agriculture development studies in regional science to which models they are reliant on, how each model attempts to clarify the elements and actual conditions on which the model places emphasis, and how the economic environment that surrounds agriculture and rural communities is captured. Irwin et al. (2010) thinks that an issue of a tradeoff among scale, transport costs, and endowments in the economic location exists at the basis of regional economic issues, and that its essence lies in (1) imperfect factor mobility, (2) imperfect divisibility, and (3) imperfect mobility of goods and services. Therefore, theoretically speaking, the regional science approach to rural and agriculture development can be regarded as how to apply the way of thinking regarding regional economic issues to agricultural communities. For example, regional input-output analysis is a commonly-used analytical method in rural development studies in the U.S., and its contribution is significant in its application, such as in the assessment of regional economic policy. However, there are also opinions that consider regional input-output analysis to be problematic as it

does not sufficiently reflect the essence of the regional economic issues as above. On the other hand, Terluin (2003) categorized recent rural development theories into three groups of (1) exogenous development, (2) endogenous development, and (3) mixed exogenous / endogenous development, and outlined the relationships with regional economic growth theories. Namely, there are 4 types of regional economic growth theories: (1) traditional models, (2) pure agglomeration models, (3) local milieu models, and (4) territorial innovation models, and the relationships with rural development theories are shown in Table 1.

Table 1 Classification of theories in the rural development and regional economic growth

Approach of rural development studies	Model of regional economic growth	Production function	Theories
Traditional approach	Traditional models	$Y=f(L,K)$	Neoclassical growth theory, Keynesian approach: export base theory
Exogenous development	Pure agglomeration	$Y=f(AE,L,K)$	Cumulative causation theories, Growth pole theories, New economic geography (NEG) theories
Endogenous development approach	Local milieu models	$Y=f(LM,L,K)$	Endogenous growth models
- Community-led rural development theory - Bryden's theory on immobile resources			Theories based on changes in the organization of labor
Mixed exogenous / endogenous development approach	Territorial innovation models	$Y=f(I,LM,L,K)$	Incubator theories, Product life cycles, Theory of the innovative milieu, Porter's theory on the competitive advantage of nations, Illeris' inductive theory of regional development, Storper's theory on the region as a nexus of untraded interdependencies

Source: Terluin (2003) p.330, p.333

Y: Income or yield, *L*: Labor, *K*: Capital, *AE*: Agglomeration effects (external economy and economy of scale), *LM*: Local milieu (space, human capital, technology, network, trust, culture, policy), *I*: Innovation

Of these types, the regional economic growth theories that rely on the regional innovation model are making rapid advancement. In terms of the theoretical aspect, theories are being developed with more attention to the roles of entrepreneurs and knowledge creation in innovation, and in terms of the empirical aspect, analyses are being made using the substitute variable of innovation and entrepreneurship, and the models need to be adjusted based on the results (Kourtit et al. 2011). At least, according to recent theories that innovations in a region are defined by expressions of entrepreneurship, the production function to be assumed in the regional economy should be the aggregation of the production functions of individual entities, instead of production functions based on aggregates. In that case, innovation is the function of entrepreneurship, in formulation as follows:

$$Y=\sum f_i(I(E),LM,L,K)$$

Y: Income or yield, *L*: Labor, *K*: Capital, *LM*: Local milieu (space, human capital, technology, network, trust, culture, policy)

I: Innovation, *E*: Entrepreneurship, *i*: Individual economic entity

The second is the relationship between the current status and the changes in agriculture and agricultural communities. According to existing notions of agriculture and rural communities, agriculture is a traditional and occupational industry that is supported by small family-run operations, and agricultural communities refer to the areas where agriculture is carried out, and the rural economy heavily relies on agriculture. Then the Japanese agriculture and agricultural communities experienced the issues of relative stagnation during the post-war period toward the high economic growth period. However, such notions are not appropriate when referring to different eras or regions, especially in rural and agriculture development in developed countries including the EU today. The socioeconomic reality of agriculture and rural communities has undergone significant changes, and economic dependency on sectors other than agriculture has increased in rural areas following the sharp decrease in the number

of farmers. In the U.S., too, changes are observed, such as the elimination of disparity in income levels between urban and rural areas, a decrease in the farming population, the diversification of the rural economy, manufacturing industries being established in agricultural communities, and increased reliance on industries other than agriculture for farmers' income (Irwin et al., 2010).

Furthermore, due to the changes in the rural economy, the “New Rural Paradigm” (OECD, 2006), which forms the foundation in rural and agriculture development policies in developed countries today, is based on the recognition that existing rural and agriculture development policies have difficulties in driving comprehensive rural development in terms of policy content and governance, (see Table 2). The Paradigm therefore seeks diversions from existing approaches. More specifically, rural and agriculture development today aims to improve the competitiveness of rural areas and to utilize unused resources through the appropriate assessment of the resources in the region. It targets various sectors in the rural economy, and the government and stakeholders at various levels implement measures by mainly using the development method of investment. Based on the above, rural and agriculture development studies in regional science today are being asked whether an appropriate analytical framework is established concerning the issues, target, methods and assessment standards according to the current status, history and development stage of the region.

Table 2 The new rural paradigm

	Old approach	New approach
Objectives	Equalization	Farm income, farm
Key target sector	Agriculture	Various sectors of rural economies
Main tools	Subsidies	Investments
Key actors	National governments, farmers	All levels of government (supranational, national, regional and local), various local stakeholders (public, private, NGOs)

Source: OECD (2006b) p.15

2.2 Assessment and Position of Existing Studies

2.2.1 Rural and Agriculture Issues in the Process of Economic Development

The stagnation of agriculture, outflow of rural population to urban areas and the resultant decline of agricultural communities in the process of economic development are fundamental rural and agriculture issues in developed countries. Hayashi (1970) analyzed the current status of the issues in mountain villages, and showed that significant differences existed between mountain villages and therefore there was a need for different development strategies. In regard to depopulation problems, Nemoto (1972) clarified the process of depopulation by including social capital and income level as determining factors in the demographic shift. In regard to the demographic shift from agricultural communities to urban areas, Nobukuni (1982) clarified its relationship with the economic cycle, and also carried out factor analysis and simulation using a utility difference model. Hagihara (1984) studied depopulation problems from the perspective of optimal population distribution, and analyzed the effectiveness of measures to address depopulation such as subsidies from both theoretical and empirical aspects. Katada et al. (1987) quantitatively formulated the mechanism of the demographic shift and commuting flows from the perspective of agricultural and mountainous communities, and studied models to forecast the size of the demographic shift and commuting flows using the levels of the living environment and employment environment in agricultural and mountainous communities and urban areas, respectively, and the commuting transport conditions between the two areas as explanatory variables. In addition, the changes in the supply and demand of food in the course of economic development, and furthermore the changes in the food trade structure have had significant impact on rural and agriculture development in the respective and related countries, regardless of whether developed or developing. As a result, studies in food policy are receiving a considerable amount of interest in Europe and elsewhere. In particular, emerging countries with enormous populations such as China and India are attracting attention. Kiminami (2009)

clarified the changes in food consumption behavior in the course of economic growth in China, and discussed the need for harmony between food policy and other policies.

2.2.2 Production Structure and Production Factors in Agriculture

The restructuring of the agriculture production structure has not advanced as rapidly in Japan as in Europe and the U.S. Structural reform is especially important in land-extensive farming. One significant feature in comparing agriculture with other industries is that land plays a crucially important role as a production factor. It does not simply refer to the size of land usage area per production value, but the significant role that is played by the quality of land (form, compartment, abundance and so on). Kiminami and Kiminami (2005) viewed land improvement as changes in capital stock on the basis of quality of land, and measured its economic effect on agricultural management. By contrast, Furuzawa and Kiminami (2006) clarified from a farmer-level analysis that the direction of land improvement projects is determined by farmers' business objectives and the assessment of land resources.

2.2.3 Diversification of Agriculture and the Rural Economy and Collaboration with other Industries

The phrase, "the rural economy is not the same as the agricultural economy" has several meanings in developed countries. It may refer to the fact that the continued existence of farmers and rural communities depends on employment opportunities in non-agricultural sectors in rural areas, or it may refer to the fact that new economic activities (community business, collaboration between agriculture, commerce and industry, and so on) are intensifying as a result of the diversification of the rural economy. The relationship of mutual dependence between agriculture and related industries is not limited to the simple trading of assets and services, but also includes business collaboration in various formats. Yoshimoto et al. (2009) looked at the relationship between agriculture and tourism in Okinawa, and measured the economic ripple effect of agriculture on other sectors and the employment creation effect by analyzing inter-industry relationship tables. In regard to unused organic resources, Yasunaga (2006) estimated the cyclic use flow of agricultural biomass in the region and quantified the effect of utilizing agricultural biomass on the regional economy including the chain effect. The effects of rural industrialization on the regional economy and rural and agriculture development by industrial cluster strategy are recently attracting attention in developing countries as well. Kiminami (2010) explored solutions for rural and agriculture development issues in China (improvement in agricultural productivity, increase in farm household income, poverty reduction, environmental conservation and so on) from the perspective of industrial clusters. In addition, studies concerning the agro-industry are making advances based on the reality that agriculture today is deepening its economic ties with other related industries, and rural areas are heavily dependent on non-agricultural industries. As a study, especially in relation to the food industry, there is Kiminami et al. (2010), which looked at business collaboration.

2.2.4 Urbanization, Agriculture and Rural Areas

The relationship between rural and urban areas, and the relationship between agricultural and non-agricultural industries have often been treated as a simple binary relationship, but the clarification of the mutual interdependent relationship between rural and urban areas and cooperation between agriculture and non-agriculture industries have become important research themes in recent years.

The importance of agriculture in the rural economy has decreased in developed countries, but agriculture still plays a significant role in terms of land management. Furuzawa and Kiminami (2007) clarified the structure of the issues concerning agricultural land use and urban land use in Niigata's city planning based on an analysis of residents' awareness, and explored consensus formation for plan formulation. The effect of economic activities in urban areas on the rural economy is also an important point of argument. For example, Kakimoto (1991) used the Harris-Todaro model that incorporates the relationship where agricultural products become raw materials for the urban sector, and showed that employment subsidies in the urban sector have no effect on improving employment in rural areas due to factor substitution. In developing countries, too, interest in food safety and environmental issues is growing, following rapid industrialization and urbanization, and as a result, the concept of urban

agriculture is getting re-examined. Kiminami et al. (2006) discussed that urban agriculture in Shanghai, China, attached importance to securing food for urban residents until the reform and opening-up of China, but the focus shifted after that to economic efficiency, i.e., increase in farmers' income. The paper also pointed out that environmental conservation and the safety of agricultural products are also given importance in recent years in response to the needs of residents.

2.2.5 Globalization, Regional Integration and Agriculture/Agricultural Communities

Studies on regional integration are roughly grouped into studies concerning regionalization of the economy and studies concerning regional trade agreements. In the studies concerning regionalization, studies on the aspects of economics and trading are advanced, and these are divided into those concerning the production network and spatial economics such as industry accumulation. Empirical studies are abundant, such as studies on the economic effect of economic partnerships in East Asia, as represented by WTO-JETRO (2011), and studies concerning location and agglomeration, such as Jin and Tokunaga (2008) and Lu and Tokunaga (2008), but studies on mutual dependence through the trading of agricultural products and food are scarce. Kiminami and Kiminami (1998, 1999) analyzed the trend in economic integration in East Asia by clarifying intra-industry trade mechanism through the typification of trade patterns and in terms of the relationship with direct investment, and clarified the international division of labor in the food industry. In contrast, in regard to the liberalization of agricultural trade, Sakuyama (2010) empirically clarified the determination factors in the custom duty reliance in agricultural protection in developed countries, and Kiminami and Kiminami (2007b) clarified domestic and bilateral consensus formation in Japan and China for achieving FTA including agriculture.

3. Future Prospects

As pointed out by OECD (OECD, 2014) that focusing on the two pillars critical to revitalizing rural areas – innovation and modernization – is one way to identify factors that can trigger or facilitate improved economic performance and identify those that tend to weaken it.

First, there is an issue of regional heterogeneity. This issue is especially important in the discussion of the effectiveness of rural and agricultural policies. Many developed countries are introducing people-based policies (to develop regions through human resource development) and region-based policies (to set a regional range and develop the region) as a result of problems in industry-based policies (which is to develop regions through industry promotion). However, there are also claims that pan-region people-based policies do not function effectively due to regional heterogeneity (Kilkenny 2010). Regarding region-based policies, policies that consider regional characteristic (place-tailored policies) rather than blanket policies are thought to be more effective, but these are problematic in terms of high policy cost. Therefore, discussion on effective policies continues. This is why it is important to consider the way of accurately capturing regional heterogeneity and reflecting it on policy formation and governance

Secondly, there is an issue of rural and agriculture development, amenity and quality of life (QOL). In Japan, there are many studies on multi-functions of agriculture and farming land, but rural and agriculture development studies are limited, for example Kiminami and Kiminami (2006, 2007a) which assessed the impact of urban agriculture on urban QOL and analyzed the sustainability of agriculture. Furthermore, studies on the relationship between the inter-regional demographic shifts, especially various formats such as “UJI turn,” and amenities are in severe shortage.

Thirdly, there is an issue of creating more effective rural and agriculture development models. Recent changes in the environment that surrounds agriculture and rural areas have certainly introduced more factors that need considering in development models and thus complicated the matter. But on the other hand, the potential to create new development models has also increased. For example, McGranahan and Wojan (2007) and McGranahan et al. (2011) proposed a new growth model by combining Florida's (2002) regional development model based on creative class with the shift of creative class to rural areas as a result of amenity factors in rural areas, and conducted empirical analysis. However, studies on innovation by individual economic entities, knowledge creation activities and their results need to be accumulated. To this end, large scale surveys at an individual

management level and the construction of databases for management results are needed.

Fourthly, there is an issue of how agriculture and rural areas are perceived. In other words, it is necessary to redefine agriculture from an ailing industry to a growth industry that continually creates innovations, and to redefine rural areas from a conservative and closed society to an open 'space' to create knowledge and innovations. Studies on innovations and knowledge creation in rural and agriculture development have only just started. Related studies include Souma and Kiminami (2012) which dealt with knowledge management in agricultural management succession and Kiminami and Furuzawa (2013) which examined the knowledge creation mechanism in international cooperation in rural and agriculture development. However, studies on innovation by individual economic entities, knowledge creation activities and their results need to be accumulated. To this end, large scale surveys at an individual management level and the construction of databases for management results are needed.

More specifically, it is necessary to introduce an approach of strategic marketing planning and industry cluster strategy to the traditional regional economic development approach in order to create a new approach of strategic development for regional agriculture (see Figure 1). The “Strategic regional agriculture development” approach is thought to be formed by comprehensively combining existing town development plans (Higasa and Hibata 1993), community development (Nitagai et al. 2008), strategic marketing and planning (Kotler, et al, 1993) and the industry cluster strategy approach (see Figure 1), which is considered to form a regional agriculture innovation system looking at new knowledge and learning processes and understanding the interaction between producers and end users, local government and research institutes.

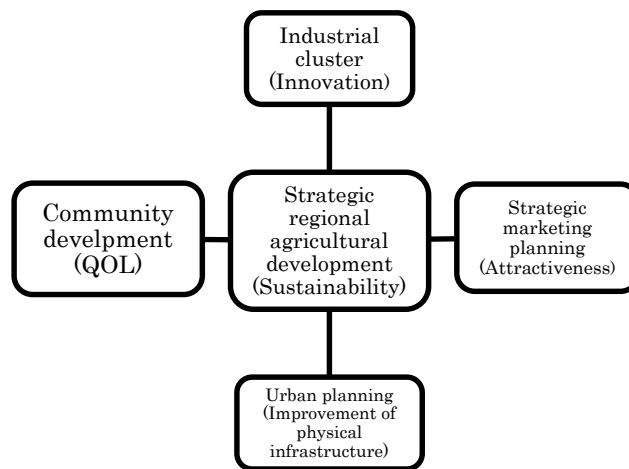


Fig.1 Concept of Strategic Regional Agricultural Development

Note: This paper is a revision from “Rural and Agriculture Development” (Kiminami, L. Kiminami, A. and Furuzawa, S.) *The progress and perspectives of regional science in Japan: The golden 50th Anniversary*, eds, Japan Section of Regional Science Association International, 2012 (in Japanese)