Quality Coordination in the Localized Food System:
The Case of Local Turnips Okabu and the Processed Food Senmaizuke in Japan

Azusa OSUMI
Ritsumeikan University

Abstract:
Protection and promotion of origin-based food products, often under geographical indication (GI) systems, are widely considered to be one of ways for rural development. While, particularities of such historical and localized food system make the quality coordination between different economic actors more complex than is the case for standard products. This paper analyses how the features of a food system are connected to the difficulty of coordination, examining the case of okabu (local turnip around Kyoto) and senmaizuke (salted and pickled okabu). Senmaizuke is a nationally famous local product of Kyoto, but producers do not have effective collective activities and have quality coordination problems. The result shows that okabu defects that cannot be identified and removed prior to sending is the main cause of the quality coordination problem. A chain structure that lacks traceability and price incentives to good quality, together with differences in triage criteria and return systems among the various processors, also hinders communication for coordination. Secondly, this paper proposes the analytical concept of quality coordination, which identifies a double structure of social/collective coordination and individual coordination as to discuss more clearly effective quality coordination. When the self-resolution of a quality problem reaches the limits, role of social coordination to solve the problem is indispensable to keep activities in the food system. Because the resolution of quality problem may require changing their growing practices, triage standards or to improve plant varieties as shown in supplemental case of Manganji sweet pepper. These resolutions are considered to be associated with long-term collective strategies and interests of whole of food system. However, the lack of platform for vertical coordination and cooperation is considered to be a common disadvantage for considerable number of localised food systems in Japan and also in other countries without interprofessional organization.

Keywords: localized agri-food system, origin-based food, quality coordination, coordination problem, geographical indications

1. Introduction

Quality coordination in the food system is part of the vertical coordination between actors (1). Quality coordination is as important as price or quantity coordination, because it is considered to affect the results of collective economic activities and their concurrency (Allaire and Boyer, 1995; Barjolle and Sylvander, 2002). Traditional and local food products, distinguished by their high quality, freshness, tradition and local specificity (Niijama, 2002), need different type of quality coordination from that for industrial and standard food products (2). These products have a unique productive structure and specificities
Quality Coordination in the Localized Food System

that tend to make quality coordination difficult. Here, the actors can differentiate their products only by retaining and strengthening these specificities related to locality and traditionality.

In Japan, Geographical Indication system is quite new and the first products were registered in June 2015. Local food products are considered to be a developmental resource in rural areas. To reach this objective, effective quality coordination is indispensable. In spite of that, the quality coordination for local food products tends to have difficulties originated in their own locality and traditionality. The real quality coordination for traditional and local product supply systems in Japan has not been extensively addressed in previous studies. The discussion about quality coordination remains ambiguous because the analytical concept is not sufficiently established (Norito, 2010; Shibuya, 2011). The interprofessional organization in quality coordination that covers several production stages in a food system has only begun to be addressed, and their functioning and the difficulties they face have been only minimally examined. The discussion of the concrete and precise elements of quality coordination needs to be deepened.

Compared to traditional foods in general, the issue of quality coordination in the food systems of traditional processed foods is more complex, largely because the raw materials producers and processors are different, and the necessary transactions between the two sets of actors are potentially complicated. In the case of okabu (Japanese white turnips, one of the traditional local varieties of turnip in Kyoto) and senmaizuke (salted and seasoned okabu identified with Kyoto), contracted transactions between the local branch of the agricultural cooperative and several processors have suffered from a high rate of returns since around 2000 (Osumi, 2015). In the first part, the present paper focuses on this situation, analyzing how features of food system substructures and basic conditions (Niiyama, 2001) made the quality coordination difficult here. In the second part, the various functions of quality coordination process are examined through a literature review. In the third part, this paper discusses what is possible measure ensuring better quality coordination in Okabu/Senmaizuke food system, doing a brief comparison with Manganji sweet pepper. While the present paper talks about specific items, its aim is to spur more general discussion about a quality coordination system that works effectively for such products. The focus is on the coordination of quality in the self-coordination field and excludes, for example, food security, since this is controlled and made obligatory by the government.

2. Quality problems in the okabu and senmaizuke food system. Why are they difficult to solve?

1) Quality problems in the okabu and senmaizuke food system

Figure 1 shows the outward forms of the okabu/senmaizuke food system according to the functions of the participating actors. The principal problem occurs in the contracted transaction between farmers, the cooperative of the two production areas, and the processors. The return rate for the shipped turnips is 10% on average but can reach as high as 50%. Because returned turnips are not paid for and the rate of returns fluctuates, the farmers’ sales income is unstable and, at the time the contract is signed, unpredictable (Osumi, 2015). At the same time, the processors suffer from unnecessarily high processing costs because of the large amount of waste.
2) Okabu’s commodity characteristics and the quality problem

Okabu’s specific commodity characteristics clearly influence the system’s ability to solve the quality problem. The cultivation of okabu requires a longer growing period, and thus the opportunities for quality failures tend to be more diverse than for standard or smaller varieties of turnips. Okabu grows to be about 20 cm in diameter and farmers need to make special efforts to stabilize their internal quality. The end product, senmaizuke, because they are a regional specialty, are often consumed as a souvenir present from a trip to the region or as a year-end gift. As such, an attractive appearance is considered very important. For this reason, the processors set a high standard for the internal quality of okabu, making effective quality coordination indispensable. Unfortunately, such coordination, for the reasons described below, has proven to be difficult, and the current system is inadequate.

- Internal quality

While the external quality of an okabu can be judged by its appearance, its internal quality cannot be definitively determined at the time of shipping. The only elements of quality that can be judged externally are its whiteness, shape, luster, weight and aroma.

However, only the internal quality of the okabu is important for processing. As suggested in Figure 2, processors cut off the upper and lower parts and a few centimeters of the skin of the okabu prior to processing. The important interior qualities are fineness, homogeneity without fiber bands, crunchiness, firmness, whiteness, taste, and aroma.

At the time of shipping, farmers cannot cut open the turnips because they cannot sell cut turnips. Consequently, they have to sell their product after only guessing from its appearance its internal quality. Triage techniques, a possible solution, are quite difficult.

- Production process and the variety of quality errors

In the senmaizuke production process, processors first wash the turnip, then remove the skin and needless parts, as shown in Figure 2; they then slice it. The slices are then salted and, after a waiting period, seasoned. Each process, including waiting time, takes two to three days.

Quality issues for the okabu fall into three categories: quality problems that can be identified from the turnip’s appearance, those

Figure 2 Internal and external quality of okabu

Source: author
Quality Coordination in the Localized Food System

Table 1 Quality failures and processing step for triage

| Distinguishability from the appearance | High | Quite a few / No |
|--------------------------------------|------|------------------|
| Time for triage                      |      |                  |
| Before shipping                      |      |                  |
| Deformation                          |      |                  |
| Cracks                               |      |                  |
| Turn to brown                        |      |                  |
| Black and grey spots                 |      |                  |
| Fibrous band                         |      |                  |
| Porous flesh                         |      |                  |
| Fibrous rings                        |      |                  |
| Turn to grey                         |      |                  |
| Semitransparent flesh                |      |                  |
| Lack of density                      |      |                  |
| Layer yield rate                     |      |                  |
| After slicing                        |      |                  |
| After salting                        |      |                  |

Source: interviews conducted by author

that can be identified after peeling and slicing, and those that cannot be identified before completion of the secondary (seasoning) process, including the pressing (Table 1).

Okabu with problems in the first category are sorted out by the farmers prior to shipping; okabu with problems in the second and third categories are dealt with by the processors. These latter types of poor quality problems are more complicated to find simply by inspecting the turnip’s appearance and create greater difficulty for the system’s actors.

For some quality problems, the cause can be readily determined or inferred. For example, fibrous bands are thought to be the result of a typhoon’s strong wind; reduced density is thought to be brought about by unusually warm autumn weather; a delay in harvesting leads to porous turnips; and soil imbalances can change the turnip’s color. The causes of other poor quality problems are more difficult to establish.

3) Chain structure, enterprise behaviors and the quality problem

Most of local processors are not significant players in national level (Osumi, 2015). Accordingly, they do not have sufficient financial and manpower resources to react to and coordinate quality problems, and there is a limit to what can be expected from individual efforts. From another point of view, about 100 processors. This structural characteristic slows down communication between actors when quality problems arise. In particular, the different methods or return systems of each processor determine in different ways the quantity of returned okabu, causing confusion for the farmers, who are eager to find the cause of the quality problem.

- Differences in traditional methods

Table 2 Different levels of traditionality in processing methods

| Traditional method | Industrialized method | Faster processing method |
|--------------------|-----------------------|--------------------------|
| Peeling            | cut off the fibrous layer | cut off the fibrous layer |
| Radius             | more flexible size for each okabu | more standardized size |
| Salting method     | weight + salt (longer) | presse + salt (moderate) |
| Loss of weight by salting | large | moderate |
| Salt amount adjusting | difficult | moderate |
| Processing steps   | 2 steps (salting + seasoning) | 2 steps (salting + seasoning) |
| Seashings other than vinegar and salt | no | some companies use |
| Vinegar            | no, only Kombu and salt | yes |
| Kombu (dried sea tangle) | rich use | moderate use |
| Lactic fermentation | light fermentation | slight fermentation |
| Preservative       | no | some companies use |
| Expiry date        | shorter | midium |
| Experienced and skillful person | necessary | desirable |

Note: 1) From interviews conducted by author.
2) This table shows the range of different methods. This is not intended to clearly classify all of concrete methods in to three types.
The processors in Kyoto prefecture normally follow traditional methods. The association of processors has decided that the traditional method for processing okabu must include two steps: salting and seasoning (with a wait). Within these constraints, however, formula differences exist. As shown in Table 2, there can be differences in the standards for shape and peel, the duration of salting, the use of different ingredients for seasoning, the use of artificial ingredients, pasteurization, and conservation measures. In contracted transactions with several processors, such differences between the various processors can prevent the farmers from identifying the cause of a quality problem that may occur. These differences are also one of the reasons that collective action is difficult or impossible.

System and behavior in returns

Adding to the confusion, the return systems for the various processors are also different. For example, in the conventional and basic way, workers who slice the okabu conduct visual checks and count the number of returns. Processors who have a more industrialized system do not count directly. They determine the normal quantity required to produce a unit and calculate the number of returns by comparing the normal (or standard) amount to the actual amount used to produce units from the current shipment (for example if the normal quantity is 10 okabu per unit and 12 okabu from the current shipment are needed to produce a unit, the return amount would be calculated as two okabu). The return rates of turnips from the same production field are thought to vary because of these different return systems and triage criteria mentioned earlier. In addition, the triage criteria are often related to the total amount of okabu received by the processor; if there is a raw material shortage, the triage conducted by the processor tends to be less strict. A farmer may have almost no returns from one processor while, at the same time, have a high rate of returns from another processor. Consequently, farmers are unable to determine if the returns represent their own failure or the fault of the processors, which causes a delay in taking action.

4) Quality coordination in each step of the chain structure

To better understand the distinctive characteristics of quality coordination in a contracted transaction, it is instructive to compare quality coordination in such a transaction to that in a wholesale market. Quality coordination involves the farmer, the processors, and communications between them regarding product quality.

- Quality coordination by farmers at the time of shipping

In contracted transactions with the cooperative, allowable weight ranges are specified. Additionally, all quality defects that can be discovered by a check of the exterior of the turnip such as differences in color, unusual shape, cracks, traces of disease, and damage from insects are to be identified and the offending turnips selected out by the farmers. The farmers perform test cuttings for each field and each ridge and decide if they should ship the okabu produced there. Since cut okabu have no sales value, the triage must be conducted in an indirect way.

For transactions in the wholesale market, the farmers use nearly the same triage system. However, because each farmer is likely to have different goals for their outgoing quality, their criteria tends not to be consistent. In general, farmers wishing to produce higher quality okabu tend to have more know-how and experience in estimating interior quality than the average farmer but even here the techniques are not
Quality Coordination in the Localized Food System

- Quality coordination by processors in raw procurement

In the wholesale market, it is possible to identify three types of purchasers by their behavior. Type A purchasers are those few who buy only top quality okabu. They are employed by processors (direct sellers) that use more traditional methods and produce higher than average quality senmaizuke. These purchasers sometimes pay triple or quadruple the average price. (Although it is thought that purchasers who look for higher quality okabu can assess more surely the interior quality of the turnips, it appeared that only one of these Type A purchasers was able to judge the interior quality perfectly, and only after a long career.) As shown in the Table 3, after inspecting the turnip’s appearance, these purchasers will use information such as individual identification number, production area, recent local climate conditions, and time of harvest in setting the price and making their purchase.

Type B make up the majority. These purchasers are associated with average quality processors (direct sellers). The remaining purchasers are Type C. These are purchasers that produce lower quality products (wholesalers). In the wholesale market, most okabu are of higher quality and are purchased by Type B buyers at the average price. Relatively small numbers of cheaper okabu are sold to Type C buyers at a lower price. It is generally considered less important for Type B and Type C purchasers to be able to perfectly predict interior quality, and they will sometimes ask for advice from an expert Type A purchaser.

In each of the processing companies, it is normal that those individuals responsible for manufacturing are also responsible for the purchase of the raw materials. They have almost daily experience buying okabu and checking their interior quality when they are being processed, but even they are unable to perfectly predict interior quality prior to processing.

In transactions involving the cooperative, farmers trade okabu in groups of five to ten members. While the contract price might be set at 150-yen per okabu, it may actually turn out to be only 120-yen because of the payment system. Under this system, because processors do not pay for returned okabu and because it is impossible to know who shipped the unacceptable units, the cooperative determines the actual price paid to the farmers by dividing its total income by the total number of shipped okabu in the same category.

- Communication about the quality between processors and farmers

Farmers who wish to sell their okabu to Type A buyers at significantly higher prices have a strong incentive to communicate with the purchaser or intermediate wholesaler and to actively seek to improve quality by developing effective cultivation and triage techniques. In

| External quality | Information about production |
|------------------|-----------------------------|
| Size | Shape | Color | Luster | Aroma | Producer | Area | Season |
| L-2L (=appropriate mature, high internal quality, appropriate size to Senmaizuke) | Flat upper and under side (=can gain more leaves) | White | + | Specific flavor | Who has shipped good quality okabu stably | Production area has appropriate climate recently | Good timing of the season |
| Over 3L (=produce more waste, risk of over-mature, poor internal quality, size for cut Senmaizuke) Under M (=too small for cheaper type of Senmaizuke) | Round upper and under side Asymmetric shape | Other Color | - | Weak flavor | Who has shipped poor quality okabu or who lack of quality stability | Production area has poor climate condition recently | Too early or late |

Source: interviews conducted by author
such transactions, the farmers will write their individual identification number on each case. In this way, individual farmers can then obtain information if there are quality problems when trading through an intermediary (and cooperative by case). With this system, if the same farmer repeatedly ships poor quality okabu, it creates a poor reputation for future auctions, and the farmer earns less.

At the Kyoto Central Wholesale Market, regional vegetables are typically handled by specialized intermediaries. In the case of okabu, there are two specialized intermediaries, each playing an important role in quality coordination. The intermediary visits farmers in Kyoto and Shiga (an adjacent prefecture) almost every day, talks with farmers directly and checks the growth situation in the fields. When the intermediary gets orders from a processor, the processor provides information regarding recent sales of senmaizuke or feedback on the quality of okabu that the intermediary has sold. The intermediary provides information regarding recent developments in the wholesale market and okabu production. The purchaser and the intermediary are encouraged to build a relationship, communicate with other actors and hold study sessions with farmers to ensure that they are buying high quality okabu, and predict market trends. These activities contribute greatly to quality coordination in a non-price way.

In a contract situation, it is rare that processors actually ship back okabu of unacceptable quality because of the transport fee. Nevertheless, farmers can learn about their product quality directly or through the cooperative. The problem is that shipping is done by the group so that systematically tracing exactly who produced the poor quality okabu is impossible.

Under this system, individual efforts to reduce failures will not noticeably increase selling price unless most or all members of the group attempt to improve quality. Moreover, the shipping system does not provide individual farmers with a strong motivation to improve product quality, and the real unit price of their product is generally insufficient to induce them to take action in this regard. Nevertheless, according to interviews, the farmers have taken some measures.

The Kyoto Prefectural Agriculture, Forestry and Fisheries Technology Center has investigated some of the poor quality issues from 2010, finding that, for example, timely use of compost is more favorable than chemical fertilizer for ensuring a homogeneous texture. The Center has also discovered that the rate of poor quality differs for each cultivar. Diffusion of such results to the region's farmers began in 2013. The quality problem has existed for more than ten years and finally solutions for some types of quality failures have begun to emerge, although some of these - such as introducing an irrigation system - are too expensive given the low price that the farmers receive. Indeed, actual price is thought to be insufficient to incentivize the farmers to make additional efforts to learn difficult triage techniques. However, even if all these measures were implemented, it would still be impossible to produce okabu with no quality issues.

In the wholesale market, transactions are not usually conducted with the same person. For this reason, it is often thought that working under contract is better than trading in the wholesale market, as quality coordination would appear to be easier when the parties can exchange information in the fixed relationship that is formed in a contracted arrangement. However, the case central to this study shows the opposite.

In contract trading, the volume of a shipment
Quality Coordination in the Localized Food System

is determined by the size of the truck. To fill a truck, the product of several farmers must be consolidated. If some units are of poor quality, it is impossible to determine which farmers shipped the poor quality okabu. Introducing a simplified traceability system offers a possible remedy. At one time, the farmers and processors attempted to build and maintain a relationship based on mutual confidence through meetings before the growing season to verify quality standards and growing conditions, and through social gatherings. Unfortunately, the relationship gradually became weaker than before, limiting the occasions where the various parties could discuss quality problems. The precise reason for this change is unclear.

As mentioned, in the wholesale market in general, the transaction partner is typically not fixed, making it more difficult to conduct quality coordination or build a stable relationship, as can be done in contract trading. However, in the case of okabu, the situation is a bit different. Okabu are traded in a smaller section of local vegetables in Kyoto's Central Wholesale Market and only a few intermediate wholesalers are responsible for a majority of the okabu trade. These intermediaries make an effort to build relationships with both farmers and processors. Shipping is done in a way that enables them to identify the producer of each okabu, since the producer number is written on the cardboard shipping boxes. These conditions allow the actors to coordinate quality rather effectively. Wholesale markets themselves tend to coordinate product quality through price, a function that is complemented by the activity of the intermediate wholesalers.

Although the wholesale market appears to work better in coordinating quality, it is limited in its ability to offer sufficient product volume for the larger processors. Furthermore, the behavior of these larger processors influences the price at auction in an adverse way, making prices in the wholesale market unstable. This is the primary reason that the larger processors prefer contract trading. Because of this observation, it is not possible to apply Transaction Costs theory. It leads a conclusion that the integration of Okabu production and processing can reduce transaction costs related to Okabu’s specificity or uncertainty. It is opposite of the reality that the wholesale market performs better. Also, the purpose of this paper is not to determine a better form of transaction.

5) Summary of the section

Table 4 gives a list of the features of the food system segregated by sub-structures and base conditions that make the quality coordination problem complex and delay normalization of the situation.

The fact that the various failures of the okabu cannot be removed at the time of transaction is considered the main cause of the

Table 4 Causes preventing early solution grouped by sub-structures of food system

| Substructure                        | Causes                                                                 |
|-------------------------------------|------------------------------------------------------------------------|
| Commodity characteristics (fundamental conditions) | Difficult suggestion about internal quality by external quality   |
|                                     | Various quality failures and causes                                   |
|                                     | Several quality failures unable to find before processing             |
|                                     | Demande for high quality product and raw material                    |
| Enterprise internal structure and behavior | Different processing methods and quality criteria for Okabu of each entreprises |
|                                     | Different return system                                               |
| Chain structure                     | Smaller and numerous processors compared to national scale companies  |
|                                     | Trade system without individual remuneration for quality              |
|                                     | Trade system without traceability to determine the producer of bad quality Okabu |
|                                     | Weak social and collective quality coordination                     |

Source: The substructures are cited from framework of food system analysis [3].
quality coordination problem. A chain structure that lacks a traceability system also hinders coordination. In addition, individual efforts to ensure good quality have little clear or direct effect on the personal incomes of farmers. Furthermore, different processor methods and return systems are confusing to the farmers, as the rate of returns tends to differ from one processor to another, even for turnips that come from the same field.

Among the causes shown in Table 4, some are common to nearly all traditional foods: the demand for high quality of raw materials and product, a chain structure that includes numerous small processors and differences in the processing method and triage criteria. Others, like the difficulty to sort out poor quality product solely by observing appearance, the large number of quality failure categories (and their causes), and the transaction form prevents successful quality coordination are somewhat unique. The level of difficulty depends on the characteristics of each food system.

3. Quality coordination process and elements required for good coordination

1) Differences in the nature of quality coordination and price coordination

It is important to understand the features and processes of quality coordination in order to produce an analytical concept that will lead to a better understanding of the quality coordination problem described in Section 2. In the coordination process by which an agreement on price is reached (price coordination), sellers and buyers typically determine a price by using a general stylized pricing mechanism before, or at the time of, product transfer. The price is not independently decided each time a transfer is made. Rather, a price will be used to decide the price in next transaction and in transactions of the same business. This also affects price coordination in the lower and upper parts of the food system. Price coordination is thus a composite system where the actors determine the price repeatedly and each price has mutual influences (Niiyama, 2002).

Quality coordination has different cycle. Product quality is set by the time production ends, but it is often not assessed until consumption, making the evaluation of quality geographically and temporally distant from the site and time of production. Typically, the quality of a product already produced cannot be changed, so the result of the evaluation is reflected only in the next production run. Quality is mainly coordinated between one production cycle and the next.

2) Processes of quality coordination

Because of the features described above, quality coordination requires more complex information exchanges than price coordination. Price can be indicated simply by a single number, but food quality involves multiple components, some of which can be difficult to assess. Nevertheless, in commodity trading, the actors need to know what components compose quality. These quality components do not naturally appear before the transaction; rather, the definition and forms of quality need to be built socially through various and repeated coordinating activities between the food system’s actors using the term of Investissements de forme (Thévenot, 1986, 1995; Eymard-Duverny, 1989). Niiyama (2001) summarized elements of quality coordination from Sylvander (1995) as quality definition, production, quality consumption (evaluation) and information exchanges. Based on these elements, the analytical framework is deepened in this paper. In this process, conceptual quality is first stipulated in order to recognize and verify the
Quality Coordination in the Localized Food System

categorical quality (Letablier and Delfosse, 1995). Based on this codified quality, the actors agree on the evaluation strategy; this would include when and how to evaluate product quality, and who will do the evaluation. Importantly, the evaluation strategy must be shared with the consumers or the user companies. It must be agreed upon by both the production side and the consumption side, so that the strategy is not unilaterally decided. In the case of traditional food products, the social process to coordinate quality is built through interactions between the local food industry and the consumers (Letablier and Delfosse, 1995).

Quality coordination has individual components related to the production of each of the producers. Producers refer to the socially built stipulated or tacit quality definition. The quality definition can be divided into segmenting definitions that determine the limits of a product and classification definitions (Thévenot, 1995) that define which product is in the upper grade of a category. When producers adopt a conceptual quality definition and design their product, they are required to satisfy the segmentation definition. If it is unsatisfied, the product cannot be sold as belonging to the category. The classification definition is referred to when a producer selects the positioning of his products (Letablier and Delfosse, 1995). Decisions regarding product quality are affected by both the business environment, including such factors as the producer’s loyal customer base, and management resources (for example, the presence of skilled company technicians or its access to raw materials).

At the moment of production, product quality is set and fixed. When the product is used or consumed, the quality of the product is partially evaluated by consumers or users based on a method that has been decided socially. Traditional and local authenticity is a quality driven by the production process. Since the consuming public is unable to verify the production process directly, socially agreed upon systems such as the Protected Designation of Origin in Europe are needed to guarantee product quality through controls, third-party audits and certification marks (Valcechini, 1995). Qualities such as taste and freshness can be affirmed by the consumer’s consumption experience, and the results of these empirical evaluations can be transferred from consumers to producers through quality communications or price for intermediate distributors; the results of this feedback can then be reflected in the next production (Niiyama, 2001). There are three types of quality feedback: Type A involves coordination to correct subsequent production without modifying product design. Type B causes modification of the conceptual quality and/or product design. Type C involves cases in which the actors cannot resolve the problem with only individual producer-based quality coordination; this might be, for example, a situation in which the actors have to avoid competition with counterfeit goods or lower quality products in modifying the collective rules of quality.

Collective quality coordination affects coordination in individual production. However, a producer, as a member of local industry, also influences social coordination. The schema shown in Figure 3 is the basic unit of the quality coordination process. Actual coordination extends to several subindustries, so that the total coordination system has several interconnected basic units. In the case of traditional food products, the producers of raw materials decide on the conceptual quality they seek and the production method to be used (essentially, their product design). They then produce the desired quality. Processors use the raw materials to produce processed food; it is
here that the quality of the raw materials can
finally be evaluated. The quality role for
processors includes quality consumption and
evaluating the raw material producers. They
determine whether the raw materials meet
quality standards and can be processed
successfully into end-products. If there are
quality failures and the cause is thought to be in
the raw materials, the processors check with
the raw material producers. The influences of
each sub-industry on quality coordination as a
whole or on the coordination of other sub-
industries are not equal. In the basic unit, each
producer has a different influence. As in price
coordination, the degree of power depends on
the competitive situation in local industry,
vertical relationships, commodity characteristics,
and the like.

3) What is effective quality coordination?

It is important to recognize that quality
coordination for okabu is not independent of that
for senmaizuke. The quality required by
processors is dominant, so that the quality
definition and the product design of the farmers
are embedded in the senmaizuke quality
coordination. Once these are established, quality
production by the farmers through cultivation
and triage, quality evaluation by processors, and
quality results in the form of information
exchanges or prices are repeated. When quality
problems occur, the causes and solutions are
clearly identified. Coordination of Type A and B,
as explained in the preceding subsection, which
can be realized with the efforts of individual
producers, can improve a problematic situation.

However, when the problem is stalemated, as
in the case of okabu, the transfer of results often
fails. Because of the form of the transactions,
mechanisms for exchanging information
regarding quality evaluations and coordination
via price do not function, and the actors involved
are unable to effectively identify the causes and
solutions for quality failures. To realize effective
coordination, the actors first have to share
information concerning the quality problem. If
the actors conclude that it is necessary, research
studies and experiments in cultivation
techniques can be pursued to provide technical
information to all involved. These are essential
functions of social and collective coordination
necessary to support the coordination of
individuals.
4) Platform, modalities/institutions and domains of quality coordination

To realize effective social and collective coordination, both the platform for coordination and regulatory or self-regulatory modalities and systems are crucial (Niiyama, 2002). The platform, regardless of whether it is institutionalized, enables the actors to find and share problems, then create new modalities or systems to control quality. To address the quality problem described in Section 4, Subsection 2, where the causes of poor quality are not clear, the nature and conditions of the platform are important: which and how organizations and/or institutions function as a quality coordination platform, and whether the functions are sufficient.

The nature of coordination depends on what kind of quality that is to be coordinated. If ensuring product quality serves the public interest, the coordination tends to be driven by the legal restraints of public authorities, and compliance is mandatory for all food industries and farmers. Food safety as potentially life- and health-threatening is an example. Beyond such issues, there is the autonomous and self-motivating coordinating field that involves coordination in pursuit of high quality. In the case of okabu, the quality issue relates to the indispensable features necessary for producing senmaizuke, which would include sufficient hardness, no significant deformities, and, for premium quality, whiteness for aesthetic purposes, none of which are in the mandatory coordinating field. A certification system can be used to facilitate the identification of quality for general consumers, but only a small volume of okabu is distributed as a fresh vegetable directly to consumers. The application of Kyoto Brand Goods certification is thus quite limited and, in fact, the certification criteria are not actually related to the quality issue (6). Quality coordination in this situation remains in the voluntary coordination field.

4. Discussion: a better quality coordination for traditional and local products

It is useful to compare briefly with another quality coordination case, that of the Manganji sweet pepper, which is also a traditional and local species in Kyoto prefecture, in order to understand better the okabu/ senmaizuke case. At one time, the Manganji sweet pepper had a serious quality problem – some of the peppers became hot – but the actors succeeded in normalizing the situation.

1) Quality problem of the Manganji sweet pepper
   - Outline of quality problem of the Manganji sweet pepper

   Until the late 1980s, the production and consumption of Manganji sweet peppers, which are grown from seed, was limited to a small geographical area called Nishi-maizuru in the north of Kyoto prefecture. Inhabitants there were very familiar with the nature of Manganji, generally it is not hot at all but some of which can be hot. In 1989, the pepper was registered in the KBG certification, and the consumption area for the peppers spread to the whole of Kyoto prefecture, then to other prefectures, including Tokyo. The new consumers were unfamiliar with the Manganji pepper and complained that some of the peppers were hot, particularly since the commercial name for the product was Manganji Amatou – Manganji sweet pepper. Especially in Kyoto, where there was competition from another local vegetable, the Fushimi sweet pepper, which was rarely hot and had become popular prior to the appearance of the Manganji, consumers were highly dissatisfied. The causes of hot taste varied and
included stresses on the plants due to water shortages and unusually high temperatures.

- Sharing the information, experimental cultivating and research

In the early stages of the product’s wider distribution, vegetable retailers, supermarkets and restaurants that had purchased the peppers transmitted their customers’ dissatisfaction with the “hot taste” of the supposedly sweet peppers to the intermediate wholesalers and wholesalers from Kyoto’s Central Wholesale Market, then to the local branch of the cooperative. The problem was shared by the various actors in daily communications. Soon thereafter, members at the prefectural meeting for vegetable culture promotion, the Kyoto Agricultural Cooperative (JA Kyoto), the horticultural economy division, the Agricultural Research Center of the Kyoto prefectural office, and the Rural Agricultural Extension Center were sharing their thoughts on the problem.

- Reactions to the problem

Actually, requests for a breeding or cultivation experiment can be made to the research center during a fixed period of every year. Which of the requests will be carried out is determined at the annual meeting, where budgets and research themes are decided. There was no set procedure at the time of the Manganji sweet pepper problem. However, it happened that a key person who had worked as a prefectural public officer in the horticultural economy department and was familiar with the pepper problem moved to the research center and initiated a set of problem-solving actions. Since 1997, two new varieties of the Manganji have been bred through natural crossbreeding. Both are true-bred so that their seeds can be produced by the farmers themselves, reflecting one of the focuses of the farmers’ collective discussion. The first new Manganji reduced the rate of hot peppers dramatically; the second is always sweet and retains all the traditional Manganji features (especially its traditional form). The second new variety was introduced to the local production area in 2012, and the significantly lower rate of hot peppers became a key point of differentiation from other new production areas.

- Differences of the situation in the case of Okabu and that of Manganji sweet pepper

The problems and conditions of quality coordination in okabu and Manganji production differ in several respects. For okabu, there are various types of poor quality, while for Manganji there is only one issue: the hot taste. In the case of okabu, a modified cultivation technique and more varietal choices have been helpful, but they did not provide a total solution to the problem. In contrast, the related actors involved with Manganji succeeded completely. Conditions, however, are quite different. In the case of Manganji, almost all of the producers belong to the same cooperative branch (JA Ninokuni), forming a single group of farmers. In addition, for the Manganji food system, there is no processing step. This structural feature makes it easier to know with whom to discuss the issue when there is a need to change cultivation techniques or address shipping problems. That is a significant advantage in quality coordination.

2）Lack of quality coordination platform for okabu

Not all traditional and local food systems have as effective a platform for collective coordination as in the case of Manganji. For okabu, it is unclear who performs the key role in addressing quality problems. In the material production stage, local cooperatives organize farmers, but at least three different cooperative branches can be found in the prefecture, and these farmers’ groups do not have a common, fixed platform specialized in quality issues.
related to okabu. In addition, there are also independent farmers outside the cooperative. In the processing stage, there is the cooperative of Kyoto Tsukemono (Japanese styled salted or pickle vegetables) processors, but it does not typically deal with quality problems, as the processors tend to believe that the problems and their solutions belong exclusively to the farmers. Several processors have tried to find problem causes but have been unable to take the initiative in solving the problems or to work collectively around them.

Lost in a situation where the quality coordinating function is ineffective, the actors in the okabu and senmaizuke food system have not effectively shared information and have generally failed to take countermeasures. As a consequence, the farmers and processors have lost confidence in each other. Over this period, both sides have suffered economic losses. Okabu producers have had a significant percentage of returned product and the price has fallen little by little in negotiations. The parties have not identified the technical causes of quality failures and have not produced a real solution partially because communications concerning the returns have been inadequate. The processors have not been willing to explain their production methods in a way that might help resolve the problems because of confidentiality concerns and have failed to support the farmers in solving the ongoing problems, even with the serious differences among the various companies’ rates of return. The processors believe that the problems are with the cultivation or the triage techniques of the farmers, and some have tried to escape the problem by switching business partners. While this may offer a short-term solution, it can lead to a corrosion of the original production areas and a delocalization of material production. Senmaizuke is a local specialty product of Kyoto, and any reduction in its territorial characteristics risks generating stronger competition with other standard items, as the logic of differentiating the market will no longer be valid. All the stakeholders in the food system, therefore, must engage in a serious discussion of the future direction of the system and their collective interests.

5. Conclusion

For traditional fresh foods, quality coordination to address difficult situations is not simple, but in the case of traditional processed foods it is much more complicated because of the multiple quality production steps and the need to coordinate vertically across several entities. In this paper, the causes of a serious quality problem in the okabu and senmaizuke food system have been defined and analyzed (Section 2). To clarify the nature of the problem, the elements and characteristics of effective quality coordination were examined (Section 3). The case of the Manganji sweet pepper was introduced and compared to the okabu situation (Section 4). Through these examinations, this paper sought to determine how quality coordination for traditional and local food products should function.

In the case of okabu, its commodity features make the solution to the quality problem especially complicated. Okabu require a relatively long cultivation period and have more potential for a variety of quality failures. Furthermore, at the time of trade, it is impossible to know and difficult to predict which units are of poor quality. Adding to the complexity, there are a large number of smaller (compared to the national tsukemono industry) processors, each having different processing methods and return systems, which farmers find confounding. A trading format that lacks traceability, where the actual producers of low
quality cannot be individually identified, prevents the possibility of a price-incentive coordination system.

The analytical concept of quality coordination as a dual structure of social and collective coordination and individual coordination was presented in Section 3. Coordination of quality is particularly difficult when quality consists of elements that are not quantitatively clear and is made even more challenging when the actors who produce the product and those who evaluate its quality are different and distant in terms of time and place. Crucially, collective and social coordination and individual coordination must be harmonized. When there is a problem that each actor cannot overcome through individual effort, it is important that the actors construct a platform for discussion and that it functions as the vehicle for collective coordination. Effective collective coordination requires inclusive discussion of quality issues, agreement on corrective measures, and the need for technical assistance, experimental cultivation and other research that may be necessary. Measures to improve quality can sometimes be accompanied by changes in cultivar, cultivation technique, or triage criteria that can fundamentally affect the traditionality and locality of the product (coordination type C). As in the case of senmaizuke and okabu, quality coordination of a processed food can be made more complex because the coordinating actors are spread over several sectors. In such cases, the creation of a common quality coordination platform can help solve the formal quality problem in a more rapid and tactical way.

As for future research, the analysis presented here should be expanded to other commodities, using the same analytical concept to develop a generalized discussion regarding effective social quality coordination for traditional food products. The case of the Manganji sweet pepper and other traditional products should be further analyzed with respect to the exchanges that took place in the process of correcting a serious quality problem (sharing the problem, setting the agenda, discussing and ultimately choosing corrective measures, and taking action). A future study that covers various other commodities would enable us to discover the links between the intensity and contents of social quality coordination that can be driven by a quality coordinating platform and the effectiveness of coordination efforts by individuals.

In the case of European quality coordination for traditional foods, the geographical indication (Niiyama, 2001) and various interprofessional organizations play an important role (Cadilhon and Dedieu, 2011). One of the challenges, then, would be to investigate collective coordination and the behavior of individual actors under these systems as a means to develop ideas regarding a suitable Japanese model of quality coordination. In addition, examining other types of traditional products would likely open up a broader discussion of the issues raised here.

Notes

(1) The relationship between actors can be described as the ensemble of sub-groups based on trading and competitive relationships of each of the actors. The trading and competitive relationships between the actors can be observed as forms and systems of price coordination and quality (Niiyama, 2002).

(2) In this paper, traditional food products mean food products that have both local and traditional commodity characteristics. Industrialized traditional foods and non-historical local foods are not included in this grouping.

(3) There are studies involving various cases of traditional and local products focused on the management of food clusters or other relationships between actors in Japan (ex. Kako
et al., 2008; Shibuya, 2011). Quality coordination for traditional and local foods has, however, not been extensively analysed, partially because these studies do not seek to discuss quality coordination itself, and the discussion is not conceptually clear.

4 This is different from the famous “lemon market” in that the seller does not have sufficient information about the product.

5 The price per one smaller plastic bag is 1,050 yen (higher price brand), 630 yen (average) or under 630 yen (lower), depending on the quality. Buyer A is associated with a company that produces only the higher price product.

6 The recognition criteria of Kyoto Brand Goods are that the product (1) evokes an image connected to Kyoto, (2) has sufficient production volume, (3) has a quality standard, (4) is unique or superior to products from other production areas, and (5) uses the Kyoto Kodawari Certification System (reduced utilization of pesticide and chemical fertilizer, cultivation record and disclosure of information). Unified quality standard normally means the shipping standard of JA; thus, that can be only the criteria for assessing external quality.

References
[1] Allaire, G. and Boyer, R. (1995) Régulation et Conventions dans l’Agriculture et les IAA, Allaire, G. and Boyer, R. (eds.) La Grande Transformation de l’Agriculture, INRA-ECONOMICA, pp.9-29.
[2] Barjolle, D. and Sylvander, B. (2002) Some Factors of Success for Origin Labelled Products in Agri-Food Supply Chains in Europe: Market, Internal Resources and Institutions, Economies et Sociétés, 25.
[3] Cadilhon, J. and Dedieu, M. (2011) Les organisations interprofessionnelles: un outil répandu de gestion des filières, Analyse, 31.
[4] Eymard-Duverny, F. (1989) Conventions de qualité et formes de coordination, Revue économique, 40(2), pp. 329-360.
[5] Kako, T., Haneda, H., Uno, Y. and Nakatsuka, M. (2008) Shinoyamashi ni okeru Tanbagurosanchi no Keiseikatei to Gendankai ni okeru Kadai (The formation process and current issues of the black soy bean production area in Shinoyama), in Journal of rural problem, 44(1), pp.36-41.
[6] Kyoto Prefectural Agriculture Forestry and Fisheries Technology Center (2013) Heisei 24 nendo Fukyu ni Utsusu Shikenkenkyu Seika (2012 Annual Report for Experiments and Researches to Diffuse). Available at http://www.pref.kyoto.jp/nougijyutsu/documents/h25hukyuu.pdf. (Accessed May 2016).
[7] Letablier, M. T. and Delfosse, C. (1995) Genèse d’une convention de qualité. Cas des appellation d’origine fromagères, Allaire, G. and Boyer, R. (eds.) La Grande Transformation de l’Agriculture, INRA-ECONOMICA, pp.97-118.
[8] Niiyama, Y. (2001), Gyuniku no Fûdosisutemu: Oubei to Nihon no Hikaku Bunseki (Beef Food System: Comparative Analysis between United States, Europe and Japan), Nihon Keizai Hyouronsha.
[9] Niiyama, Y. (2002) Fûdoshisutemu ni Okeru Kouzou to Suichokuteki Chousei (Structures and Vertical Coordination in a Food System), Takahashi, M. and Saitou, O. (eds.) Fûdoshisutemugaku no Riron to Taikei, Association of Agriculture and Forestry Statistics (AAFS), pp.313-328.
[10] Norito, T. (2010) Yunyu Kakudai to Jyuyou Henka ni Tomonau Umesanchi no Henka to Renkeisoshiki no Keisei (Structural Changes and the Development of a Coordination Body Under Growing Imports and a Demand Shift in Ume Production), in Takayanagi, N., Kawakubo, A., Nakagawa, S. and Miyachi, T. (eds.) Gyobaruka ni Taikousuru Nourinsuisangyo, AAFS, pp.107-119.
[11] Osumi, A. (2015) Okabu to Senmaizuke no Fudoshisutemu: Kisojyouken to Yottu no Fukukouzou no Bunseki wo Tousite (The Okabu and Senmaizuke Food System: An Analysis of the Fundamental Conditions and Four Substructures), Journal of Food System Research, 22(3), pp.181-192.
[12] Shibuya, C. (2011) Noushoukourenkei ni okeru...
Soshikikanbaikaisoshiki no Kinou (Functions of an "inter-organizational intermediary" in cooperation among agriculture), in Journal of rural society and economics, 29(2), pp.101-108.

[13] Sylvander, B. (1995) Convention de qualité, concurrence et coopération. Cas du label rouge dans la filière Volailles, Allaire, G. and Boyer, R. (eds.) La Grande Transformation de l’Agriculture, INRA-ECONOMICA, pp.73-96.

[14] Thévenot, L. (1986) Les investissements de forme, in Thévenot, L. (eds.) Conventions économiques, Presses Universitaires de France, pp.21-71.

[15] Thévenot, L. (1995) Des marchés aux normes, Allaire, G. and Boyer, R. (eds.) La Grande Transformation de l’Agriculture, INRA-ECONOMICA, pp.33-52

[16] Valcechini, E. (1995) Entreprises et pouvoir publiques face à la qualité. Les produits agro-alimentaires dans le marché européen, Allaire, G. and Boyer, R. (eds.) La Grande Transformation de l’Agriculture, INRA-ECONOMICA, pp.53-72.

[2017年9月10日受付、2018年4月19日受理]
[Received 10 September 2017, Accepted 19 April 2018]