## Interrelating knowledge processes with institutional and cultural contexts in organic rice farming

Insights from integrated rice and duck farming in the Hongdong community of South Korea

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## Introduction

We can build on each others' experiences through exchanging knowledge and know-how. In the best case this enables technical, social and economical innovation and evolution. This article tells the story of sharing, modifying and creating new knowledge around an organic rice farming method applied and adapted in South Korea. The article's goal is to show how the analysis of knowledge processes brings meaning into the process of searching for greater sustainability in agriculture and rural development. The article emerges from a master thesis

in Human Geography where concepts from knowledge management were used to describe and analyse the knowledge sharing and learning processes within the international network of Integrated Rice and Duck Farming (IRDF) (Rutz 2008). Its local focus lies on the community of Hongdong, a rural place in South Korea with about two thousand small scale farmers.<sup>3</sup>



*Figure 1: Visitors from the city area release the remedy for weed control in a rice paddy in Hongdong, South Korea. (Source: mundang.invil.org 2007)* 

## Four organic rice farming methods

Farmers in the rural community of Hongdong in South Korea produce rice and other crops on farms with an average size of 1.53 ha (Kang 2005; Ministry of Agriculture and Forestry 2006). Somewhat more than 50% of the farmers in Hongdong shifted entirely to organic farming during the last 15 years.

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<sup>&</sup>lt;sup>3</sup> Fieldwork was carried out in Hongdong, South Korea, and Japan from July to October 2008. Data were collected mainly by interviews and during field visits and excursions. The primary data were complemented with a literature review.

The other 50% of the farmers in Hongdong combine organic and conventional farming methods to produce rice and agricultural commodities. The four organic rice farming methods used there are the Integrated Rice and Duck Farming (IRDF), the Snail Method, the Rice Bran method and the Winter Flooded Rice Field method (see box). Compared to conventional rice paddy farming, the organic methods not only have ecologic benefits, but also economical benefits since the harvested rice can usually be sold for higher prices.

IRDF found practical application in many countries in Northeast, South East and South Asia. In those other countries, ducks have been raised and herded either near or

on rice paddy fields for centuries. However, the systematic use of ducks to control weed, pests, and fertilization in organic rice paddy farming was invented in the late 1980's by a Japanese farmer and agronomy PhD, Mr. Takao Furuno. According to the information provided by the websites of United Nations Food and Agriculture Organization (FAO) and the International Rice Research Institute (IRRI), some tens of thousand farmers use the method in this manner throughout Asia. In South Korea, the IRDF is used in several areas by some hundreds of farmers, but none of them has more users than Hongdong. This can be explained by specific links fostered by the community with knowledge carriers of IRDF as well as the specific institutional and cultural context of Hongdong (see section below).

## Interrelation between knowledge processes and institutional structures

The story of the IRDF method is not only telling for the search for more sustainability in paddy field farming in Asia. It is also interesting to see how the method came to Hongdong, why it was so successful there, and how it has been modified over time. To answer such questions we shift our focus to the knowledge processes during and after the adaptation of IRDF in Hongdong. The knowledge processes happen in networks and groups of organic farmers and



Figure 2: IRDF field in Takahata, northern Japan (Dominik Rutz, 2007. Note that in the area near the duck shed the rice plants are affected by ducks' activities.)

other farming experts who are part of the institutional structure, i.e. the institutional, cultural and socio-economic environment. Various groups of actors originating from different contexts overlap, interact and carry out knowledge sharing and learning processes. In the following we use the ideas of the Community of Practice (CoP) (Wenger 1998) as well as an integrative understanding of knowledge as tacit and explicit knowledge, basically following Polanyi (1985), to explain the interrelation between knowledge processes and institutional context.

This interrelation can be assessed by looking at how actors collaborate in and between different groups and institutions. Processes of learning and knowledge sharing are ways of participating in different groups of people who share a common interest or belief. In the knowledge management literature they are called Communities of Practice. Boundaries between such CoPs are influenced by the institutional structure, as for instance by clan affiliations or cooperative organizations, but they are not reducible to them. The boundaries between CoPs have a crucial meaning for knowledge processes as they allow a deeper level of professional specialization within the CoP but hamper the exchange of knowledge across the boundary. For sharing and creating new knowledge, collaborations between different CoPs tend to have more potential than collaborations within one and the same CoP, but the former need more effort and more means.

#### Box 1: Four organic rice farming methods of small scale farmers in Hongdong, South Korea (Source: Rutz 2008)

Integrated Rice and Duck Farming (IRDF): IRDF is a blend of traditional Asian rice farming with recent systematically tested agricultural knowledge. Following the basic pattern<sup>4</sup> of the IRDF method means to release 10 days old ducklings to the rice paddy fields a few days after transplantation. The number of ducklings per area varies between 150 and 300 ducklings per hectare. The ducklings control weeds by either eating or paddling down sprouts, eat the pests within reach of their beaks, and fertilize and paddle the soil. Ducks do not eat the tough rice plants but rice ears, so they need to be taken out of the rice paddies latest when the plants grow ears. The method requires relatively little financial and human resources for building fences around the paddy field in order to keep the ducks in and predators out, a shed where ducks can stay over night, and hatchery facilities for the breeding and training of ducklings.

The Snail method: Apple Snails of the right kind are as effective for weed control as ducks. The method does not include the other positive effects ducks bring to the rice plants (e.g. constant paddling, fertilization, pest control). However, a growing number of Hongdong farmers use snails instead of ducks since they do not necessitate either fences or sheds, nor feeding twice a day which is time consuming and binding. About 30-35% of organic farmers in Hongdong area use the method, and the number is increasing at the expense of IRDF.

**Rice-Bran method**: Only a few, although a growing number, of fields in Hongdong are farmed with this method. Rice bran is good for fertilization, but the thin layer of it on the soil does prevent many but not all weed from germination. This is why preparing fields with a two-time rotation is recommended in order to get rid of most weed sprouts before the transplantation of rice seedlings. The Poolmoo College of Hongdong tested two-time rotation for the first time in 2008. Ponds that accompany paddy fields farmed in this way are important for a lasting biodiversity where water creatures can take refuge when the rice paddy fields are not flooded from October to April. They are small, but are an additional input of resources necessary for this system.

Winter Flooded Rice Field: Biodiversity is also the characteristic of paddy fields where WFRF is used. In addition, because the fields are also flooded in winter, they attract migrant birds and demonstrate a somewhat richer biodiversity of aquatic and amphibious species. This method has not yet been tried in Hongdong, but it is being prospected by the Poolmoo School and innovative farmers. As in Rice-Bran fields, yield is estimated to be smaller for several years in the initial phase, but when the methods are carried out correctly, similar quantities of rice can be harvested like on other organic or conventional rice fields.

<sup>4</sup> For detailed descriptions of the IRDF method see Furuno (2001) or Gaguan, Branckaert & Van Hove (2001).

The tensions that evolve in multi-party collaborations are possibilities for so-called creative frictions and are not unwanted in knowledge creation and sharing processes. Basically, the more CoPs interact within a case such as ours concerning the spread and adaptation of the IRDF method, the more possibilities for creative friction exist.

The meaningful connection of interacting CoPs, in other words boundary management or interfacing, is always done by actors with special social roles, such as multimembers who experience membership in different CoPs, or knowledge brokers who bring together and mediate between different CoPs (Wenger 1998). Those key persons are also part of the institutional structure influencing their social interactions. The notion of social interactions that are embedded in every knowledge process derives from the perspective that knowledge always consists of two complementary levels - the explicit and the tacit. As depicted in Figure 3, knowledge processes, especially those who transcend knowledge boundaries, need to consider not only verbal aspects of communication (sharing of explicit knowledge) but also embedded social interactions (sharing of tacit knowledge). Actors A, B and C represent members of different CoPs that are trying to exchange knowledge across the boundaries between the CoPs. Embedded social interaction consist of either traditional or institutional regulations and authorities, power dynamics, ways of conceiving and relating to others, and of socialization processes (Nonaka 1998, Ravn 2004). They considerably shape the way knowledge is being exchanged, modified and newly created.



Figure 3: Levels of Explicit Knowledge Sharing (1) and Tacit Knowledge Sharing (2) (Source: Ravn 2004)

The concept of coexisting tacit and explicit knowledge leads also to the assumption that knowledge is place-bound in the same way humans are, for sharing tacit knowledge is only possible if a concomitant socialization process is enabled. Thus, to settle in or near a cluster of overlaying CoPs (like the community of Hongdong) usually reduces the cost of accessing knowledge carriers and also allows for more trustful relationships. This means that in addition to the institutional structure, the concept of nearness has a distinct meaning for knowledge processes because it allows direct face-to-face contacts where not only explicit knowledge but also know-how (tacit knowledge) is being exchanged. Crossing knowledge boundaries is easier if actors who want to share knowledge work or better live near each other.

The perception that knowledge and knowledge carriers are placebound has a decisive meaning in the context of agriculture: If a farming method is shared across spatial distances, it always has to be adapted to new natural but also social environments. Actors from different levels and regions who collaborate to bring about sustainability in agriculture and rural development thus have to understand and respect local practices, cultures and institutions. A fruitful co-construction of sustainable knowledge is only achieved if all actors involved focus not on mere adoption but on a creative adaptation of new techniques.

The concepts of CoPs as well as the distinctive knowledge definition including tacit and explicit knowledge are now used to outline and explain the meaning of the institutional structure of Hongdong and the adaptation process of IRDF. In this study, we identified formal and informal institutions relevant for knowledge processes, like farming organizations (cooperatives, NGOs, schools, governmen-

tal extension services), the marketing environment, as well as social aspects of every day life like clan, family and neighbour group affiliations. Furthermore, we elaborated the interaction patterns between them, like regularity and quality of meetings inside and between the CoPs, the spatial nearness of actors, as well as the possibilities for both formal and informal interaction and for socialization. It was then possible to qualify the knowledge processes that are going on with regard to IRDF and organic paddy farming in Hongdong. It can be shown that local and national institutional structures as well as cultural and socio-economic differences of South Korean and Japanese societies play distinctive roles and explain the different application of IRDF in different regions.

### Institutional structure in Hongdong

The idea of IRDF initially came to Hongdong in 1993 when Takao Furuno was invited to teach the basic pattern of the method for the first time to teachers of the Poolmoo Schools in Hongdong and associated farmers. The Poolmoo Coop members consist of about 200 consumers, and of 800 producers of which the large majority produce rice with IRDF. It is a spin-off

from a cooperative of Poolmoo School teachers and students, and it fosters close ties to other cooperatives in the village and to consumer cooperatives in Seoul, the capital of South Korea. Another important link to the city area is the Mundangri Centre, which per year receives about 20'000 visitors from urban areas who are interested in farming life and IRDF. About half of the population in and around Hongdong belong to a network of the following groups: people that migrated from the city to this rural area (called refarmers), teachers, students, and graduates of both Poolmoo Schools, and members of the Poolmoo Coop and the Mundangri Centre. Within this network, people easily connect with each other, i.e. the different CoPs have permeable boundaries to each other. Many farmers address teachers for technical support, and teachers together with farmers and cooperative members engage in multi-party collaborations about organic farming or various other community related subjects. Another group of farmers is not that well connected and are reluctant to address teachers or collaborating actors. They are mostly members of the local branch of the nationwide Nonghyop cooperative, which consists of about 400 organic farmers who mostly use IRDF, and of about 1'000 farmers who grow rice and other crops with conventional methods. Both networks (the Poolmoo institutions and the Nonghyop cooperation) are more or less separated, but efforts are being made from both sides to establish connections.

The fact that farmers of both networks use organic farming methods like IRDF shows that the boundary does not completely block knowledge sharing. One possible reason for this is the quality of community life in small neighbourhood groups which is inherent to Korean culture: Groups of usually 5-10 farmers (mostly men) gather in informal CoPs that either engage in joint labour on paddy fields or chat together. This tradition of sharing thoughts in frequent face-toface encounters but also every day life in groups is a cultural institution in South Korea and decidedly different from Japanese society. It clearly influences the way IRDF is shared and applied in the two countries: Most of the farms in Japan on which IRDF is used are one of few within a region, whereas in South Korea, there are several regions where more than hundred farmers use the method. Another difference is that,

especially in the organic market, Japanese farmers usually sell their products directly to consumers, whereas in South Korea, people strive to establish large size cooperatives with hundreds of members.

The above mentioned cultural characteristic of sharing community life within small groups of neighbouring Korean farmers is an aspect of embedded social interaction that favours knowledge sharing processes. As noted above, socialization processes along this pattern is a possible reason why knowledge can be exchanged across the relatively impenetrable boundary between the two local networks sharing different beliefs and techniques of paddy agriculture. The importance of socialization and informal meetings seems to be understood by local institutions like the Poolmoo Schools as they strive to establish communal organizations and joint projects that enable the sharing of explicit as well as tacit knowledge within local society as well as with visitors from outside. Those activities have already carried many fruits, and Hongdong is now famous not only for organic farming, but also for community life and development. This attracts not only numerous visitors from the cities but also refarmers who choose to live permanently in Hongdong.

# Adaptation process of IRDF in Hongdong

Although the natural conditions in southern Japan and the west, south and east of South Korea are similar, the method was applied differently in Hongdong. In the mentioned areas, one rice harvest per year can be yielded in the humid subtropical climate, and times for transplantation (around June 1st) and harvest (around October 10th) are similar. The fields can be used to grow winter wheat or green manure in the remaining time. Applying ducks for one month after transplantation is enough to clear the rice paddy fields of weed. As the weeding activity is the main reason Hongdong farmers use ducks, most farmers simply "rent" them from a large breeding company about 150 km south of the village for one month, from around June 10th to July 10th, and give them back after the "ducks' job" is done (see timeline on figure 4).



Figure 4: IRDF adaptation in Hongdong (Source: own design)

In Japan however, ducks are allowed in the paddies for a maximum of about two months. They are taken out before rice plants come into ears in mid August, and can be sold in November. During that time they have to be fed and cared for outside the rice paddy.

Even in South Korea, which has become a member of the Organization for Economic Co-operation and Development (OECD) in 1996, most of the farmers depend largely on their harvests to secure their livelihoods. Therefore, they are not willing to conduct or allow tests with new "adventurous" methods on their fields. When IRDF was tested in Hongdong on fields of the Poolmoo High School and of a graduates' farm, success had to be demonstrated for several consecutive years before more and more farmers of the region were willing to apply it. This shows that the activities of key persons or key institutions are crucial to knowledge processes. For example, for the success of IRDF in Hongdong the school director was crucial who spotted the method in a Japanese publication for alternative farming and who initiated the testing.

When the first IRDF trials were conducted in Hongdong in 1993, most farmers who cultivated either organic or conventional rice had difficulty sustaining their livelihoods. As the method proved to be sound for organic agriculture, and as the market for organic rice boomed, farmers could count on secure incomes and thus could refrain from migrating to cities. Furthermore, more and more refarmers chose life in the area that became famous for organic farming and alternative education. Therefore, IRDF indirectly led to more inventiveness: Compared to other areas in South Korea that face the typical brain drain of peripheral areas (being drained of especially young and inventive people), the trend goes in the opposite direction: In Hongdong area, a growing number of locals, refarmers, their interlinkages, and their networks extend the realm of possibility for creative friction. Actors live in close proximity to each other and knowledge sharers benefit from the nearness, which reduces the cost and enables trust for lasting relationships.

### Conclusion

The systematic integration of ducks to control weeds, pests and fertilization can be considered an unsophisticated rice paddy farming technique, which empowers farming households to sustain their livelihood without agrochemicals. The process of adapting Integrated Rice and Duck Farming in Hongdong shows that various characteristics of institutional structures influence the way knowledge is dealt with. Differences between South Korea and Japan in terms of farmers' livelihood security, the organic market, and embedded social interaction led to a different way of adapting IRDF, and also a different way of sharing the method in both countries. The local network of co-present communities of practice and different institutions in Hongdong was a starting point for the application of IRDF in South Korea, which eventually led to more farmers using the method than in Japan.

But not only the potential of a local institutional structure is crucial to knowledge processes leading to more sustainability in agriculture and rural development but also the potential of the technique that is shared: In addition to its power of making agrochemicals unnecessary, IRDF also offers possibilities for more sustainable natural resource use because it is less time consuming than manual weeding practices. This way, farmers can engage in work other than weeding, such as off farm work which is an important link to other CoPs and networks. If such multi-members can connect farming knowledge systems with others, they become knowledge brokers that are key persons in knowledge processes. Furthermore, the success of IRDF motivated people to stay or even move to the area, which leads to a growing number of overlaying communities of practice that now engage in creative collaborations.

In regions with a booming organic market, as well as in regions where agrochemicals are not readily accessible for farmers, IRDF has the potential to allocate human, financial and natural resources more sustainably. When compared to other organic rice paddy farming systems, IRDF can be called a stepping stone to applying and sharing more sustainable combinations or methods that allow biodiversity and complete material cycles like the Rice-Bran or the Winter Flooded Rice Field method. In Hongdong, more than half of the local small scale farmers did that step, and some of them, together with the Poolmoo Schools and Cooperative, are currently striving to innovate new and modify existing knowledge in order to achieve higher levels of sustainability in paddy rice farming, and in community life too. A part of this sustainability is due not only to richer diversity in biology on paddy fields, but also a richer diversity in farming methods. The story of the IRDF method is a telling example of how agricultural knowledge in organic farming has been creatively adapted and enabled a more sustainable practice, and how this practice can catalyze further knowledge sharing and learning processes.

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