

Knowledge Creation and Flow in Agriculture: the Experience and Role of the Japanese Extension Advisors

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Abstract: This paper presents findings of a recent study on the experience and roles of agricultural extension advisors in the context of knowledge creation and flow in organizations. Data were collected through interviews with eleven principal and senior extension advisors and a consultant from different Prefectures and organizations as well as questionnaires from 135 extension advisors in the Ibaraki Prefecture, Japan. The purpose of the study was to explore the preferences and roles played by extension advisors in relation to knowledge sharing among advisors, farmers and other stakeholders. Results show that the Japanese agricultural agencies are actively involved in facilitating knowledge creation within their organizations. The extension advisors, as intermediaries and catalysts, are the key links between farmers and the relevant agencies in terms of providing personalized and need-based information for decision-making.

Keywords: knowledge creation, knowledge sharing, information use, knowledge flow, agricultural information, agricultural extension, information management, agriculture, information intermediary

1. Introduction

The Japanese agriculture has experienced several phases of reforms and modernization for more than a century ago. Since the end of the Second World War Japan started to embark on a concerted effort to revitalize its agriculture sector in order to boost production to meet the escalating demand for food. The Central and Prefectural Governments worked closely to enhance the training of farmers to uplift their technical and managerial skills and to ensure sustainability, and this was remarkably carried out through the activities and programs by the agricultural extension services.

The Japanese extension system for agriculture which started in 1948 was meant for helping farmers to acquire useful, appropriate and practical knowledge in the domain of agriculture (Fujita, n. d.). This system was adapted from the Western extension system into the Japanese culture to suit their local needs and requirements. Traditionally, extension focuses on disseminating R&D information from research laboratories to farmers (Roling, 1990), providing farmers with technical advice as a guide to improved farming methods (Williams, 1968), training of new, youth and women farmers as well as community reorganization.

The Japanese agriculture has thus far been successful and sustainable. This “suggest that farm decision-makers have either been using more and better information or becoming more knowledgeable” (Jones et al., 1987). The food shortage in the recent past has seen how important it is for nations to ensure

sustainability of their agriculture sector. In fact, agricultural sustainability has been the focus of many developed nations as well as emerging economies. There have been a few interpretations of sustainable agriculture which could describe a state whereby: a) farm productivity is enhanced over the long-term, b) adverse impacts on the natural resource base and associated ecosystems are ameliorated, minimised or avoided, c) residues resulting from the use of chemicals in agriculture are minimised, d) net social benefit (in both monetary and non-monetary terms) from agriculture is maximised, and e) farming systems are sufficiently flexible to manage risks associated with the vagaries of climate and markets (Australian Standing Committee on Agriculture, 1997).

It would be interesting to understand how a developed country such as Japan manages its agriculture sector through the extension services, hence the study reported in this paper explored the roles and experience of the extension advisors in the context of knowledge creation and flow.

2. Methods and procedures

This study used questionnaire-based survey and interviews for data gathering. Eleven principal and senior extension and agricultural officers from different Prefectures and organizations and a consultant on the Japanese extension system were interviewed and 232 questionnaires were sent out to the extension advisors at the Headquarters and all of the 12 branches of the Ibaraki Prefecture Agricultural Center, Japan. Ibaraki is one of the 47 prefectures in Japan, with an area of 6,093 km² situated in the northern part of the Kanto region in Honshu Island. It has close to 3 million population and in terms of productivity, in 2006, Ibaraki was ranked 4th most productive agricultural region with its production of vegetables, crops, flowers, fruits and livestock (Ibaraki Prefectural Government, 2009).

One hundred and thirty-five completed questionnaires were returned, providing an overall response rate of 58.2%. The breakdown of respondents according to branch is given in Table 1.

TABLE 1
Questionnaire Response Rate

Branches of the Ibaraki Agricultural Center	N (135)	%
Bandou	12	8.9
Chikusei	12	8.9
Hitachiomiya	13	9.6
Hitachiota	10	7.4
Hokota	12	8.9
Inashiki	12	8.9
Kasama	12	8.9
Mito	11	8.1
Namegata	9	6.7
Tsuchiura	12	8.9
Tsukuba	12	8.9
Yuuki	8	5.9

The development of the questionnaire was based on the review of literature where a few open and close-ended questions were derived from themes from previous studies related to information management and agricultural extension services such as those conducted by Jones et al. (1987), Kaniki (1989), Rolling

(1990), Majid et al. (2000), Middendorf (2007), and Fukuda (2008). Subsequently, interviews were conducted with several experts in the field of agricultural extension to ensure that the questionnaire items are relevant with the nature and characteristics of the extension advisory services. The survey instrument was reviewed by a number of senior extension advisors before it was distributed to the extension advisors.

Meanwhile, additional information was gathered through interview sessions with principal and senior agriculture officers from a national organization for agricultural extension, a national agricultural research institute, three Prefectural Agricultural Centers, and a retired expert and consultant on agricultural extension system. The purpose of these interviews was to seek further clarifications on their experiences on the overall development of the Japanese agricultural extension system in relation to inter-organizational linkages and co-operations, common practices and leadership of the extension services.

3. Findings and discussion

3.1 Survey demographics

Twenty-three (17.3%) respondents were between 20 and 29 years old while the largest were in the age group of 30-39 years old (30.8%), 32 (24.1%) were between 40 and 49 years old, 34 (25.6%) were between 50 and 59 years old, and only 3 (2.3%) were 60 years old or more. Of the 134 respondents who provided feedback on their gender, 89 (66.4%) were male and 45 (33.6%) were female.

On their highest educational attainment, four (3.1%) respondents held a PhD degree, 29 (22.5%) had a Master's degree. The majority (79 or 61.2%) of them had a Bachelor's degree. Only 1 (0.8%) had only a college or high school education.

More than a third of the extension advisors who participated in this study had five years of working experience or less with the extension service, while 11 (8.9%) had 36 or more years of experience. Table 2 provides detail breakdown about their experience.

TABLE 2
Experience of Respondents

Experience (years)	N (124)	%
Up to 5	46	37.1
6-10	19	15.3
11-15	15	12.1
16-20	10	8.1
21-25	9	7.3
26-30	5	4.0
31-35	9	7.3
36 & above	11	8.9

As extension advisors, respondents were assigned to 1 or more areas of specialty where 55 (40.7%) respondents associated to vegetable farming, followed by rice cropping, 44 (32.6%), upland cropping, 31 (23%). Apart from farming and cropping, respondents also specialized in technology applications, 23 (17%), human resource management, 22 (16.3%) as shown in Table 3.

TABLE 3
Area of Specialty of Respondents

Area	N	%
Vegetable farming	55	40.7
Rice cropping	44	32.6
Upland cropping	31	23.0
Technology applications	23	17.0
Human resource management	22	16.3
Business management	20	14.8
Fruit farming	17	12.6
Community development	16	11.9
Feed cropping	13	9.6
Flower farming	11	8.1
Dairy cow farming	8	5.9
Beef cattle farming	7	5.2
Pig farming	6	4.4
Chicken farming	5	3.7

3.2 Personalized learning activities

Respondents were asked to indicate on a scale of 1-5 (as noted below in Table 4) their preference of the channels of communication when interacting with farmers, the industry as well as with other organizations and related parties. It was discovered that extension advisors used several means to communicate with their clients in performing their advisory tasks and responsibilities. Table 4 provides the list of communication channels preferred and used by extension advisors and their mean score.

From the table, the channels which were highly rated by the respondents were personal face-to-face meetings with farmers and other clients and visits to their farms and work places. The mean score for this preference was closest to 1 (most preferred). It is observed that the top 3 rated channels of communication (i.e. personal face-to-face meetings, visits; fixed line telephones and cell phones) would relate to the extension advisors' preferences for personal, on-the-spot and interactive communications with their clients.

TABLE 4
Preference of Different Types of Communication Channels

Rating	Types of Communication Channels	N	Mean Score	Standard Deviation
1	Personal face-to-face meetings, visits	135	1.34	0.625
2	Office, residential fixed line telephones	135	1.77	0.712
3	Cellphones, SMSes	132	2.54	1.162
4	Handouts, flyers	132	2.67	1.061
5	Workshops, seminars, classes	131	3.18	1.094
6	Postal correspondences	126	3.33	0.980
7	Emails	128	4.13	0.908
8	Weblogs	127	4.87	0.591

Note: Scale: 1) Most preferred 2) Preferred 3) Neutral 4) Less preferred 5) Least preferred

From the interviews it was possible to highlight that active learning happened during the interactions between extension advisors and farmers and between farmers where the more advanced farmers often provide assistance and guidance to other farmers. It was reported that farmers developed close collaborations between them through the formation of various local societies and groups. The extension services, on the other hand, constantly exchange ideas, experience and tacit knowledge with the farmers. The 'bottom-up' approach which is widely practiced in the Japanese agriculture permeates well with the extension's focus on personalized and repeated interactions. This approach apparently allows farmers to provide direct input to the development of the agriculture field. In addition, through this the extensions are able to gather firsthand information from farmers which are subsequently shared within the community and authorities for further actions.

This phenomenon (of personalization) is further evident by the preference of the extension advisors to meet with farmers at the latter's residence (mean score of 1.38, where 1 = most commonly at/on, 2 = commonly at/on, 3 = neutral, 4 = less commonly at/on, and 5 = least commonly at/on), followed by farmers' farmyard (mean = 1.94). Table 5 provides the list of meeting places rated by extension advisors.

TABLE 5
Preference of Places of Meeting With Farmers

Rating	Places of Meeting	N	Mean Score	Standard Deviation
1	Farmers' residence	134	1.38	0.691
2	Farmers' farmyard	132	1.94	0.955
3	Respondents' office	132	2.64	0.967
4	Workshops/classes/meetings	131	2.69	0.894
5	Local agricultural cooperatives	130	2.92	1.061
6	Experimental plots/sites	129	3.19	1.146

It would be interesting to highlight that the interactions between the players in agriculture provide a platform for formal and informal exchanges of ideas and experience, which gradually formed into what is called communities of practice (Wenger, 1998) where individuals through active social participation contribute to the practices of and learning in their communities and/or organizations. Wenger believes that 'learning is an issue of sustaining the interconnected communities of practice through which an organization knows what it knows and thus becomes effective and valuable as an organization' (p. 8). Sharing of one's experience is an integral part of a community where the alignment of individuals towards common goals may facilitate change within the community (Kahan, 2004).

Therefore, we can conclude that in the context of the agricultural extension, social interactions and participations between advisors and farmers lead to the creation and sharing of new knowledge which would contribute to the enhancement and sustainability of the agriculture sector. In this case, the extension advisors act as intermediaries and key players in the community.

3.3 Need-based and personal sources of information

Respondents were asked to indicate from 17 items on where they acquire

and seek the information required to perform their advisory and administrative tasks. Table 6 shows the list of advisory information and the sources used by the extension advisors in performing their advisory tasks. Of the 19 types of advisory information, 12 were acquired from their Prefectural Agricultural Center, 2 each from the Ministry of Agriculture, Forestry and Fisheries (MAFF); mass media; and customers and farmers; and 1 from their superiors, colleagues and subordinates.

It is obvious from Table 6 that the Prefectural Agricultural Center caters for most of the advisors' needs for information which spans from R&D findings, new technology, technical aspects of agriculture to managerial issues. The MAFF meanwhile was referred to for governmental incentives and policies as well as legal and regulatory information. Information pertaining to the needs of specific farmer groups and community development were acquired from their clients themselves. The mass media were relied upon for news on global and local affairs and finally, for information on credit system, they referred to their superiors, colleagues and subordinates.

We can conclude that the Prefectural Agricultural Center possesses a repository of tacit and explicit knowledge which could be easily accessed and used by the extension advisors in performing their advisory tasks. The availability of such facilities is an integral part which would enhance knowledge sharing within the organization.

TABLE 6
Sources of Information for Advisory Purposes

Advisory Information	Source	N	%
New research & experiment findings	Prefectural Agricultural Center	74	55.6
New technology development	Prefectural Agricultural Center	70	52.6
Government incentives & policies	Min of Agriculture, Forestry & Fisheries	61	46.2
Legal and regulatory information	Min of Agriculture, Forestry & Fisheries	67	51.1
Farm management methods	Prefectural Agricultural Center	38	29.0
Technical specifications	Prefectural Agricultural Center	42	33.6
Soil improvement	Prefectural Agricultural Center	57	44.2
Plant/animal breeds	Prefectural Agricultural Center	36	27.9
Pest & disease control	Prefectural Agricultural Center	63	49.2
Natural disaster protection	Prefectural Agricultural Center	57	45.6
Water & irrigation systems	Prefectural Agricultural Center	37	30.8
Farmer groups' needs & requirements (new, young & women farmers)	Customers, farmers	59	46.5
Community reorganization	Customers, farmers	29	22.8
Food safety	Prefectural Agricultural Center	28	21.9
Environmental issues	Prefectural Agricultural Center	34	26.6
Local market information (including prices & consumer demands)	Prefectural Agricultural Center	28	22.0
Credit system	Superiors, colleagues, subordinates	37	28.9
Current global affairs	Mass media	61	47.3
Current local affairs	Mass media	53	41.1

Similarly, the respondents were given a list of 10 types of administrative information to indicate the sources of information in performing them as listed in Table 7. It shows that 6 types of administrative information were acquired from their superiors, colleagues and subordinates. This is followed by 2 each from the Prefectural Agricultural Center and their customers and farmers.

In relation to the high preference for sources of information from the Prefectural Agricultural Center, it could be argued that the concepts of communities of practice and organizational learning with individual active participation and sharing of experience are indeed well observed and activated at this Prefectural Agricultural Center. It is evident that human expertise and experience are the main source of information and shared within the organization as the main ingredients for decision-makings, aligned toward the achievement of organizational goals.

TABLE 7
Sources of Information for Administration Purposes

Administrative Information	Source	N	%
Making predictions and forecasting	Superiors, colleagues, subordinates	32	26.0
Doing research and experiments	Prefectural Agricultural Center	68	55.7
Providing feedback on community issues to research institutions	Customers, farmers	42	33.6
Preparing presentations	Superiors, colleagues, subordinates	33	27.0
Preparing reports for farmers	Superiors, colleagues, subordinates	36	28.8
For personal and private use	Customers, farmers	22	17.5
On-the-job training	Superiors, colleagues, subordinates	43	36.4
Preparing departmental reports	Prefectural Agricultural Center	37	31.1
Preparing institutional strategic plans	Superiors, colleagues, subordinates	42	35.0
Responding to emergency cases	Superiors, colleagues, subordinates	45	37.2

4. Conclusions

This study highlights an integral factor that contributes to the success of an organization that is the ability to generate and share knowledge among members of the organization. Results showed that the agricultural extension system actively promotes and facilitates the sharing of ideas and experiences between extension advisors and farmers as well as other stakeholders.

Farmers have learned that agriculture is a risky business, hence they need to make accurate decisions based on real life experience and specific knowledge to ensure that they could get the appropriate return on investment and to minimise losses. They need constant, accurate and timely advice from the extension services and other advanced farmers. The agricultural extension organizations naturally provide the place or the Japanese concept of 'ba' (Nonaka & Konno, 1998), which means 'a shared space that serves as a foundation for knowledge creation' (p. 40) for the promotion of active interactions, consultations and exchanges between extension and farmers.

An example of the initiative that creates the ba is the on-the-job training (OJT) for farmers through on-site and hands-on sessions, and for extension advisors which is widely practised in most Japanese organizations. It is worth noting that Japanese organizations adapted the OJT concept into their work culture which allows the sharing and flow of implicit knowledge among members. The open office concept where workers are placed closely together in an open office space helps to further enhance the OJT practices, thus allowing for ideas and experience to naturally flow, underpinned by a situation referred to by Nonaka and Konno as 'entrainment' (synchronizing behaviour), and eventually got aligned towards the common culture and goals of the organization.

The findings of this study have provided some insights as to the ways in which knowledge is created and shared within an organization and are expected

to serve as an initial framework for organizational leaders to create opportunities and space for such activities to be carried out. Future research may be conducted to find out the state of knowledge creation and sharing in the other Prefectures and in other organizations in general.

5. Acknowledgements

The authors acknowledge with gratitude support from Universiti Teknologi MARA, Malaysia; Research Center for Knowledge Communities, the University of Tsukuba, Japan; and collaboration of the Japan Agricultural Development and Extension Association (JADEA); Japan National Agricultural Research Center (NARC); Agricultural Center of Ibaraki and Toyama Prefectures and Hokkaido; Tochigi; Dr. Yasuki Fujita; Mr. Asahi Kiyokawa; the respondents and consultants.

References

- Australia. Standing Committee on Agriculture (1997). *Sustainability indicators for agriculture: introductory guide for regional/national indicators and on-farm indicators*.
- Fujita, Y. (n.d.) *Japan's extension system for improvement of agriculture and rural life*. Unpublished paper.
- Fukuda, K. (2008). *Study of problems and improvement measures of information activities used with information technology in agricultural extension*. Tokyo: Japan Agricultural Development and Extension Association.
- Ibaraki Prefectural Government (2009). *Data on Ibaraki*. Mito: Ibaraki Prefectural Government. Available at <http://www.pref.ibaraki.jp/bukyoku/seikan/kokuko/en/data/index.htm>
- Japan Agricultural Development and Extension Association (2005). *Nougyo fukyu jiten = Agricultural extension services overview & perspectives*. Tokyo : Maruikoubunsha.
- Jones, G. E.; Rolls, M. J. and Tranter, R. B. (1987). *Information management in agriculture : British Library R&D report 5931*. Reading, England : Agricultural Extension and Rural Development Centre.
- Kahan, S. (2004). Etienne Wenger on communities of practice: engagement, identity and innovation. *The Journal of Association Leadership*, March 2004.
- Kaniki, A. M. (1989). *Agricultural information needs in Zambia: a study of a two-way information flow*. Unpublished doctoral thesis. University of Pittsburgh.
- Majid, S.; Anwar, M. A. and Eisenschitz, T. S. (2000). Information needs and information seeking behavior of agricultural scientists in Malaysia. *Library & Information Science Research*, 22(2), 145-163.
- Middendorf, G. (2007). Challenges and information needs of organic growers and retailers. *Journal of Extension*, 45(4). Available at: <http://www.joe.org/joe/2007august/a7.shtml>
- Nonaka, I. and Konno, N. (1998). The concept of 'ba': building a foundation for knowledge creation. *California Management Review*, 40: 40-54.
- Roling, N. (1990). The agricultural research-technology transfer interface: a knowledge systems perspective. In David Kaimowitz (Ed.). *Making the link: agricultural research and technology transfer in developing countries*. London: Westview.
- Wenger, E. (1998). *Communities of practice: meaning, and identity*. London: Cambridge University Press.
- Williams, D. (1968). *Agricultural extension: farm extension services in Australia, Britain and the United States of America*. London: Cambridge University Press.

