Research Management Implications of the Knowledge Sharing and Decision Making among Rice-Farmers in LGU- and NGO- Managed Cyber-Villages

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Abstract

One of the challenges of the research managers is to bring out the knowledge products (including technologies, research results information)from the R and D organization (RDO) to the extension system, as well as from RDO to the direct clients, like the farmers. To ensure the utilization of knowledge products on rice technologies, several modalities have evolved in the past decades, including farm demonstration, farmers training and other technology transfer and extension methods. But the conventional communication delivery systems (CDS) need to be ameliorated so that access to up-to-date agricultural technologies could be as fast as the click of the mouse with the advent of information communication technology (ICT) and the goal to modernize agriculture. This paper is based on the study which analyzed how the CDS in local government unit (LGU)-managed and non-government organization (NGO)-managed cyber-villages contributed to knowledge sharing and decision making among the rice farmers in Infanta, Quezon Province assisted by the International Rice Research Institute (IRRI). The rice farmers in the cyber-villages appear to be more of knowledge seekers than knowledge donors indicates that they value knowledge on NRT as an important resource. The intermediaries (LGU technicians and NGO worker) have influenced the adoption decisions of the cyber-village farmers. The paper uncovered some implications of cyber village as the hub of knowledge sharing and decision making to R&D management in terms of organization and management (between LGU- and NGO-managed cyber village), external linkage-building, and coordination among international and local RDOs, NGO, and LGU.

Introduction

Bringing out the knowledge products (including technologies, research results information) with the assurance of their utilization has always posed challenges to research managers – from the research and development (R&D) organization (RDO) to the extension system, as well as from RDO to the direct clients like the farmers. In rice farming, several modalities have evolved in the past decades, including farm demonstration, farmers' field school, farmers training, and other technology transfer and extension methods. But with the advent of information communication technology (ICT) and the goal to modernize agriculture, the conventional communication delivery systems (CDS) need to be ameliorated so that access to up-to-date agricultural technologies could be as fast as the click of the mouse.

Cognizant of the rice farmers' plight, the International Rice Research Institute (IRRI), an international RDO based at Los Banos, Laguna, Philippines, has designed a CDS to strengthen farmers' learning and help address the problem of food security worldwide. In the Philippines, IRRI was implementing the Cyber-Village Project at the time of the study. It aimed to enhance rice farmers' productivity by improving their access to and application of rice and other related knowledge through the use of alternative models of technology transfer combined with relevant ICT. The CDS were downloaded through the Cyber-Village Project. However, food

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sufficiency is not only rice on the table but also participation of the farmers in knowledge sharing and decision making, which would bring them to the level of farmer scientists.

Under the Cyber-Village Project, IRRI provided technical experts, ICT infrastructure, and capability building services to the lead implementers – the local government unit (LGU) of Infanta, Quezon through its Municipal Agriculturist's Office (MAO) and the non-government organization (NGO), the Infanta Integrated Community Development Assistance, Inc. (ICDAI). The lead agencies facilitated the diffusion of new rice technology from IRRI to the rice farmers in the villages.

The new rice production knowledge and technologies acquired by the farmers need to be shared with other farmers. As the transcendental philosopher Ralph Waldo Emerson underscored, knowledge exists to be imparted. Once knowledge has been captured and codified, it needs to be shared and disseminated throughout the organization (Dalkir, 2005). Knowledge sharing is the process where individuals mutually exchange their knowledge (tacit and explicit) and jointly create new knowledge (De Vries and Van Den Hoof, 2006), implying that every knowledge-sharing behavior consists of both bringing (or donating) knowledge and getting (or collecting) knowledge. Even with the advent of high technology media, knowledge sharing is becoming more inevitable and in the process, people – not the media or technology – are still the foremost information source.

The decision making process is important in the design of technology since it has direct bearing on its effectiveness, and basically, on whether or not it will be adopted or used by the intended users. Also important to consider is the farmers' perception of the characteristics of information products/services which translate directly to decisions on their use/non-use or positive/negative valuations of such (Sison, 2002).

This paper discusses the R&D management implications based on the study which analyzed how the communication delivery systems in LGU-managed and NGO-managed cyber-villages in Infanta, Quezon Province contributed to knowledge sharing and decision making among the rice farmers assisted by IRRI.

This paper aims to:

1. Trace the knowledge sharing and decision making behaviors of the rice farmers; and

2. Discuss the implications of cyber-village as the hub of knowledge sharing and decision making to R&D management in terms of organization and management (between LGU- and NGO-managed cyber-villages), external linkage-building, and coordination among international and local RDO as well as local NGOs and line agencies.

Management Appoaches

The Cyber-Village Project was implemented in Infanta, Quezon Province using two sets of management modalities: LGU-managed and NGO-managed.

IRRI provided the ICT infrastructure support facilities, capability building initiatives, initial farm inputs, and mobilization funds to the lead-collaborating agencies – LGU-MAO and ICDAI. The ICT infrastructure support facilities included the electronic tablets, computer sets, printers, and digital cameras used by the LGU-MAO and NGO-ICDAI intermediaries. IRRI provided trainings of the intermediaries and farmer-leaders from the LGU and NGO on relevant topics. During trainings, experts from IRRI visited the field or the participants were brought to IRRI. Also, IRRI experts were tapped as resource persons when necessary during trainings and field days initiated by the LGU and NGO. For monitoring and evaluation, IRRI required the LGU-MAO and NGO-ICDAI to submit periodic reports. IRRI's National Program Relations (NPR) office served as the secretariat of the Cyber-Village Project.

As stipulated in the terms of reference for the Cyber-Village Project's implementation, the LGU-MAO and NGO-ICDAI ensured that the NRT from IRRI were downloaded to the rice farmers. In effect, three rice farming villages were identified each by the LGU-MAO and NGO-ICDAI as pilot cyber-villages. LGU-MAO identified Barangays Binulasan, Gumian, and Maypulot (involving 35 rice farmers) while NGO-ICDAI identified Barangays Abiawin, Alitas, and Balobo (involving 41 rice farmers). The LGU-MAO assigned three agricultural technicians to oversee the LGU-managed cyber-village activities, while the NGO-ICDAI assigned one community worker to facilitate and monitor the NGO-managed activities of the cyber-villages.

The existing officers of Barangay Farmers Councils (BFARMCs) were tapped as the cyber-village leaders to minimize overlapping of rice farmers organizations at the barangay level. Aside from the activities initiated by IRRI, members of each cyber-village met regularly. The intermediaries were present during the farmers' meetings.

The different technology transfer modalities or CDS were the commonly conducted activities under the cyber-village project. For the ICT-based CDS, the intermediaries took charge of the use of the electronic tablets while the computer sets installed with the Rice Knowledge Bank (RKB) were set-up permanently at the barangay center. The intermediaries and some trained farmer-leaders were usually consulted by the cyber-village members each time they wanted to have access to the new rice technology. For the conventional CDS, the farmers' concerns and schedules of activities were usually addressed during their regular meetings.

Cooperation, resource sharing, and collaboration were practiced by the LGU-MAO and NGO-ICDAI to optimize the cyber-village resources. For instance, the NGO-initiated Youth Field School (YFS) in Abiawin Elementary School tapped the expertise of the LGU agricultural technicians during the lecture sessions. Meanwhile, the NGO community worker provided technical assistance to rice farmers from barangays that were hardly-served by the agricultural technicians. The two implementing offices, LGU-MAO and NGO-ICDAI were closely located since the municipal church where ICDAI office was housed was located near the municipal hall. Local telephone services and Internet providers were also operating in the town of Infanta, Quezon, making the communication lines between the two implementing agencies fast and convenient.

Methodology

The study followed the descriptive research design as it sought to describe the knowledge sharing behaviors and knowledge ties of the rice farmers. Guided by the case study as a form of descriptive research, the study tried to examine who share and from whom farmers seek information within the Cyber-Village Project of IRRI.

Infanta, one of the oldest towns, is a first class municipality in the province of Quezon, Philippines. As of December 2010, it has population of 64,866 people in 15,151 families from its 36 barangays. It is situated in the northern part of the province lying along the coast of the Pacific Ocean facing the island towns of Polillo. Located 144 kilometers northeast of Manila, and 136 kilometers north of Lucena City, Infanta is also known as the "gateway to the pacific." According to the livelihood report of the 1995 Census, 45% of the working population was engaged in agriculture (primarily rice farming) and fishery while another 41% was engaged in trade and services. Others (14%) were engaged in quarrying, manufacturing, construction and utilities. Considered as the largest lambanog manufacturer in the province of Quezon, it is the center of economic activity in the northern part of the province. The Agri-Profile Report of the Municipal Agriculturist's Office of Infanta, Quezon (2011) recounted that the

town has 1,836 hectares of irrigated rice farms cultivated by 2,948 farmers. Production posted at 4.15 and 4.30 tons per hectare during wet and dry seasons, respectively.

The municipality of Infanta, Quezon Province as study site was chosen since IRRI was implementing the Cyber-Village Project within the said town. Out of 36 barangays of Infanta, Quezon, six barangays were covered by the Cyber-Village Project of IRRI. The LGU-managed barangays included Binulasan, Gumian, and Maypulot while the NGO-managed barangays included Abiawin, Alitas and Balobo.

Judgment sampling technique was used and respondents were selected following these criteria: 1) the respondent had been involved in any of the activities implemented by the NGO relative to the Cyber-Village Project of IRRI, and 2) the respondent was available and willing to participate during the time of the study. In selecting the rice farmer respondents, the intermediary (who happened to be the agricultural technicians designated by LGU and community worker designated by the NGO) were consulted. The respondents included rice 35 rice farmers from LGU-managed and 41 from NGO-managed cyber-villages. The farmer-respondents were tapped during the survey. The intermediaries (LGU technicians NGO community worker) were considered as key informants. Key informant interviews were conducted with the intermediaries and the IRRI personnel in-charge of the Cyber-Village Project. Participant observation was also done during the internship of the researcher at the Cyber-Village pilot areas.

Measurement of Variables

To measure the knowledge sharing behaviors, a Likert-type scale was developed (Table 1) adopting the measures used by De Vries et al. (2006) and Van Den Hooff and Huysman (2009).

The context used in this study was knowledge sharing of new rice information or technology among the farmers in the cyber-villages. The farmers were asked to indicate whether they strongly agreed, agreed, neutral, disagreed, or strongly disagreed (rated as 5,4,3,2, or 1, respectively) to each of the statements. The mean scores were derived and interpreted as: highly positive (M=4.20-5.00), moderately positive (M=3.40-4.19), neutral (M=2.60-3.39), moderately negative (M=1.80-2.59), and highly negative (1.00-1.79).

During the sociometric survey, the following questions were asked to the farmers: (for knowledge seeking ties) if you want to know about new rice information or technology, from whom among the cyber-village participants do you talk to?;(for knowledge donating ties) if you want to share the new information or technology, to whom among the cyber-village participants do you share with?; and (for decision making behavior) before you adopt a new rice information or technology, whom do you consult with? To analyze and generate the knowledge sharing maps, the UCINET 6 software was used for the social network analysis.

Results & Discussion

Farmers' Access to CDS and NRT

The CDS that the farmers were exposed to included the Rice Knowledge Bank (RKB), nutrient management for rice (NMRice) mobile and Internet, farmer field schools (FFS), brochure, trainings, seminars, and demonstration farms. The new rice technology (NRT) acquired by farmers from the Cyber-Village Project included proper fertilizer application and water management, identification of friendly insects and pests, proper application of pesticides, proper seeding, seed selection, proper planting, and seed purification. The cyber-village stakeholders also shared their acquired knowledge with the non-members, creating a greater reach of the NRT in the pilot areas.

Table 1: *Measures of the knowledge sharing behaviors of farmers.*

VARIABLE	QUESTION
Knowledge seeking	1. When I need certain new rice information or technology, I ask from anybody who knows about it. 2. I like to be informed of what my co-farmers know about the new rice information/technology. 3. I ask from anyone about their practices when I need to learn about new rice information or technology. 4. When somebody is good at new information or technology in rice farming, I ask them to teach me how to do it.
Knowledge donating	1. When I've learned something new about rice farming (information, technology), I tell my co-farmers. 2. I share the information I have with my co-farmers. 3. I think it is important that my co-farmers know what I am doing in the rice farm. 4. I regularly tell my co-farmers what I am doing in the rice farm.

Knowledge Donating Behavior

The LGU-managed cyber-villagers were moderately positive on the statement "When I've learned something new about rice technology, I tell my co-farmers about it." On the other hand, the NGO-managed cyber-villagers were highly positive on the same statement. This indicates that the NGO-managed farmers have a more positive behavior than their LGU-managed counterparts when it comes to sharing to their co-farmers what they have learned about new on rice farming.

Conversely, the LGU-managed rice farmers had highly positive behavior on the statement "I share the information I have with my co-farmers" as compared to the NGO-managed cyber-villagers who had a moderately positive behavior about it. This implies that the LGU-managed farmers have a more positive behavior than their NGO-managed counterparts when it comes to sharing their tacit knowledge or information with their co-farmers.

Both the LGU- and NGO-managed cyber-villagers had moderately positive behavior on the statement "I think it is important that my co-farmers know what I am doing in rice farming." This indicates that both groups have a moderately positive behavior in terms of the perceived importance of sharing with their co-farmers what they know about rice farming. Similarly, both groups had moderately positive behavior on the statement "I regularly tell my co-farmers what I am doing in rice farming." This implies that the farmers in the cyber-villages have moderately positive behavior when it comes to sharing with other farmers on regular basis what they are doing in their farms.

Both groups had moderately positive overall ratings for knowledge donating behavior. This implies that the rice farmers in the cyber-villages are already agreeable to share their tacit and explicit knowledge.

Knowledge Seeking Behavior

Both the LGU-managed and NGO-managed cyber-villagers were highly positive on the statement "When I need certain new rice

knowledge/technology, I ask from anybody who knows about it." This implies that the farmers in the cyber-villages have a highly positive behavior in terms of seeking information on new rice technology from anybody whom they know are knowledgeable about it.   Similarly,   both groups of cyber-village farmers had highly positive behavior on the statement "I like to be informed of what my co-farmers know about the new rice technology." This means that the farmers in the cyber-villages are eager to be informed about the new rice knowledge possessed by other farmers.

On the statement "I ask from anyone about his/her abilities when I need to learn about new rice knowledge/technology," the LGU-managed farmers had moderately positive behavior while the NGO-managed cyber-villagers had highly positive behavior. This indicates that when it comes to asking from anyone about his/her tacit knowledge in order for them to learn about new rice technology, the NGO-managed farmers are more eager than their LGU-managed counterparts.

Again, both groups had highly positive behavior on the statement "When somebody is good at new knowledge/technology in rice farming, I ask him/her to teach me how to do it." This indicates the rice farmers' eagerness to learn from somebody who is good at new rice technology.

The overall ratings of both groups in terms of knowledge seeking were highly positive. This implies that the rice farmers place highest regard for acquiring tacit and explicit knowledge on rice farming from others. Moreover, it appears that the cyber-village farmers still find more interest in receiving from others than in giving to others tacit and implicit knowledge on rice farming.

That the rice farmers in the cyber-villages appear to be more of knowledge seekers than knowledge donors indicates that they value knowledge on NRT as an important resource. As they continue to be active in seeking more knowledge, their stock knowledge on NRT will accumulate, and if they continue to be motivated as knowledge donors, awareness about the NRT will readily spread within and outside the cyber-villages.

Decision making behavior of rice farmers

Generally, in terms of adoption decisions, a big proportion of the farmers from both LGU- and NGO-managed cyber-villages were early adopters because they wanted to see good results and increase their yield. Their primary considerations for adopting new rice technology were reduced expenses and increased yield.   The intermediaries had influenced the rice farmers' adoption decisions.

Almost all of the cyber-village farmers (97% from LGU- and 100% from NGO-managed cyber-villages) claimed to have adopted certain new rice technology (NRT) that they acquired through the Cyber-Village Project. They identified some considerations for adoption. Foremost among the considerations were reduced expenses and increased yield, indicating that the rice farmers in both camps would adopt a particular NRT if such would reduce their expenses and contribute to increased yield.   The LGU-managed farmers also said that if the technology was easy to apply, easy to understand, had good eating quality, and had less water requirement, they would readily adopt such NRT. Meanwhile, the NGO-managed cyber-villagers, would readily adopt a technology that was easy to understand and had less water requirement.

As to the adoption mode, 22 of the LGU-managed cyber-villagers immediately adopted the new rice technology; they were classified as early adopters. Some 13 farmers adopted the technology introduced to them sometime later;   they were called late adopters.   Out of 41 farmers from the NGO-managed cyber-villages, 27 were early adopters, 11 late adopters, and a few (3 farmers) were non-adopters because they never adopted some of the new technology.

When asked about the primary reasons for

immediate adoption, LGU-managed farmers said they wanted to try it out, to increase their yield, and to prove the effectivity of the technology. Meanwhile, the NGO-managed farmers wanted to increase their yield, to try it out, and to reduce farm inputs.

Those who adopted sometime later reasoned out that they failed to adopt the technology immediately because they just learned about it lately. Others averred that they wanted to observe it first from other farmers.

The few farmers who never adopted claimed that the technology required a lot of work, and they did not want to harm the friendly insects in the field.

When asked who influenced them to adopt or not adopt a particular technology, most of the LGU-managed cyber-villagers identified the LGU technicians. A few of them identified IRRI personnel, NGO worker, and co-farmer.

Meanwhile, the NGO-managed cyber-village farmers identified the NGO worker as their primary influencer. Aside from the NGO intermediary, the IRRI personnel, co-farmers, PhilRice staff, and LGU technicians were also considered as influencers.

Again, it appears that the intermediaries (LGU technicians and NGO worker) have influenced the adoption decisions of the cyber-village farmers.

Implications to Research Management of the Cyber- Village as Knowledge Sharing and Decision Making

The implications of the cyber-village as the hub of knowledge sharing and decision making to R&D management revolve around organization and management (between LGU- and NGO-managed cyber-villages), external linkage-building, and coordination among international RDO, local NGO, and LGU.

Results indicated that both LGU and NGO could work together in the same project within a municipality. As implied in the Cyber-Village Project implemented in Infanta, Quezon, the LGU-managed and NGO-managed cyber-villages could be

considered to have similar levels of accomplishments and performance. The Cyber-Village experience underscores the fallacy that if it is NGO-managed, it is better and faster in delivery because of less bureaucracy, etc. Extension services for rice could be considered as constituting a primary function of the LGU. With the Cyber-Village Project experience in Infanta, Quezon with both LGU and NGO implementing a communication-extension delivery service for rice, it can be deduced that the NGO-ICDAI served as an "extended arm" of the LGU-MAO. The NGO may appear to be dependent on the LGU for assistance, however, it plays a critical role in the quick replication of the modality of knowledge products diffusion. With the NGO in place, many sites could be served given LGU's limited resources. The presence of the RDO, in this case IRRI, as the main initiator of the project could have contributed to the friendly implementation of the Cyber-Village Project with both LGU and NGO leading its operation in the same area.

The role played by RDOs in the academe as provider of knowledge products could not be understated even with the advent of ICT. With the presence of knowledge products in cyber-villages, the physical presence of experts may no longer be necessary, but their presence could still be felt by the stakeholders. With the cyber-village set-up, farmers can be virtually linked to the expertise from academe and RDOs like IRRI and PhilRice for exigent farming problems, solutions to which may be found in the knowledge products made available in the cyber-village.

External Linkage Building

In partnership and external linkage building, the emerging farmer-consultants or scientists from the ranks of the rice farmers could be sustained through the cyber-village. Since the knowledge products are made available through the worldwide web, farmers could forge continuous partnership with the RDOs

accessible through this platform. Formalities are only needed in the setting up of cyber-villages, but the continued provision of knowledge products and sharing of knowledge can be done both through informal channels and ICT-mediated tools.

Coordination among Stakeholders

With the Cyber-Village Project, coordination is promoted. Duplication of functions and overlaps in project activities are minimized since the specific roles of each partner in the project implementation are clear. There is complementarity of resources, and resource sharing among the agencies involved is maximized. Friend generation rather than fund generation was also evident in the cyber-village. Even if IRRI physically pulls out of the site, there is a great likelihood that diffusion of NRT will continue with the presence of LGUs and the institutionalization of activities in the cyber-villages. The emerging farmer-consultants will fill in the gaps vacated by the intermediaries.

Summary, Conclusions and Recommendations

Research managers could take part in raising social and economic responsibility in the context of the Cyber-Village Project. The initiative to allow both LGU and NGO to take the lead in managing the operation of technology transfer modality integrating ICT for rice farmers' empowerment and productivity was proven effective in the cyber-villages. The package of NRT emanating from an RDO was downloaded to the targeted users, and the emerging famer-consultants have surfaced – a promising initiative to sustain food production in this ICT era.

The vital role of LGU in village-level project implementation is the giving of power to the village people in knowledge sharing and decision making; the farmers' participation in such activities could empower them, elevating them to the status of farmer scientists or consultants. Activities should be initiated by research managers to build the farmers' capability for them to be adept in ICT-based technology transfer modality. This could pave the way for the less intermediary-dependent culture in farming villages. An environment that promotes the development of emerging farmer-consultants, and improved access to ICT-based communication delivery systems, will eventually change the extension landscape in the country.

There is a need for R and D managers to enhance their skills in ICT, especially for technology clinic and use of various ICT applications. This will enable them, together with experts and researchers, to replicate their presence in various villages through service via the cyber space.

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