Communication Structures and Processes in Technology Development in an Academic Institution: A Critical Analysis

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Abstract

Good communication, strong interaction and effective collaboration among researchers, extensionists and farmers are crucial in identifying farmers' actual needs and in formulating researches that lead to countryside development. This study aimed to surface and analyze the communication structures and processes that led to the development of three agricultural technologies in a state university in northern Philippines. Qualitative methodology was used to collect information from 18 participants composing of researchers, extensionists, farmers, representatives from the funding agency, and the business sector. Findings reveal that communication structures and processes that have shaped the development of the three technologies were top-down and hierarchical, with the funding agency's research agenda as the dominant voice dictating the nature and type of conducted researches during technology conceptualization, and the researchers the dominant group particularly during technology generation, promotion and commercialization. Research-farmer communication in the research conceptualization was organized but unilinear. Farmers' local knowledge and practices were not considered in the research process. It was the researchers who identified the farmers' problems and provided solutions for them. However, during the commercialization process, farmers played the critical role of producers of raw materials for manufacturing of the research-generated products. Extensionists were muted during the technology generation and were marginalized during the technology promotion stage. There is a need for a shift to occur from the top-down hierarchical approach to an egalitarian and participatory process in which farmers serve as partners with researchers and extensionists to ensure needs-based researches and technology development that will contribute to poverty alleviation.

Keywords: *Critical, extensionists, farmers, generations, participatory*

I. INTRODUCTION

In the Philippines, just like other countries, the right to education has been hindered by poverty. Poverty has been one of the major problems and societal concerns in the country. As defined by Crossman (2017), poverty is a social condition that is characterized by the lack of resources necessary for basic survival or necessary to meet a certain minimum level of living standards expected for the place where one lives. The income level that determines poverty is different from place to place, so social scientists believe that it is best defined by conditions of existence, like lack of access to food, clothing, and shelter (Valle, 2017).

Christoplos (2003) argued that to achieve agricultural and rural development, new approaches are needed that make better use of knowledge among farmers and provide for them a stronger voice to demand advice, services and negotiating power. This calls for participatory communication in which the researchers, extension agents, and farmers, working as a system, engage in a dialogic or multilogic communication, regarding each other as co-equal in what FAO (2001) calls a "knowledge triangle". After all, they are the three main pillars and key stakeholders of the agriculture system.

Thus, for agricultural technologies to be appropriate to farmers' needs and thereby ensure their adoption, technology development should not be the sole responsibility of researchers. Rather, extension workers and farmers must play important roles in identifying research problems, adapting the recommendations to local conditions and providing feedback about the innovations that have been developed. In such a scenario, there is no muting of participants' voices; rather, parties engaged in communication act as both

source and receiver in a transactional communication.

Studies that delved into the communication among the key stakeholders revealed the non-involvement of farmers and extensionists in the research process. Bayissa's study (2012) for instance, found that implemented researches in Ethiopia did not address the problems of Ethiopian farmers. The lack of effective linkage between researchers and farmers has been the major reason for the low yield and productivity in Ethiopian agriculture, Bayissa claimed. She then argued that hierarchal institutional arrangements observed in centralized agricultural research systems created problems in addressing the needs of farmers who were marginalized from contributing their share in the innovation process. Farmers have to be involved in the agricultural innovation, she claimed, as it is not produced by organized science alone. Similar advocacies were noted by Ramirez and Quarry (2014) in their study which pointed out the importance of communication in supporting participatory or people-centered development.

In the Philippines, higher education institutions are mandated by the Commission on Higher Education (CHED) to conduct research and extension, hand in hand with instruction. This is in recognition of the vital role these institutions play in the development of communities and in poverty alleviation. (*For ethical considerations, the real name of the university is not used in this study).

The ABC University*, an agricultural state university in northern Philippines, has been actively engaged in research generation and technology development as part of its trifold function. Products of these researches are then promoted to communities through its Extension department. Agricultural researches that lead to product development are expected to be demand-driven, need-focused and problem-based. This necessitates a strong interaction among the three key stakeholders—the researchers, the extensionists and the farmers who are the agricultural researches' target clients. However, one wonders whether the key stakeholders engage in participatory communication during the technology development process in the ABC University.

In this study, technology development refers to the processes of generation, promotion and commercialization of products that have been developed through research. Using Freire's theory of participatory communication as a theoretical framework, this critical analysis looked into the communication structures and processes that have led to the development of three technologies generated at three research centers in the ABC University. Freire's participatory theory of communication (Tufte & Mefalopulos, 2009) focuses on community involvement and dialogue as a catalyst for individual and community empowerment. According to this theory, the free and open dialogue is the core principle of participatory communication. Freire's basic model of the dialogue informed this study as it aimed to find out whether the communication structures and processes that have shaped the development of three technologies in ABC University permitted a free and open dialogue among the three stakeholders. In this study, communication structure referred to the pattern of interaction and flow of information and decision-making as well as extent of participation of stakeholders in the agricultural technology development system. Communication process referred to the ways in which information pertaining to research and agricultural technology development was transmitted from and to the various stakeholders. It also defined the roles the stakeholders assumed in the communication process, described as source, channel, or receiver.

Knowing the communication structures and processes in technology development would provide important feedbacks to improve the research processes in the ABC University. Results of the study would also highlight the importance of giving voice to farmers as it would lead to demand-driven and problem-based research projects that would contribute significantly to the improvement of their socio-economic conditions, which ultimately, foster poverty alleviation and countryside development.

This study aimed to find out whether participatory communication had been carried out in the development of three technologies generated at three research centers of the ABC University. These technologies were cacao tablea, canned chevon, and vermicast. Specifically, it aimed to: (1) find out the communication structures and processes that appeared to have shaped the development of the three technologies; (2) determine the communication roles and identities of the stakeholders in the development of the said technologies, and (3) analyze the communication structures and processes to determine dominant and muted voices in the development of the said technologies.

II. METHODOLOGY

Research Design

This communication research employed the critical qualitative methodology. Data

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gathered for this study were nonnumeric and less structured than those generated through quantitatively oriented inquiry. Denzin and Lincoln (2008) defined qualitative research as "a situated activity that locates the observer in the world" or in this study, the communication structures and processes that appeared to have led to the development of three agricultural technologies generated at three research centers in the ABC University. The technologies that were the focus of this study were the canned chevon, cacao tablea, and vermicast fertilizer developed at the goat center, cacao center and organic fertilizer center, respectively, in the ABC University.

Respondents

A small sample size of 18 were engaged in an in-depth conversation for this study, selected through snowball sampling to provide richly-textured information. The participants were: the four (4) researchers from the ABC University who developed the cacao tablea (2 researchers), the canned chevon (1 researcher) and the vermicast organic fertilizer (1 researcher); three (3) extensionists from the Extension Office; eight (8) small holder farmers from different barangays adjacent to the University's main campus; two (2) evaluators of research proposals from the funding agency and the manager (1) of the business entity that entered into a licensing agreement with the ABC University for the commercialization of the canned chevon. The participants represented the stakeholders involved in the development of the three technologies that were the focus of this study

Instrumentation and Data Gathering

In-depth interviewing, making use of open-ended questions as guide to allow the interview to flow by the order of the interviewee, was used to gather information. All the participants consented to the researchers' request for the interviews to be recorded using a digital voice recorder. Interviews were conducted from January 2019 to April 2019. A blend of English and Filipino was used to converse with the participants, except in the case of farmers with whom the researcher used their native dialect.

Data Processing and Analysis

All the interviews were manually transcribed into word document immediately after they were completed for easy recall of participants' statements. The participants' narratives were then coded and analyzed to generate patterns that revealed the communication structures and processes that appeared to have informed the generation, promotion and commercialization of the three technologies. For example, when farmers were asked whether their local farming practices were ever asked by the researchers during the training process, their response was "Di naman nagtatanong; kung maglecture siya, maglecture lang. Siempre, sasabihin niya, yung technology niya ang mas maganda. (He/She did not ask us. If they lecture, they just lecture. Of course, they would say, their technology is better.)" This response was interpreted as a one-way and hierarchical communication process in technology promotion denoting the perceived superiority of the researchers, as denoted by a single arrow from the latter to the farmers.

Thus, communication processes were illustrated using arrows to indicate communication flows from the source to the receiver of message. For example, transactional communication denoting open and free dialogue between participants was illustrated using a double-sided arrow (⟷) indicating that they both acted as source and receiver of messages. A broken arrow denoted a dysfunctional communication flow (⇠). One-way/unilateral communication from the source to a receiver was denoted by a single arrow. For instance, top-down unilateral communication was denoted by downwards arrow (↓).

Ethical Considerations

For ethical considerations, the identity of the participants was not disclosed even though they agreed to have their actual names mentioned in the publication of the study results. The real name of the ABC University was also not mentioned in this study. In addition, days before the researcher met with the participants, she informed them about the objectives of the study and assured them of their right to decline the researcher's request for interview. Before the interview started, they were presented with the Informed Consent Form, which they signed to signify their willingness.

After all the interviews have been transcribed, coded and analyzed, they were deleted from the files saved in the voice recorder.

III. RESULTS AND DISCUSSIONS

Profile of the Participants

All the researchers who developed the three technologies were doctorate degree holders occupying top level faculty positions in the ABC University. The developed technologies

were related to the researchers' fields of specialization. The researchers were predominantly male. The two persons leading the Extension services were also both doctorate degree holders and were teaching in the University. They were both female. The only fulltime Extension staff who was in-charge of the community outreach section of the Extension Office was a male. In this study, they were referred to as extensionists. All the farmers were small holders possessing at most, four hectares. The two goat farmers were raising 5 to 20 heads of goat at the time of the interview. Two farmers were female, the rest were male. Other participants of the study were the two representatives of the funding agency in Metro Manila who evaluated proposals submitted for funding, and the manager of the business entity that held the license for the processing and manufacturing of canned chevon. This was so far the only product of the ABC University that was ready for licensing by a business entity.

Communication Structures and Processes during Technology Generation

All the three technologies underwent the processes of conceptualization, implementation, verification and perfection. Two communication processes appeared to have taken place in the generation of the three technologies. The first process underscored the dominant role of stakeholders who were consulted in formulating the research agenda of the funding agency, and the funding agency that has the authority to reject or approve submitted proposals for funding (Fig.1). The second process highlights the role of the researcher in the verification of the technologies (Fig. 2).

The communication flow during the conceptualization process began with the stakeholders who were consulted by the funding agency regarding needs and concerns of the agricultural sector in the region to improve its productivity. These needs and concerns were evaluated and validated by the funding agency. Thus, in this communication process, both the stakeholders who were consulted by the funding agency and the funding agency itself served as both source and receiver who were engaged in a transactional communication or participatory communication that was characterized by free and open dialogue. The product of these deliberations formed the funding agency's research agenda communicated through different channels by the funding agency, now serving as the source of the message, to the researchers. The communication process that took place between the stakeholders and the funding agency was two-way; however, the communication of agenda to the researchers was one-way and top-down as feedback was not sought from their side. This process underscored the dominant role of the stakeholders who were consulted by the funding agency and the funding agency itself in the research agenda formulation, because research proposals were basically built from their research agenda. In essence, these agenda shaped the nature and kind of technologies that were developed by the researchers.

Analyzing the implications of this finding in light of the critical theory, the position of the stakeholders and the funding agency rendered them the powerful and dominant group and the researcher, the subordinate group in research agenda setting. The dominant groups dictated what researches to be conducted, and the subordinate group was confined to the funding agency's agenda, being powerless to impose their own ideas. It is how funding is secured, as stressed by the representatives of the funding agency. Such established arrangement, according to Stoddart (2007), reproduces a sort of "social homeostasis" or a view of the world that is accepted uncritically. In essence, the process undertaken by the funding agency in formulating its research agenda served to secure the consent of the researchers.

Meanwhile, the conceptualization of the proposals that led to the generation of cacao tablea, canned chevon and the vermicast was mostly researcher-led. Although it was a result of the researchers' interface with farmers in ABC University's nearby communities, the ideas for the researches that led to the development of the three technologies mostly originated from the researchers themselves. The interface, which was mostly in the form of farmers' meetings, trainings, seminars and even surveys, was a result of the researchers extending their knowledge and expertise as ABC University faculty acting as extensionists. Researchers were informed about farmers' concerns and opinions through this process. They used these pieces of information to conceptualize their proposals which they submitted to the funding agency. At the start of the interface, the researchers acted as the source of message, passing on expert knowledge to farmers.

As the interface continued, a reversal of roles ensued, as the farmers became senders, transmitting their farming problems to the researchers (receiver). However, no in-depth digging at farmers' needs took place in these interfaces. The opinions gathered from the farmers merely served as springboard for conceptualizing a research project that aligned with the funding agency's agenda, thus, the broken arrow (⇐--) from the farmers to the researchers. In essence, there also occurred a "manufacture of farmers' consent". Such

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communication process, though organized and consultative in nature, was still one-way, based on Lilja and Ashby's (1999) typology of participation. It also violated Friere's requirement of a genuine dialogue, for it failed to create an "encounter" between the researchers and farmers to "name the world", or in this study, to define actual farmers' needs.

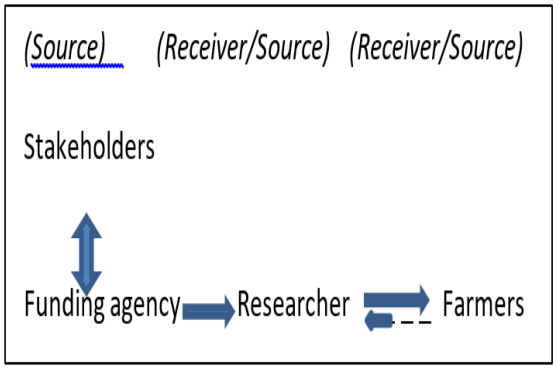

Figure 1. Communication process in technology conceptualization

In addition, the actual research that led to the development of the products was purely the researcher's job. The three technologies underwent verification/perfection, a purely researcher-initiated process with the researchers communicating with verification agencies to ensure the products' readiness for public consumption. Verification agencies included the Food and Drug Administration (FDA) for the canned chevon, Food and Nutrition Research Institute (FNRI) for the cacao tablea, and the Fertilizer and Pesticide Authority (FPA) for the vermicast. At this stage, the researchers acting as source submitted a letter of request for the testing of their products to these agencies (receiver).

They also submitted samples of their products to the verification agencies. Test results were then fed back to the researchers, now becoming the receivers of message coming from the verification agencies. During this process, they were required to maintain direct contact with the verification agencies as queries were addressed to them in connection with their technologies that needed to be responded immediately. This necessitated a two-way and transactional communication process as both the researchers and the verification agencies, both possessing expert knowledge, have a need for each other to complete the verification process for the researchers' products. (Fig. 2.). At this point, there was no account of involvement of extensionists and the farmers as verification was initiated solely by the researchers who worked closely with the verification institutions.

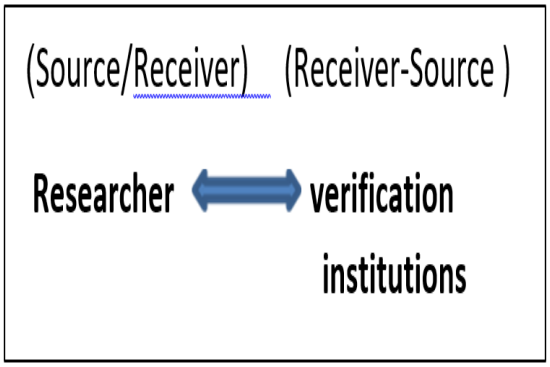

Figure 2. Communication process in technology verification

The findings of this study reveal that it was the researchers who defined both the problem and the solution for the farmers' problems. Although the resulting technologies were well-received by the farmers, there may be a possibility that a completely different technology that met actual farmers' needs or that had considered their indigenous/local practices and yet fitted the funding agency's agenda would have been developed had the process of problem and solution identification been collaborative. Smith et al (2004) argued that because farmers generate and use knowledge, they should be the natural partners of researchers in the research processes.

Communication structures and processes during technology promotion

Three routes appeared to have been taken in the promotion of the three technologies. First, when the technologies have been developed and the products that were generated from them have been packaged for promotion, it was the researchers who informed and introduced them to the public and to the farmers (Fig. 3a). Trade fairs, trainings, and seminars served as channels of promotion. However, communication flowed from the researchers to the recipients unilinearly. Thus, the technology transfer flow followed the top-down approach**.** Feedback, at this point, particularly from the farmers, was hardly solicited. Another route of promotion was also followed. This time, the extensionists introduced the products to the farmers during Extension-initiated farmers' meetings. However, they still sought the researchers' assistance as resource speaker in these meetings. The research team served as the major source of information transmitted to the farmers. In essence, they also dominated the whole promotion process as they themselves demonstrated the methodology of the technology to the farmers, making the role of Extension Department as merely organizer and facilitator (Fig. 3b).

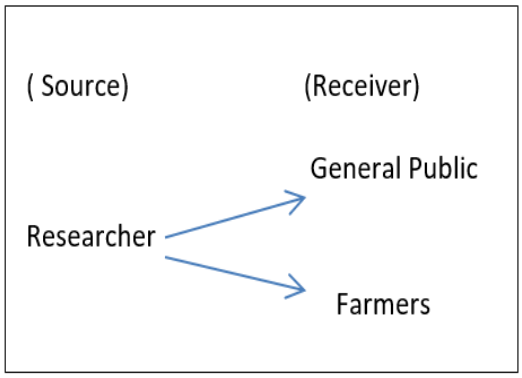

Figure 3a. Communication process during technology promotion-1st process

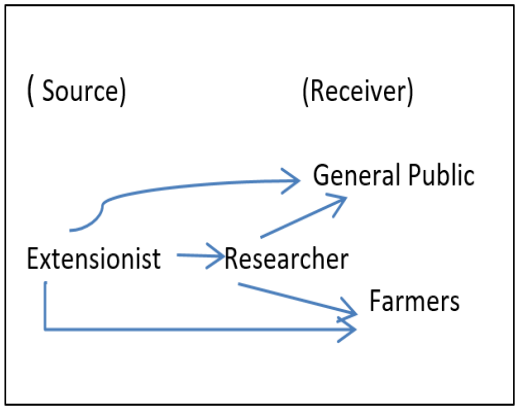

Figure 3a. Communication process during technology promotion- 2nd process

The perceived superiority of scientific knowledge and rigor had apparently impeded an open and egalitarian communication process during the promotion stage. Farmers were basically regarded as passive consumers of knowledge generated by agricultural researchers and their voices were muted. The farmers were introduced to the technologies only during the promotion stage so that even if they would have wanted to suggest ideas and share their locally-developed practices, they were not given the opportunity to do so. “Di naman nagtatanong” (They didn’t ask) was a common retort among the farmers when asked whether their perspectives and practices were also considered.

These findings corroborate the results of a study conducted by Mwaseba et al (2014). Investigating the implementation of an externally-funded project in Tanzania that was aimed at empowering farmers, the researchers noted that active participation of farmers was not achieved because decisions on research activities were exclusively taken by researchers. Such situation inhibited innovativeness as well as institutional growth and development of participating farmers and established farmer groups, they claimed. Similar results of poor communication linkage among researchers, extensionists, and farmers were found by Nyamupangedengu and Terblanché (2016) and Modirwa and Oladele (2017). This transmission-reception knowledge transfer process that did not acknowledge farmers’ experiences and knowledge, according to Craig (1999), is inherently faulty, distorted and incomplete.

The promotion of the research-generated products also marginalized the extensionists. When invited to trade fairs and exhibits, the Extension Office would merely request the researchers for samples of their products to display during these events. They would also distribute print materials promoting these technologies. Indicated in these materials was a note: “For more information, contact the (name of the) researcher, the research center and their address in ABC University”.

Communication structures and processes during technology commercialization

Among the three technologies, only the canned chevon has reached the commercialization stage. The communication process in the commercialization for canned chevon commenced with the business entity signifying its intent to the researcher to commercialize the chevon products. The researcher then informed the top management regarding the readiness of the research-generated product for commercialization and evaluated the capability of the business entity to engage in the manufacturing and processing of the product. The management’s decision was transmitted to the researcher who in turn informed the business entity.

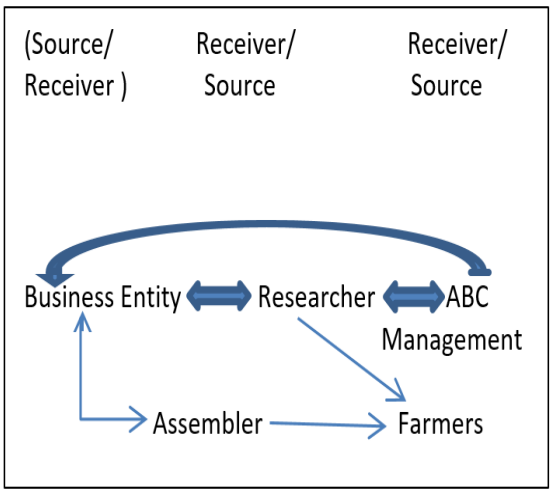

Figure 4. Communication process in technology commercialization

This transactional communication process rendered the canned chevon researcher, the

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business entity and the top management of ABC University as both receiver and source, because of their symbiotic need to transact for the commercialization of the generated technologies. It was during this stage that the involvement of goat farmers was acknowledged and recognized, as they assumed the critical role of producer and supplier of live goats for the manufacturing of canned chevon. This necessitated maintaining an open communication line with the farmers to ensure the flow of goat supply. It was not, however, the business entity who communicated directly with the farmers, but the assembler serving as the channel of communication for the two.

IV. CONCLUSION

Technology development at the ABC University has not been truly participatory and egalitarian as it followed the top-down and transmission model of communication process that privileged the researchers, disregarded the perspectives and local knowledge of the farmers, and marginalized the extensionists. Communication flow and decision-making from technology conceptualization to technology commercialization were organized around the stakeholders who set the agenda, the funding agency that approved and rejected research proposals, and the researchers who generated the technologies. This is reflected in the four communication structures and processes that appeared to have shaped the development of the three technologies.

There is a need to shift from the top down hierarchical approach of technology development to a participatory process that involves researchers, extensionists and farmers to ensure need-based, problem-focused and demand-driven research projects. The power of identifying the farmers' problems and giving solutions to these problems has to be decentered, giving voice to the less heard—the farmers. Opportunities for farmers to engage in small-scale commercialization may also be created, as this may improve their socio-economic condition and alleviate them from poverty. The Extension department may facilitate the organizing of farmers into cooperatives to pool their resources, enabling them to utilize the technologies for commercialization. Other government agencies such as the Cooperative Development Authority and LGUs can also be requested to assist the farmers. Lastly, findings of this study may serve as a springboard for other state universities and colleges to critically reflect on their technology development process.

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