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IMPACT OF ORGANIC AGRICULTURE INFORMATION SHARING ON MAIN ACTORS IN LAGUNA, PHILIPPINES

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ABSTRACT

The adoption rate of organic agriculture is still low despite the efforts of the Philippine government and the enactment of the Republic Act No. 10068 or the Philippine Organic Agriculture Act in 2010. This study attempted to clarify information sharing-related factors affecting the low adoption rate, as information links all agricultural sectors, activities, and operations. This qualitative study specifically determined how information sharing influences different actors' decisions to share and adopt organic agriculture technologies in Laguna, Philippines. There were five institutions, 30 farmers, and six family members who were interviewed at least twice between 2017 and 2020 using Historically Structured Inviting as a sampling method. This study also utilized different data collection methods and diverse data sources accessed over time for data triangulation to ensure the validity and reliability of the research. Life History Approach, Trajectory Equifinality Approach, and Grounded Theory revealed needs, importance, sustainability, pressure from others, availability, and easiness to adopt as factors affecting actors' attitudes toward learning, sharing, and adopting organic agriculture technologies. Moreover, the degree of the economic, well-being, and environmental impacts varied. Although personal information sources had the strongest interaction and impact, improvement in the accessibility and availability of other sources (e.g. mass media sources) might increase the degree of the impact. Furthermore, farmers showed interest in technologies that benefited them and their children, who would eventually manage their farms.

Key words: grounded theory, life history, needs, technology adoption, trajectory equifinality

INTRODUCTION

Organic agriculture (OA) has changed unsustainable habits around the globe by inspiring producers and consumers. Concerned organizations and institutions are continuously working to meet the principles of health, ecology, fairness, and care at the core of the organic philosophy (Arbenz et al. 2016). In the Philippines, OA was given priority as one of the essential technologies and farm practices to address current issues on sustainable agriculture, environmental degradation, and climate change. Republic Act No. 10068 (more commonly known as the Philippine Organic Agriculture Act) was enacted on 6 April 2010 to devote five percent (5%) of the agricultural land to organic farming (del Rosario 2018). Despite the efforts of the Philippine government to promote and adopt the technology, the OA adoption rate is still low. The Department of Agriculture (DA) has set a target of 200,000 ha to be devoted to OA, equivalent to five percent (5%) of the estimated 4 million ha cropland (Pantoja et al.

2016). However, the reported 17,156 ha of OA managed land (0.17%) in 2017 by Willer and Lernoud (2019) conveys that the situation is still far from reaching the government target. Various challenges such as policy gaps, lack of production support, promotion, and awareness activities, fragmented and inadequate research and development, extension and capability building activities, and poor market systems may have attributed to low adoption rate of OA (del Rosario 2018; Pantoja et al. 2016).

Research and extension are critical to attaining and achieving the desired outcomes on agricultural development in the Philippines (Aquino et al. 2011). However, in reality, the weak research and extension connections restrict the full implementation of successful agricultural development efforts. Upon reviewing past literature, most studies focused on the economic aspect and production (Piadozo et al. 2016; Shimoguchi and Mojica 2016), while only a few studies about farmers' attitudes and behavior affecting information sharing. Furthermore, there are few in-depth studies of the non-monetary effects of information sharing on farmers. Thus, research models are necessary for developing countries, especially those adequately emphasize the impact of knowledge and information sharing by individuals, organizations, and their respective intentions to technology adoption (Kettinger et al. 2015).

Information is critical in agricultural development as it connects all components, activities, and operations in a value chain network and is a tool for communication and coordination among stakeholders. It also serves as a channel for assessing trends and shaping decisions (Chisita 2012 and Lotfi et al. 2013). Agricultural information sharing has two main actor groups: the institutions as the major sources of information and the farmers as the main receivers or beneficiaries. However, having this kind of conventional major actor group, certain studies acknowledged the vital role of farmers in experimenting and knowledge sharing, especially information dissemination by farmer-to-farmer that has been used significantly in the Philippines and Central America since the 1950s and 1970s, respectively (Chambers et al. 1989; Franzel et al. 2015). In fact, almost all traditional agriculture practices result from the spontaneous spread of innovation from one farmer to another, from one village to another, and even clear across continents (Bunch, 1989). Hence, focusing on the effect or impact of knowledge and information sharing to different actors in agriculture, specifically in developing countries, is needed (Kettinger et al. 2015). Therefore, this study utilizes three main actor groups on OA information: the institution as the main source, the farmers as the primary receivers and main beneficiaries, and the farmer's family members who directly affect farmer's decision and as the secondary receivers or indirect beneficiaries.

To address the problems in mismatched technologies, policies, and programs, farmers should be adequately heard and understood. This initiative can result in effective information dissemination that will eventually lead to adopting the technologies they need. In addition, farmers sharing their motivation and aspirations with younger generations may persuade them to engage in agriculture. Furthermore, promotion and adoption of OA are vital initiatives to uplift the lives of the poorest populations and attain agricultural sustainability, specifically in Asia; however, empirical evidence on its impacts on poor organic farmers is limited, particularly in developing countries (Setboonsarng 2015). Thus, this study attempts to clarify one of the possible solutions to achieve agricultural sustainability through assessing the impact of information sharing to farmers and other actors in the community. This study specifically sought to explore different factors affecting actors' attitudes that affect farmers' decisions, distinguish differences among actors on the value of factors, and assess the degree and interaction of impact of information sharing to farmers.

MATERIALS AND METHODS

Study area. Laguna Province was chosen as a research study area because Los Baños is one of its cities designated and declared through the Proclamation Order No. 349 in 2000 as a Special Science and Nature City of the Philippines catering to different agricultural institutions (Fig. 1). Los Baños has remained the country's hub of science and nature with the presence of national and international

research institutions such as the University of the Philippines (UPLB), Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development (PCAARRD), Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), International Rice Research Institute (IRRI), and Bureau of Plant Industry (BPI). In addition, the province is also the location for various agriculture-related regional offices. OA information is available in most of these institutions and regional offices. Thus, farmers have an advantage point, and OA has considerable potential for growth and development in the area. However, more efforts seemed to be required to disseminate and adopt OA. Furthermore, according to the DA-Agricultural Training Institute (DA-ATI), as of December 2017, there were only 2 out of 85 OA Farmer-Scientist in Laguna.

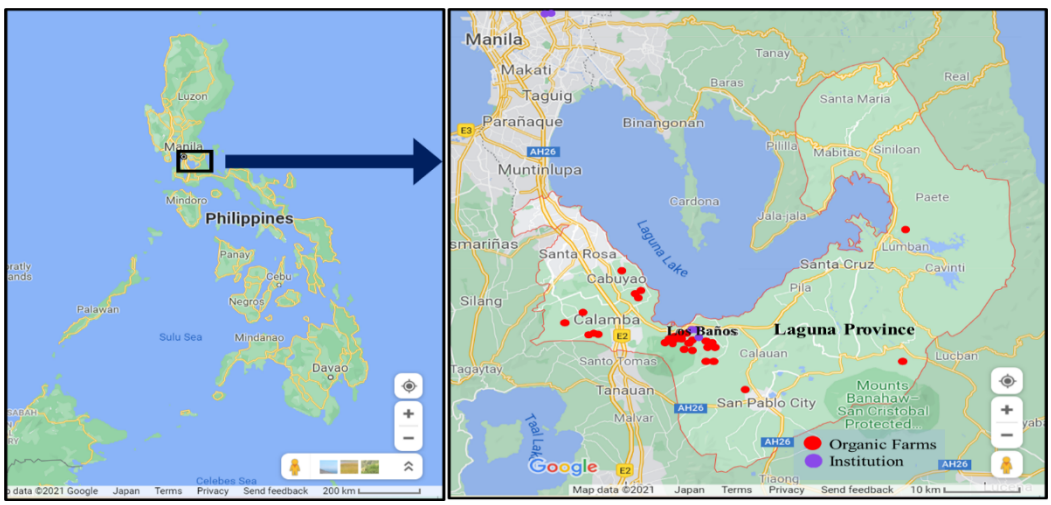

Fig. 1. The Philippine map and locations of organic farms and institutions
Source: Google maps, 2021

Interviews and sampling. Primary data sources were semi-structured interviews to gain good access to people's perceptions, meanings, and definitions of situations to understand and record what is happening on the ground. The purpose of the interviews was to confirm the existence of information systems, record its details and compare what information and technology are being delivered and received by the farmer-participants from the information and technologies offered by different sources. For this reason, this study utilized purposive sampling and the Historically Structured Inviting (HSI) of Valsiner and Sato (2006) and Sato et al. (2007) to arrange participants who satisfied the requirements for the appropriate sample and cases. The primary requirements of farmer-participants were 1) practicing organic agriculture, 2) residing in Laguna, 3) receiving (received) OA training, 4) sharing OA information to others, and 5) being willing to cooperate as a research participant. This study collected different factors from the series of interviews and observations conducted with five (5) organic farmer-participants on July to August 2017, March 2018, and July to August 2018.

From the initial data collected, researchers prepared a questionnaire focusing on information sharing and the adoption of OA technology. Since initial interviews showed that there were farmer-participants with no formal OA training, the primary requirement on "receiving OA training" was changed to "received OA information" in order not to limit the farmer-participants to those who received formal training only. This study then organized HSI and conducted continuous interviews, visits, and observations with 17 farmer-participants from 17 July 2019 to 2 September 2019. Refinement of questionnaires was performed based on the encoded data and observation memos. This study made life histories and plotted the life paths of each farmer using Trajectory Equifinality Models (TEM). Before compiling all the life histories into one TEM, each farmer verified their respective life history (path). It should be noted the TEM results will not be presented and discussed in this paper.

Continuous encoding and comparison of data were executed. From March to August 2020, four (4) more farmer-participants were interviewed in-person and/or through phone. Although this study accomplished data comparison of 21 farmer-participants, 14 complete validated life histories resulted in data saturation. This study distributed at least 35 more questionnaires to other areas in Laguna. Unfortunately, they did not allow farm visits or face-to-face interviews due to the COVID-19 pandemic. As a result, only nine (9) questionnaires were returned, which made 30 farmer-participants.

On the other hand, institution staff-participants consisted of 11 staff from five different institutions and organizations providing OA information were interviewed in 2017, 2018, 2019, and 2020. Staff-participant criteria include affiliation to an institution/ organization that farmer-participants mentioned, direct involvement in OA information sharing to farmers, and willingness to cooperate as a research participant. Six farmers' family members were also interviewed and observed following the criteria: currently living with the farmer-participant, having experience of any organic farm work and information sharing-related activities, and being willing to cooperate as a research participant. It is noteworthy that this study attained consent from both parents and children regarding the interviews and observation of children below 18 years old (including expected results). Moreover, parents or older family member/s were present during the interview.

Study approach and data collection. Qualitative research requires validity and reliability; thus, this study conducted data triangulation to ensure validity and reliability. Triangulation included the use of different data collection methods (e.g., interviews, observation, and surveys), different sources (e.g., information from farmers, institution staff, family members, memos, field notes, books, journals, training modules, websites, and other printed materials) accessed over time between 2017, 2018, 2019, and 2020. In addition, this study conducted constant data comparison and respondent verification.

The Life History Approach (LHA), Trajectory Equifinality Approach (TEA), and Grounded Theory Approach (GTA) were utilized in this study. Equifinality Points (EFP) and Obligatory Passage Points (OPP) were set as a guide in HSI which was one method of sampling selection. The life history of each farmer was plotted with the aid of the TEM. According to GTA as adopted from Locke (2002) and Glaser (2001), data collection was conducted using continuous interviews, observations, and memoing with different actors in the information flow. Data transcription gathered was continuously coded and categorized using the constant comparative method. This method allowed careful comparison of all new data to previous data gathered until achieving data saturation.

Observations included different settings on how actors (farmers, institution staff, and some family members) receive, share, and practice the OA information and technology. OA practices were noted and double-checked during the interviews, while notetaking was also done for particular words or concepts that the participants emphasized. Total participants consisted of eleven staff from five institutions, 30 farmers, and six family members were interviewed, and all mentioned impacts were noted, grouped, and categorized. In addition, this study asked each participant to specify the source, frequency usage, and effectivity ranking of each information they are receiving to clarify the impact of information sharing to the farmer and other actors in the community. The categories of information sources were electronic sources, printed materials, and face-to-face information sharing. All interviews were recorded using IEC digital recorder to capture the voice from the ground.

Data analysis. Qualitative research is interpretative, very dynamic, and free-flowing process. It is used to understand and discover how meanings are formed and transformed, uncover relevant variables that later can be tested through quantitative research, and take a holistic and comprehensive approach to study phenomena. (Babbie 2014; Corbin and Strauss 2015)

LHA helped in the explanation of what happened to the farmer-participants and what caused certain decisions. LHA aided in exploring and identifying the dominant narratives of people's lives

within events and situations. These narratives were contextualized and described how a specific event came to be significant and how opinions and decisions changed over time (Hagemaster, 1992); TEM as one of the three major components of TEA (Sato, et al. 2016) was generated following TEA aid in the discussion of LHA; and GTA which was used in categorizing and linking data. Following the analytical method for the grounded theory of Locke (2002) and Glaser (2001), there were constant comparison and categorization of data using GTA with the Archive of Technology, Lifeworld and Everyday Language text interpretation (ATLAS.ti) application until achieving data saturation.

Research participants were asked to specify and rank the factors or reasons they individually considered when choosing a technology to learn, adopt, and share. Main actors were also asked about the influences or changes to their lives after receiving OA information. All answers were noted, encoded, and grouped using Atlast.ti. Codes were set based on varied quotations from the interviews with main actors. These quotations linked to a code of each valued factor were referred to as "groundedness" or the code frequency. For this study, the "groundedness" was divided into three groups: High: 67%-100%; Moderate: 34%-66%; Low: 33% and below, based on the percentage of occurrences of codes per actor group.

RESULTS AND DISCUSSION

Factors affecting actors' attitudes that affect farmers' decisions must be explored to understand and assess the impact of information sharing on farmers and other actors in the community. Afterward, the differences among actors on the value of factors can be distinguished. Subsequently, the degree and interaction of impact of information sharing to different actors can be assessed.

Profile of Participants. Main actors in this study included 11 staff-participants from five institutions (as the main information sources), 30 farmer-participants (as the main receiver or beneficiaries of information and innovation), and six family member-participants (who were the main factor or reason affecting farmer's decision in adopting specific innovation) referring to children and spouses of some farmer-participants. Staff-participants were composed of seven female and four male respondents ages 35 to 62 years old with an average age of 48 years old. Years engaging in formal OA information sharing for staff-participants ranged from 5 to 19 years with an average of 11 years. On the other hand, farmer-participants consisted of 21 male and nine female respondents ages from 30 to 72 years old with an average age of 52 years old. Their farming experiences ranged from 4 to 50 years, with an average of 29 years, while organic farming experience seemed shorter with an average of 10 years. It should be noted that organic farming experience ranged from 1 year (those farmers who tried OA but went back to conventional) to 30 years.

Factors affecting actors' attitude and the differences of valued impacts. Different factors affecting actors' attitudes were identified from the study. These factors were grouped into two parts: the *extrinsic variables* (e.g. characteristics of the farmers, external environment, and innovation) and the *intrinsic variables* (e.g. attitude, knowledge, perception, motivation- that will be understood through participants' life histories). For this study, only intrinsic variables are utilized.

Staff-participants from institutions valued highly the importance of innovation, including OA's safeness for farmers, consumers, and the environment (Table 1). The sustainability of OA and the easiness to learn and adopt were ranked second and third, respectively. For the staff-participants of five institutions, OA is a sustainable agriculture method and the adoption of the innovation itself can be sustained because OA is site-specific which also leads to the easiness to learn and adopt as all inputs are available in the farm. Likewise, farmer-participants and their families tend to value their needs and interests more or the beneficial or positive influences that they will be getting from the innovation. Positive impacts include improved livelihood and family relationships and gained trust from their consumers and neighbors. These results are in line with the study conducted by Aquino (2019), which presented that aside from increased income and profit, small-scale organic farmers in the Philippines

had different reasons and needs in adopting specific technology that included the safeness of the family and the environment.

Farmers' attitudes towards receiving and adopting OA technology also tended to be affected by the pressure from neighbor farmers and their family members, followed by the availability of information about the technology and its easiness to adopt. As farm successors, farmers' families tend to value the sustainability of innovation more than easiness to adopt. Thus, these three main actors had different but connected reasons or factors affecting their attitude in sharing or receiving information and adopting OA innovation.

Table 1. Rank of different factors affecting actors' attitude in information sharing and adoption of innovation

Rank	Institutions	Farmers	Farmers' Families
1st	importance of innovation	needs, interest (benefits)	needs, interest (benefits)
2nd	sustainability of innovation	pressure from neighbor-farmers and family members	sustainability of innovation
3rd	easiness to learn and adopt	availability and easiness to adopt	easiness to adopt

Sources: Survey data in 2018 and 2020

Impact of information sharing to different actors in the community.

Based on the main actors' quotations from the validated transcribed interviews, codes were set and categorized, GTA analysis revealed that there were three major categories or themes, with respective sub-categories consisting of different codes. Groups included economic (monetary and non-monetary influences or positive changes from information sharing), well-being (enhanced relationship and improved mental health), and environmental (ecological benefits gained) impacts (Fig.2).

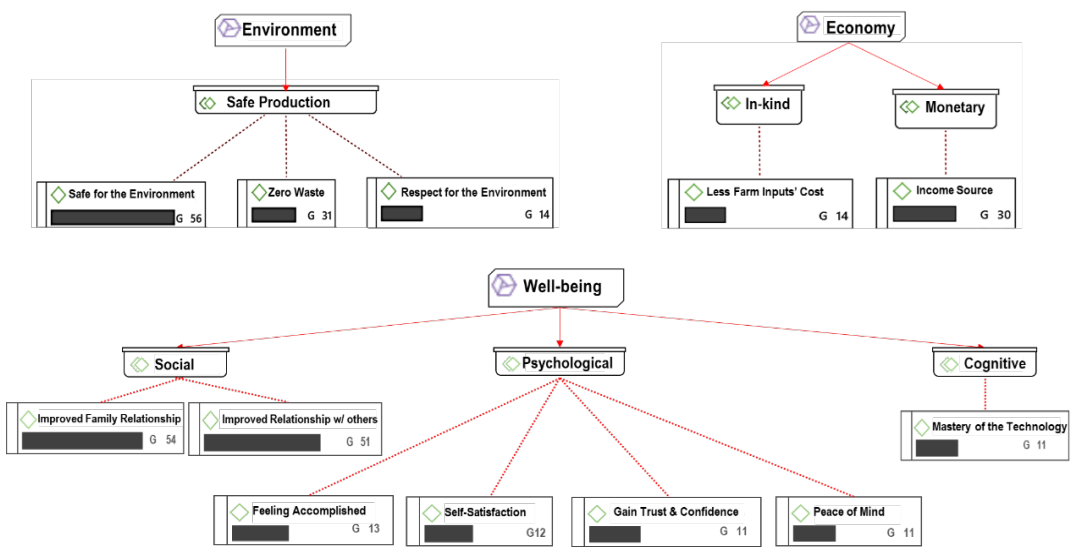

Fig. 2. Categories, codes, and "groundedness" of codes from the impact of OA to different actors in Laguna, Philippines derived using GTA analysis in Atlas.ti

The economic impacts are the positive effects or gains of different actors financially, whether in-cash or not, while practicing and sharing OA. It has two sub-categories: "monetary benefits" and "in-kind". Economic benefits such as additional income, improved profit, and livelihood through less cost of input were noted. Some had enough savings to send their children to college or buy tricycle or small piece of land. Economic benefits consisted of two sub-categories: "in-kind" and "monetary" with each code of 'less farm inputs' cost' (with 14 linked quotations) and 'income source' (or improved income with 30 linked quotations), respectively. "Groundedness" or code frequency refers to the number of times each quotation is linked to specific factor's code valued by the participants. Thus, the higher the code frequency, the higher the participant values the specific factor's code.

The environmental impact had a sub-category of "safe production" with three codes: 'safe for the environment,' 'zero-waste,' and 'respect for the environment' with 56, 31, and 14 linked quotations, respectively. "Safe production" contained the tag of quotations from farmers related to producing food that is 'safe for the environment,' such as using natural fertilizers and pesticides or farming without synthetic chemicals. In addition, 'zero-waste' referred to tags on the process of recycling nutrients and 'respect for the environment' representing tags on their efforts or contribution in saving the environment were also included.

On the other hand, the well-being impact is composed of three sub-categories and seven codes. The "social" sub-category considered the participants' desire to have a role in and help their family and community. The "cognitive" sub-category focused on how participants positively processed the information, knowledge, and learnings they were getting to be more effective and successful in their farm and information sharing activities. The "psychological" sub-category covered farmers' positive sense of purpose or self-satisfaction.

Positive feelings brought by OA to their lives became their reasons to continue and eventually adopt the OA technologies. Codes belonging to this category were 'improved family relationship,' 'improved relationship with others,' 'mastery of the technology,' 'feeling accomplished,' 'self-satisfaction,' 'gain trust and confidence,' and having 'peace-of-mind.' Quotations such as *"This changed my life as the feeling of fulfillment that I now have another role for my family"; "through OA, I was able to be an important family member"; "trust and a good farmer-consumer relationship are also created"; "I am not worried if they [his children] do farm activities with me because I am using natural pesticide and fertilizer, so I am sure that it is safe even for my kids"* were tagged under these codes and category.

Participants were able to get positive benefits specifically on their well-being, knowledge on environmental protection, and economic advantage from the OA information received, practiced, and shared with others. Valued impacts of information sharing on different actors (Table 2) revealed the differences of these impacts to different actors in the study area. All the interviewed staff-participants valued highly the "well-being" impact, and the code impact included 'gain trust and confidence,' 'self-satisfaction,' 'peace-of-mind,' 'feeling accomplished,' and 'mastery of the technology.' In addition, they also valued 'safe food and production' that they shared and imparted to their beneficiaries. They emphasized the importance of the ecological or "environmental impacts" of practicing OA.

The economic impact to staff-participants was lowest among all actors because it did not matter if there is an honorarium or additional pay for extending knowledge and information about OA. They thought that receiving tokens of appreciation from farmers, or local government units are just additional benefits, but they treasured more the trust and self-satisfaction they are getting through imparting the OA innovation to others.

Likewise, the 30 farmer-participants valued well-being and environmental impact greatly on social (improved family and neighbor relationship), psychological (boost confidence, feeling valued),

and safety for the environment. Some farmer-participants increased their yield, which led to increased income, but some farmers who could not improve their income believed that other positive impacts (e.g., improved family and neighbor relationships and environment protection) were more important than having a better income. On the other hand, family members-participants, especially the children who were doing gardening in school, valued well-being and environmental impacts the most (e.g., enriched school social relationship, feeling valued). They even often boasted to their other classmates that OA was easy and beneficial. Surprisingly, even though some farmer-participants were not making a high profit from practicing OA, farmer-participants valued well-being and environmental impacts of knowing and understanding OA through information sharing more than its economic impact.

Table 2. Valued impacts of information sharing on different actors

Impacts	Farmers Gr=76	Impact to Farmers Gr (%)	Institution Staff Gr=28	Impact to Institution Staff Gr (%)	Farmers' Family Members Gr=16	Impact to Farmers' Family Members Gr (%)	Total
Economy Gr=44; GS=2	35	Moderate 46	3	Low 11	6	Moderate 38	44
Environment Gr=101; GS=3	67	High 88	23	High 82	11	High 69	101
Well-being Gr=103; GS=7	72	High 95	20	High 71	11	High 69	103
Total	174		46		28		248

Sources: Survey data in 2018 and 2020

Notes: Gr- Groundedness of codes (number of quotations coded by a code) or documents (quotations created in a document); Gs- Number of codes in a code group. Impacts were based on the "groundedness" of each valued factor from Atlas.ti (High: 67%-100%; Moderate: 34%-66%; Low: 33% and below)

Effective information service delivery or dissemination, specifically to the grassroots, could be achieved when adequate attention is focused on how the information is received, processed, communicated, and used positively for the benefit of all the actors. Ogar et al. (2018) stated that information delivery with good quality is the right step towards the growth of agriculture through good communication with the rural population that will enable access to relevant information. In addition, Heeks (2018) pointed out that information communication technology positively impacts poverty alleviation concerning rural development and food security.

Impact on the institutions' staffs as main information sources. Resource speakers tended to try first the different OA technologies before they share these. From the interviews conducted, extension agents, heads, and project staff from the institutions seemed to continuously check the technology for its effectiveness and easiness of application. Also, they seemed to adopt and apply each OA technology to their backyard gardens because they believed in OA's health benefits. The staff-participant from Institution 1 mentioned: *"We want that if we are healthy, they [farmers] should also be [healthy]. I always try and apply the technology in my garden. I want to verify because sometimes it is not doable…"*. In addition, staff-participant from institution 2 declared: *"I do not have a large area, but I can use recycled materials. When persuading other people, it should start with oneself. Also, with this [experience], one can be assured that own crops are free of chemicals and safe to eat while [having the opportunity] to save money. Working eight hours [a day] and five days a week in front of the computer, this [home gardening] is [also] a good physical activity"*. Furthermore, the staff-participant (division head responsible for information sharing) from Institution 4 stated: *"Aba, I also need to have my garden wherein I can adopt technologies that we are disseminating. How can we encourage others if we are*

not practicing it?". Hence, for this study, staff-participants emphasized on importance of sharing their own experiences to others.

Information providers essentially do, try, and practice the technology first in order for them to understand quickly what the farmers or beneficiaries will be experiencing and be ready for all the questions and challenges the farmers or beneficiaries will ask. These convey that institutions' staffs were able to have peace of mind, mastery of the technology, and confidence in what they are sharing that leads to gaining beneficiaries' trust, feeling accomplished, and self-satisfaction.

Impact on farmers. Farmer-participants seemed to value well-being and environmental impacts of the OA information more than its economic impacts similar to the staff-participants. Their main reason for OA practicing and sharing was the safeness of the technology. Notably, most farmer-participants stated that OA was safe for them, their family, and the environment, which fell under the "well-being" and "environmental" impacts. Transcripts from farmer-participant 3 and farmer-participant 17 highlighted the impact of OA information on most farmers, specifically for becoming aware of the importance of nutrient cycling and the effect of OA on the health of farmers, their families, consumers, and the environment. Farmer-participant 3 stated: "*Synthetic pesticides negatively affects humans, so why do I still need to use them. [Moreover,] if natural pesticides and fertilizers can be found just around here [within the farm], there is no reason for using synthetic ones? OA is safe for everyone [and] safe for the consumer's health. We can also help our environment by not using synthetic chemicals"*. Also, farmer-participant 17 mentioned: *"I am practicing OA because of the flow of nutrients. It is just in a cycle. Everything can just be found within the farm…"*.

In addition, farmer-participant 4 stated: *"Yes. [Practicing] organic is very hard, laborious, time-consuming, and tedious. However, I realized that it would be more beneficial in the long run because it is safe for me, my children, consumers, and the environment. I am at ease that my children, unlike me when I was their age, now know the importance of organic. They are even bragging in their school about how to do it. They often say that they saw me doing it, and it is easy to do."* In addition, farmer-participant 18 said: *"I want to change not only their [neighbors'] farming ways but also on how they live. Most of the mothers here spend the whole day chatting and talking about others' lives. [When given the opportunity,] I try to teach them what I know from my experiences and own farm practices"*.

Transcripts from farmer-participant 4 and farmer-participant 18 indicated that aside from being aware of the safety of the technology, improving and touching the lives of the people around them matters remarkably. As a parent and concerned neighbor and relative, these farmer-participants were also inclined to share the positive impacts of OA information they are receiving to those they care for who live near them.

On the other hand, some farmer-participants were also able to maximize the economic benefits and impacts of OA information and technology in their lives as they could save some money and even buy a parcel of land. For example, farmer-participant 7 stated: *"Farming is important. During this pandemic, we have something to eat. Unlike others, we do not need to go down [to the market] to buy food. Farming and OA have many advantages. Also, after engaging in OA, my husband and I were able to purchase a small [piece of] land through monthly installments."* These statements also emphasized that their OA farm helped them survive and be less exposed to other people, especially during the pandemic.

Farmers seemed to value more the well-being and environmental impacts of OA information sharing, being knowledgeable about the nutrient cycle and the health benefits or safeness of OA to people, and the opportunity to teach and help their family members and neighbors matters notably for the farmers. Moreover, farmers seemed to be satisfied and happy with having safe and accessible food for their respective families, most especially during the pandemic.

Impact on farmers' family members. Family members of farmers were also interviewed to represent secondary or indirect beneficiaries of OA information sharing. Family member-participants also valued well-being and environmental aspects. The wife and son of farmer-participant 3 were interviewed regarding the effects of information sharing and engaging in OA. His wife shared that after engaging in organic farming and attending several OA training, her husband changed positively in terms of having a better family relationship and gaining self-worth as he can decide on his own. The family member-participant 1 (wife of farmer-participant 3): *"It [Our family situation] is better [than before his OA engagement] now, because he has time for us, especially for our children. He is free to decide on matters regarding his farm. He has no boss because he is the boss. He is always with us, but he can still provide for the needs of the family. I also feel proud that students and other (future) farmers are visiting our farm to learn and experience farming."*

The family member-participant 2 (youngest son of farmer-participant 3) shared his personal feelings and preferences as he said: *"I like it now. I can always see my Papa. He can play with me now."* As a 4-year-old son, he needs his parents' attention and affection, especially his father that he rarely sees and remembers when his father was still working as a security guard. Based on their statements, positive effects on the quality of life were also apparent, specifically in terms of improving family time and relationships, boosting confidence and morale, and providing for family needs.

Children of farmer-participant 4 were also interviewed. Based on the observation during the interview, family member-participant 3 (grade 6 son; 12 years old) was shy at first, but when asked about his mother, OA and the effect of the OA training to her, he expressed positively and courageously his feelings: *"I am proud of my mother. I usually do garden activities in school, [similar to what] she is doing on our farm. I can confidently tell my classmates that organic agriculture can be fun and easy if we do what my mom is doing."* In addition, family member-participant 4 (grade 4 daughter; 10 years old) eagerly answered: *"I am happy that my mother is doing better now. She also has more time for us and can help us in school activities."*

Family time greatly matters for these children who had working parents. Engaging in OA seemed to contribute to having better family relationships, while proud children boosted the morale and confidence of their farmer parents. Therefore, it could be concluded that information sharing and engaging in OA seemed to positively affect the farmer-participants through the impact to their families.

Degree of impact on the effectiveness of information sources. Identification of the different information sources and the problems the receivers were facing showed that most farmer-participants were not receiving the needed printed materials. A pamphlet, brochure, or leaflet on the institution and the disseminated technology are often received. Farmer-participant 30 mentioned: *"We often received a pamphlet or brochure that the institution made for us. During the training, they [the institution conducting training] asked us what we learned. They usually [summarized the discussion and] printed it on paper and gave it to us. We already know what the content is. We want something new that will interest us in reading, like new information, knowledge, or technology. So, for me, the printed materials I am receiving are not that effective. However, I am still getting it for the sake of my neighbor farmers."*

Another farmer stated the need for materials more than a brochure. Farmer-participant 18 shared: *"We received a pamphlet or brochure, but we already know what the content is. If possible, I want a book or manual. I keep requesting that, but until now, there has been none. Books will be effective because everything is already there. You will not be lost because it will be your guide for everything. I need a refreshment."* Farmers keep requesting, but until March 2020, they have not received the printed materials. With the pandemic, further delay of the printed material is expected.

Regarding electronic sources, only 14 out of 30 farmer-participants were using electronic sources. Only four used primarily TV to get information about natural or organic crop production

practices and weather updates. farmer-participant 19 affirmed: *"I frequently watch the news on TV about the weather updates. I need to know if there will be a typhoon coming to prepare and adjust farm activities. In the past, I could not harvest anything because I was not aware of an incoming typhoon. I mainly focused on the harvest schedule."* The main electronic information sources were radio (four farmer-participants), cell phone (three farmer-participants communicating about training schedules or orders), and internet (three farmer-participants watching YouTube on OA).

The face-to-face sources seemed to show positive results as all farmer-participants could rank at least two of the most effective means. Specifically, the most effective information sharing method is training for 15 farmer-participants, and family members for 11 farmer-participants (Table 3).

Table 3. The frequency distribution of the face-to-face information sources by rank of effectiveness for farmer-participants (n=30)

Information Source	Rank of Effectiveness			Total
	1st	2nd	3rd	
Training	15	4	4	23
Family member	11	2	4	17
Neighbor-farmers	2	9	5	16
Exhibition	-	2	1	3
Demonstration	-	4	1	5
Field visit	-	5	-	5
Farm shop	-	2	2	4
Others	2	2	1	5
Total	30	30	18	

Source: Survey data in 2020

Notes: Farmer-participants initially answered questions on their source of OA information and innovation. Then, they ranked their answers based on the effectiveness of each source or method. Some farmer-participants only gave two sources of information.

Available information sources seemed to be diverse in the study area (Fig. 3). To further understand the information sharing between different stakeholders, information sources were divided into four major categories: personal information sources, public information sources, private information sources, and mass media sources. The impact of information sharing can be divided into three types: Strong impact (refers to complete, effective and efficient transfer of information to the receiver), Moderate impact (refers to the transfer of information with certain assistance for the receiver to understand) and Less impact (refers to transfer of information with no assistance; often contains shallow information of what the intended receiver is looking for).

The personal information sources, including family members, neighbor farmers, and farmers' organizations or association members, were noted to have strong interaction and impact. Based on the previous transcripts, this result could be associated with farmers' attitudes and interests to share information with people who were close to them and knew them well. It was noteworthy that some farmer-participants in Los Baños had strong interaction and impact with the researchers and Extension Agents (EAs) of Institution 1 and the staff from Institution 3. This result was in line with Toma et al. (2018) research that stated access to technical information and knowledge transfer were among the key influences on adoption behavior and information sharing.

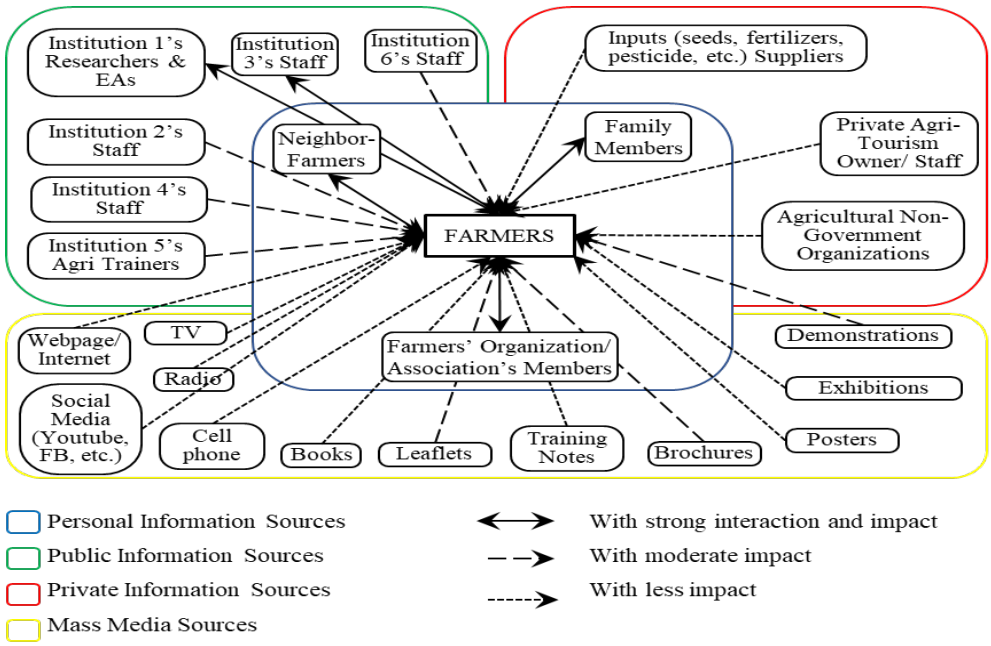

Fig. 3. Information sharing impact to actors by degree and interaction

Source: Survey Data in 2020

Notes: The impact was determined using the frequency percentage of each information source: Strong Interaction and Impact (67%-100%), Moderate (34%-66%), and Less Impact (33% and below). Institutions 1, 2, and 6 are all located in Los Baños, Laguna. Although there was no interview conducted in Institution 6 due to the unavailability of the focal person, this study included Institution 6 for this particular analysis because more than half of the farmer-participants mentioned the effectiveness of their staff.

The remaining public information sources and some mass media sources (e.g., leaflets, brochures, and demonstrations) had moderate impacts, while the remaining mass media sources and private sources had a low impact. Contrary to the expected positive impact of mass media (Ali *et al.* 2016 for Zambian farmers on TV usage), the farmer-participants could not utilize these sources. Notably, the effectiveness of TV, radio, and webpage/internet sources were only 23%, 20%, and 10%, respectively.

Farmer-participants used a cell phone to contact someone about training or availability of produce. This result is similar to the study conducted by Labonne and Chase (2009), which revealed that cell phones provide Filipino farmers more access to information, specifically on various transactions, including selling their goods. However, the cell phone had moderate to low impact since only 10% of the farmer-participants owned one. Moreover, most farmer-participants did not have internet access, and some did not even have electricity. These conditions can be considered reasons for the low usage of electronic sources under mass media. Therefore, improvement in the accessibility and availability of information and sources may increase the degree of impact.

The strong interaction and impact for the farmer-participants also had something to do with the future of their farms. Since farmer-participants usually seemed to want the best for their children, they tended to be interested in the technology that would benefit them and their respective families, especially their children who will inherit their farm in the future.

CONCLUSION

The importance of interpretation of the farmer's attitude and behavior towards OA adoption and how these attitude and behavior affected information sharing and technology adoption were clarified. Life History Approach, Trajectory Equifinality Approach, and Grounded Theory revealed needs, importance, sustainability, pressure from others, availability, accessibility, and easiness to adopt as factors affecting actors' attitudes toward learning, sharing, and adopting OA technologies. The factors affecting the attitude of the three main actors (e.g., farmers, institutions' staff, and farmers' families) in sharing information and adopting OA innovation were different but interconnected. Interaction and degree of impact of OA information sharing were also influenced by and associated with the attitudes and interests of the beneficiaries to accept, share, and adopt information they were receiving. The degree of the economic, well-being, and environmental impacts varied. However, the main actor groups seemed to value OA's well-being and environmental impacts more than economic impacts. Although personal information sources had the strongest interaction and impact, improvement in the accessibility and availability of other sources (e.g. mass media sources) might increase the degree of the impact.

Furthermore, farmer-participants tend to be interested in the technology that will benefit them and their respective families, especially their children who will inherit their farm. Thus, there is a need to plot the life paths of farmers who adopted and know their reasons of continuing or discontinuing OA using the Trajectory Equifinality Model (TEM). This study may formulate new ideas or ways to increase the number of organic farmers and persuade the youth to participate in agriculture.

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