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Climate-Smart Agriculture: Do Young People Care?

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ABSTRACT

*This paper is about the information-seeking and information-sharing behavior on climate-smart agriculture (CSA) of high school students who participated in the Infomediary Campaign in 2014. This seeks to answer five research questions: (1) What are the indicators that searching and sharing of information by the infomediaries transpired? (2) What are the characteristics of infomediaries who are most likely to share information on CSA? (3) What sort of information can be competently shared by high school students? (4) How is information transferred from the information source (PhilRice) to the farmers? (5) What evidence suggests that information transferred was put to good use by the intended recipients? A survey (N=388) was conducted among eight randomly selected schools, from the pool of 108 schools, nationwide. Focus group discussions, individual interviews, and participant observation were likewise conducted. The Stakeholder Theory and Livelihoods Approach were combined to unpack the findings in this research. Results show that females are more likely to share information than males (*p*=.071). Land tenurial status (*p*=.430) and familial background (*p*=.052) do not seem to influence the information-seeking behavior of young people. Information that is easy to understand and reinforced elsewhere was shared often by students as compared with more complex ones. Several pathways were generated in documenting the infomediation process on CSA with the schools as the nucleus of agricultural information. These are: (1) PhilRice to farmers, (2) PhilRice to teachers to farmers, and (3) PhilRice to teachers to students to farmers.*

Keywords: infomediary, intermediary, agricultural extension, climate smart agriculture, student agricultural extensionists

JEL Classification: Q16

INTRODUCTION

There is much literature confirming the negative impact of climate change on food production. Oerke et al. (1995), in their work on the spatial and temporal distribution of pests largely determined by climate, reported that crop losses due to pests (weeds, pathogens, and insects) in Asia reached USD 145.2 billion during the 1988–1990 period. In 2013, Typhoon Nari (local name: Santi) left Philippine agriculture with close to USD 70 million damage as it hit major food-producing provinces such as Nueva Ecija and Aurora (Peralta 2013). In the Maplecroft's Climate Change Vulnerability Index 2014, the Philippines ranked ninth in the world as the most vulnerable to the negative impacts of climate change (CCC 2014).

In 2014, the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) announced the onset of El Niño toward the end of the year, which might last through the second quarter of 2015. Provinces where this phenomenon was forecasted to occur included those in Central Luzon and some parts of northern Luzon, all of which are major rice-producing provinces. In 1998, the country experienced a huge decline in rice production due to the El Niño phenomenon (Tacio 2014).

The urgency of climate change is something that has surpassed major academic debates. People are being called to come up with aggressive efforts to cushion its negative impacts and take advantage of any positive impacts climate change may have. In 2014, the Program on Climate Change Adaptation and Food Security (CCAFS) of the Consultative Group for International Agricultural Research, Philippine Rice Research Institute (PhilRice), and the Philippines' Department of Education (DepEd) collaborated to implement an initiative to mobilize high school students to serve as information providers on climate-smart agriculture (CSA). This initiative was well anchored on the PhilRice-initiated Infomediary Campaign, an initiative to engage young people in agriculture, which started in 2012 (Manalo 2013).

The project "Development and Roll Out of Climate-Smart Agriculture Modules among Infomediary Campaign-Participating Schools," was implemented in 108 high schools, most of them belong to agricultural technical-vocational (TecVoc) high schools of the Bureau of Secondary Schools of DepEd. TecVoc is a separate track in secondary schools in the Philippines, which offers different fields of specialization and one of these is on crop production.

This paper will tackle the information-seeking and sharing behavior of the students engaged in the campaign. This paper has five objectives: (1) show indicators that searching and sharing information by the infomediaries transpired; (2) identify the characteristics of infomediaries who are most likely to share information on CSA; (3) determine the types of information that can be competently shared by high school students; (4) discuss the infomediation process that transpired from the information source (PhilRice) to the farmers; and (5) show evidence of usage of information generated through the infomediation process.

This paper is divided into five parts. The introduction sets the context of this initiative, and hence answers the question on the need to conduct this project. The literature review discusses several issues that are related to this initiative such as issues on agricultural extension and some important information on the Infomediary Campaign. The methodology section discusses the different methods used during the data collection and their respective justifications. Processes in analyzing the data, and information on research participants and respondents are likewise provided. The results and discussion section responds directly to the

five objectives of this paper. The results and discussion section ends with a subsection on applying the combined Stakeholder Theory and the Livelihoods Approach to better understand the findings of this research. Recommendations on how to improve this initiative as well as some policy implications are likewise provided.

About the Infomediary Campaign

The Infomediary Campaign is a PhilRice-initiated project on youth engagement in agriculture (Manalo 2013). The key objective is to mobilize the students to serve as rice information providers in their respective rice-farming communities. It is being implemented in partnership with the Technical-Vocational Unit of the Bureau of Secondary Schools of DepEd. The campaign was piloted in 2012 in three schools in Aurora and Sultan Kudarat (Manalo et al. 2014b; Manalo et al. 2015a). As of this writing, there are now 108 participating schools, mostly TecVoc schools. The campaign implements strategies depending on the development context where the participating schools are located. In general, there are three main strategies: *read*, *surf*, and *text*. In the read component, publications on rice are provided to participating schools. The surf component introduces the students to PinoyRice, a website that contains plenty of downloadable information on rice such as technology videos, powerpoint presentations, handouts, voice clips of experts talking about technical aspects of rice production, and many others. An offline version of the website is available in CD format for schools with internet connectivity issues. The text component encourages students to use the PhilRice Text Center (PTC), a short message service (SMS) platform that answers queries on rice. The PinoyRice website and PTC were both developed under the auspices of the Open Academy for Philippine Agriculture (OpAPA) and are now being maintained by the Development Communication Division of PhilRice.

To complement its key strategies, the campaign hosts a range of activities (Manalo et al. 2014b; Manalo et al. 2015a). These include the establishment of rice gardens, the Infomediary Quiz Bee and Face-Off, snowballing, and field days.

The establishment of rice gardens is an initiative to increase the confidence of the students in talking about rice production. During the pilot stage of the campaign, it was noted that the students did not have the confidence to talk about rice farming-related concerns. They thought that they did not have sufficient knowledge to talk about these things. The campaign provided 1 kilogram each of three registered new rice varieties to participating schools. Registered seeds are high-quality seeds. By classification, it is a notch higher than certified seeds, which promise a 10 percent yield advantage over ordinary seeds or those that are sourced from other farmers via seed exchange.

The Infomediary Quiz Bee is an edutainment (education and entertainment) approach to gauge students' knowledge on rice farming. The final round of this activity is called the Face-Off where farmers invited to witness the activity are asked to throw questions to the students. The students then use the PinoyRice website to answer the questions. After this activity, a credibility index survey is administered to the farmers. The survey is composed of five questions revolving around the credibility of the students in relaying information.

Snowballing is a monitoring activity done to gauge the potential reach of information passed on from information sources (PhilRice or the teachers) to the farmers. In this activity, at least three students who have sent SMS to the PTC are interviewed about how they passed

on the information that they collected. The ones who received information are then asked the same question. The same process is repeated up to the third order of sharing (the third time the information has been passed on from the main source) if successive sharing transpired. In the context of this study, this is sharing from the farmer-parents to other farmers.

Field days are often initiated by participating schools. These are small school events where local government officials and farmers are invited for a garden walk. The students then explain the management options that they employed in taking care of the rice crop. Since 2013, during the first national implementation, up to the present, DepEd has supported this campaign by issuing memoranda calling for the participation of teachers in the training programs conducted under this campaign, and rallying support for the integration of the CSA modules in the curriculum of participating schools.

Agricultural Extension in the Philippines

There are several issues that confront the Philippine extension system. Fragmentation, devolution, and aging and inadequate number of extension workers are among the top three concerns (Saliot 2014). Fragmentation basically speaks of the multitude of players in extension, which often leads to duplication of activities conducted and those done in the same area. The devolution era has caused quite a number of concerns especially because agriculture is not the main priority of host provinces (Hondrade 2007). In many instances, this has resulted in extension workers not able to do field work or even the non-existence of any extension activity. Just like the farmers, the country also has aging extension workers. The average age as of 2011 was 50 years old (Saliot 2014). Hence, there are plenty of physical limitations that can be factored in when assessing their performance. As for their number, the country only has 13,285 extension workers who serve more than 2 million rice farmers (Saliot 2014). The number alone speaks of the need to come up with alternative ways to deliver information to farmers. This is one thing that the campaign seeks to do by mobilizing the students to serve as information providers in their respective rice-farming communities, although not on an equal capacity as the agriculture extension workers (AEWs).

Youth, Agriculture, and Climate Change

It can be said that there are a few and disparate efforts to engage the youth but an activity that is massive enough to engage them is yet to be conceived. Gould and Gomez (2010) noted instances of mobilizing young people as infomediaries in projects in Sri Lanka, India, and Costa Rica. Engagement in these projects, however, were limited to tapping young people's expertise in using computers and other information and communications technologies (ICTs). An effort to address low literacy among farmers by teaching young people agricultural concepts so they could eventually relay these to farmers was done in Belize, in northeastern Central America (Renwick 2010).

In the Philippines, efforts to involve the youth are mostly on a project basis (lasting about 1–2 years) and are easily affected by shifts in the priorities of the bureaucracy. Table 1 shows that the 4-H Club of the Agricultural Training Institute seems to be the sole and longest-running initiative on youth engagement in agriculture in the country. As regards climate change, youth engagement has mostly focused on essay writing contests, tree planting activities, and awareness campaigns (DENR 2012).

Table 1. Initiatives on youth engagement in agriculture

Youth Initiative	Proponent	Year	Nature
Youth in agriculture and fisheries program	Agricultural Training Institute	2009	Scholarship
Fulbright-Philippine Agriculture Scholarship Program	Fulbright	2013–2014	Scholarship
Gulayan sa Paaralan	Department of Agriculture	Ongoing	Training/Skills competency
4-H Club	Agricultural Training Institute		Training/Skills competency
Search and Award for the Outstanding Farmers in the Philippines	Junior Chambers International	2012	Award
Future Farmers of the Philippines	Department of Education, Culture, and Sports (formerly DepEd)	Before 2000	Organization
Future Agricultural Homemakers of the Philippines	Department of Education, Culture, and Sports (formerly DepEd)	Before 2000	Organization
Student Technologists and Entrepreneurs of the Philippines	DepEd	2001	Organization
Young Farmers Program		2010	House Bill/ Scholarship
Agri Pinoy Youth	National Youth Commission	2012	Resolution/ Scholarship

Source: Manalo et al. (2014b)

Climate Change and Rice Production

It is known that climate change will hit worst sectors that are weather-dependent, such as agriculture (Field et al. 2014; Lasco, Espaldon, and Habito 2016). Water scarcity (Rosegrant, Cai, and Cline 2002) and extreme weather events (PAGASA 2011), which have damaging impacts on food production efforts, are among the key issues attached to climate change.

Research studies show that the country experiences an average of 20 typhoons annually, half of these cause significant destruction. Research also locates 300 volcanoes, 32 of which are active and are potential causes of earthquakes. In 2004 when 25 weather disturbances visited the Philippines, the country ranked fourth in the countries with the most disaster occurrences and highest death tolls (Duque 2005). The adverse effects of climate change are now observable in rice farming (Wassmann and Dobermann 2007). "Increased temperature and decreased hours of sunshine" caused yield reduction in rice (Luo et al. 2015, 83).

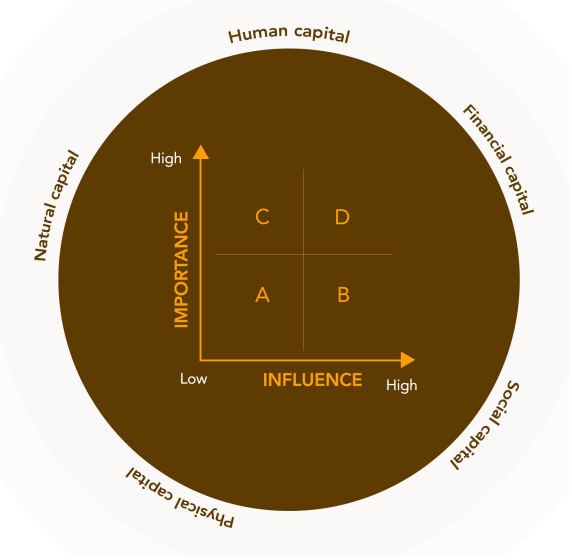
With the projected and already felt impacts of climate change on rice production, the need for innovative extension modalities is indeed high. This is the gap that the Infomediary Campaign seeks to help fill in—to come up with alternative communication pathways to deliver information on CSA by mobilizing high school students to serve as infomediaries or information providers in their rice farming communities.

THEORETICAL FRAMEWORK

We used the combined Stakeholder Theory and Livelihoods Approach to better understand the findings of this research. The Stakeholder Theory has its roots in the business discipline. Stakeholders are "those groups without whose support the organization would cease to exist (Freeman 1984 as cited in Bailur (2006), 31). For this study, the importance-influence map is used (Gavin and Pinder 1998), which captures the contributions of various stakeholders in an initiative. The Livelihoods Approach, on the other hand, sees the poor as operating in the context of vulnerability. There are five forms of assets that comprise livelihoods (Duncombe 2006). They are human capital, physical capital, natural capital, financial capital, and social capital. Human capital speaks of the type of personnel available in the community. Physical capital refers to infrastructure present. Natural capital refers to the resources that are naturally available. Financial capital talks of the livelihood sources in the community. Social capital refers to the organizations present in the community.

For this research, the Stakeholder Theory (Bailur 2006) and the Livelihoods Approach (Duncombe 2006) were combined. We first used the combination of the two in a book chapter titled "The Infomediary Campaign as a strategy to alleviate information poverty" (Manalo et al. 2015a). Hence, using it again for this paper serves as a sequel to advance this combined theory. The figure below combines Gavin and Pinder's (1998) influence-importance map (Stakeholder Theory) and Duncombe's division of assets (Livelihoods Approach). The stakeholders are divided into four types: A, B, C, and D. Type A are stakeholders with low influence and low importance; Type B are those with high influence but low importance; Type C are those with low influence but high importance; and Type D are those with both high influence and high importance (Figure 1).

Figure 1. The combined Stakeholder Theory and Livelihoods Approach



Source: Manalo et al. (2015a)

The combined Stakeholder Theory and Livelihoods Approach has three assumptions, which can either be debunked or affirmed by the findings. These are:

1. The extent of vulnerability set forth in the Livelihoods Approach will determine the behavior of the stakeholders toward a development initiative.
2. High vulnerability of stakeholders will result in negative repercussions on the campaign.
3. The level of intervention that will be extended to stakeholders will be influenced by their level of vulnerability.

METHODOLOGY

Research Participants and Respondents

This research was conducted in eight participating schools randomly selected from the pool of participating schools in the Infomediary Campaign nationwide. There were 388 students from TecVoc high schools who participated in the survey. Students taking the crop production track comprised the majority (52.3%) of the respondents, most of whom were female (67.5%). Most of the respondents were from Grades 8–10 and 13–18 years old. Lastly, 56 percent of the respondents came from non-rice farming households. Teachers, parents, and several key informants were also interviewed.

Research Sites

The eight schools for this research were Ilocos Norte Agricultural College (INAC) in Ilocos Norte, Balagtas National Agricultural High School (BNAHS) in Bulacan, Libon Agro-Industrial High School (LAIHS) in Albay, Southern Samar National Comprehensive High School (SSNCHS) in Eastern Samar, Malalag National High School (MNHS) in Sarangani, Cateel National Agricultural High School (CNAHS) in Davao Oriental, Dingle National High School (DNHS) in Iloilo, and Agusan Pequeño National High School (APNHS) in Agusan del Norte.

Methods and Analysis

A range of methods, both qualitative and quantitative, were used to answer the research questions. This research employed surveys, focus group discussions, participant observation, and document reviews. The questions asked in the survey revolved around the socio-demographic characteristics of the respondents, CSA information passed on to others, and general information on CSA. Focus group discussions and snowballing were instrumental in answering the research question on documenting the infomediation that transpired. Content analysis of the messages sent to the PTC provided substance in assessing the information-seeking behavior of the students by looking at the topics that they showed interest in. Participant observation data reinforced findings on the information-seeking and -sharing behavior of the students by looking at the publications provided to the school and their confidence in sharing information to others. References to national data are made as necessary.

Quantitatively-derived data were analyzed using frequencies and percentages. We also did chi-square tests to establish relationships among variables. Data from qualitative methods were analyzed thematically.

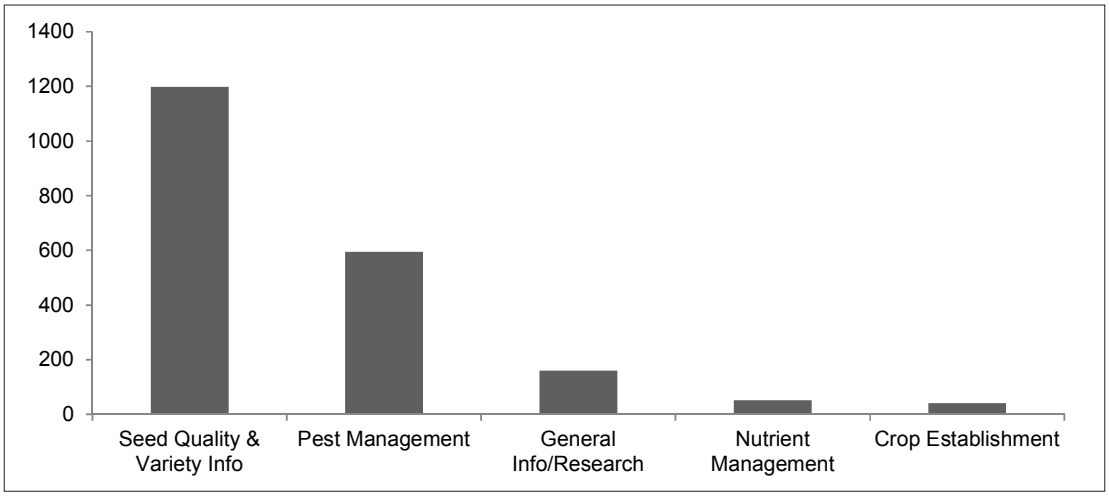
RESULTS AND DISCUSSION

Evidence of Searching and Sharing

The first thing that should be established in this paper is the evidence of searching and sharing that transpired. Similar with the first national implementation of the campaign in 2013 (Manalo et al. 2014a), evidence of students performing their roles as infomediaries, this time on CSA, is indeed high. This means that they either sent an SMS to the PTC, searched information from the Pinoy Rice Knowledge Bank, or read the publications provided in their school library. Figure 2 shows the students' frequently asked questions. Consistently, data on varieties seemed the highest among the frequently asked topics. Queries on integrated pest management and general information (more on trivia and science-related topics on rice) were also of interest to the students. From July to December 2014, the PTC received more than 3,000 SMS from the students (Figure 2).

Another indicator of searching for CSA

Figure 2. Topics of SMS queries sent by students to PTC, July–December 2014, national data



information is the mobility of the publications provided to the schools. In our observation, we noticed that most of the pages of the publications in some schools were torn out. In the interviews, we noted that some schools (i.e., Cateel National Agricultural High School in Davao Oriental) set up a loaning scheme for publications as students wanted to borrow publications so they could show them to their parents. Lastly, another indicator of searching for information or at least an indication that the students made the effort to study about rice are the Infomediary Quiz Bee scores. Across the country, the scores suggest that the students prepared, and at some point, acquired plenty of technical knowledge in growing rice. Interviews with random students also showed their confidence in talking about rice production. Confidence is something that is acquired once mastery has been developed, and mastery is acquired through thorough study. Many of these interviews are captured and uploaded in the campaign's website (www.infomediary4d.com).

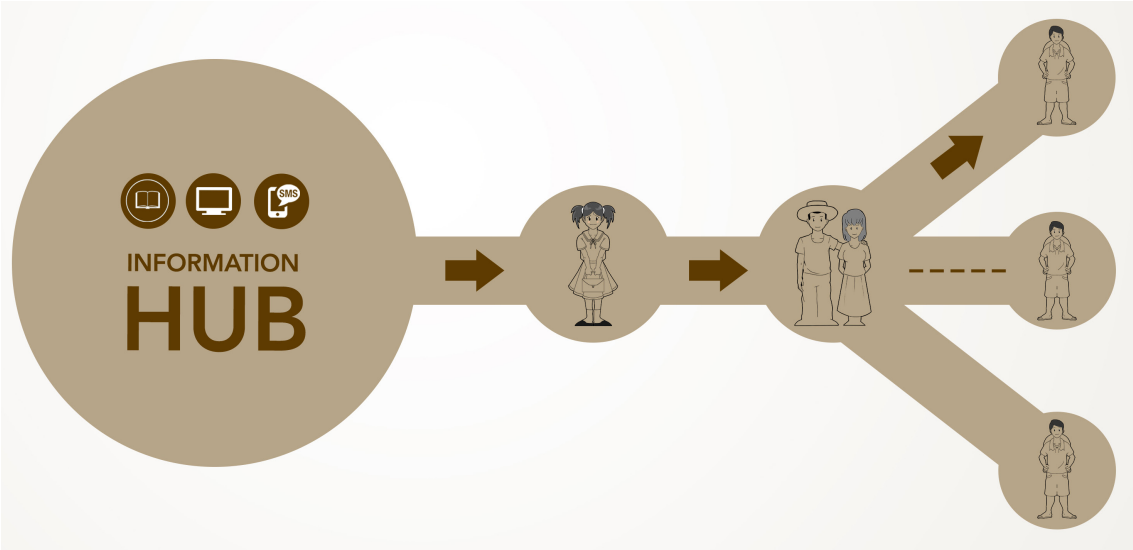
As for sharing, the data on snowballing proved useful. Figure 3 tries to capture the extent of sharing that transpired. It shows that as the information source passes the information to the student, it is almost certain that the information will be passed on either to his/her parent or to other farmers. Third-order sharing, however, is not always certain (Figure 3).

This illustration validates the 2013 data on the extent of sharing that transpired (Manalo et al. 2014a). It also reinforces data on sharing in farmers field school (FFS) sites in the Philippines. Rola, Jamias, and Quizon (2002) noted that farmers trained in FFS kept their learnings to themselves. The key messages of the illustration above are: (1) sharing transpired from the students to other people in their community; (2) there is a need to reflect on how to improve second- to third-order sharing; and (3) more creative ways to optimize sharing by the students should be devised.

Characteristics of Infomediaries

In advancing the science of infomediation, it is imperative to characterize the infomediaries. Of interest is to know the types of students who are most likely to share the information that they gathered. Additionally, central to this attempt is to know some factors that will affect the infomediation process. For this section, chi-square tests and cross-tabulations on several

Figure 3. Level of sharing that transpired from the infomediaries to farmers and others



Source: Manalo et al. (2015b)

Table 2. Characteristics of the infomediaries

Area of Interest	Chi-square Test (*p*)	Remarks
Gender and the act of sharing	.071	Females more likely to share information than males
Area of specialization and act of sharing	.052	Non-crop production students more likely to share than crop production students
Land ownership and act of sharing	.430	Land ownership is not associated with the act of information-sharing
Familial background (rice farming or non-rice farming)	.052	Act of sharing information possible regardless of students' livelihood source

Source: Manalo et al. (2015b)

variables were done to establish relationships that will shed light on this question.

Table 2 shows the tests conducted and their respective results. First, females are more likely to share information than male students. There are several ways to interpret this result. First, there is a need to come up with more ways to further engage the females to optimize their sharing activities. Second, there is a need to look more deeply on how to increase the probability of sharing by male students. Third, there might be some wisdom in crafting strategies where both females and males can collaborate to make the sharing more meaningful.

During the early stages of the campaign, the team members theorized that crop production students would show strong interest and thereby share more about their learnings during the course of their participation in the campaign. The chi-square test, however, seems to deny this as non-crop production students were more likely to share than crop production students. This is not easy to explain, but in the literature, a parallel result was observed in the study of FFS participants in Iloilo City, Philippines (Rola, Jamias, and Quizon 2002). Farmers who were trained kept their learnings to themselves.

Sharing did not always transpire. This result requires careful thought. A good take-off point for discussion is how to increase sharing by crop production students. Given that non-crop production students are more likely to share, the accuracy and types of information that they share are worthy of investigation.

As regards land ownership, the result seems to strengthen the present campaign strategy on engaging any student, and not minding their land tenurial status. This means that interest to perform infomediary roles is not affected by land ownership status. An almost parallel finding was reported in our previous paper (Manalo et al. 2015a), which underscored that being an infomediary is not dependent on whether or not one came from a rice farming or non-rice farming household.

Types of Information Shared

Figure 4 shows two things: (1) the topics taught in class, and (2) the topics shared by the students to others. The figure speaks of many things as far as sharing is concerned. One obvious observation is that the first two topics (general information on climate change and effects of climate change on rice production) were shared more than the last two (mitigation and adaptation measures).

A plausible explanation for this is that the first two topics are quite easier to share than the last two. For instance, modules on adaptation and mitigation mechanisms contained some very specific technologies and how-tos to manage the impacts of climate change. The first two topics, on the other hand, were trivia types of modules. In addition, general information on CC and effects of CC on rice are also reinforced in other subjects, such as in science. This means the chance is higher that these topics will be taught again in other subjects.

Corollary to the level of difficulty of the various messages, this means that segmentation of the campaign messages is necessary. For instance, the easier topics can indeed be left for the students to share. The more complex ones, such as those on adaptation and mitigation mechanisms, can be left to the teachers. Having clearly segmented messages will also manage expectations regarding the ability of the students to pass on information to others.

The findings also suggest that far more creative ways to convey these messages will prove useful especially for the students. Fun-

Figure 4. CSA topics taught in class and shared to others, data from all schools

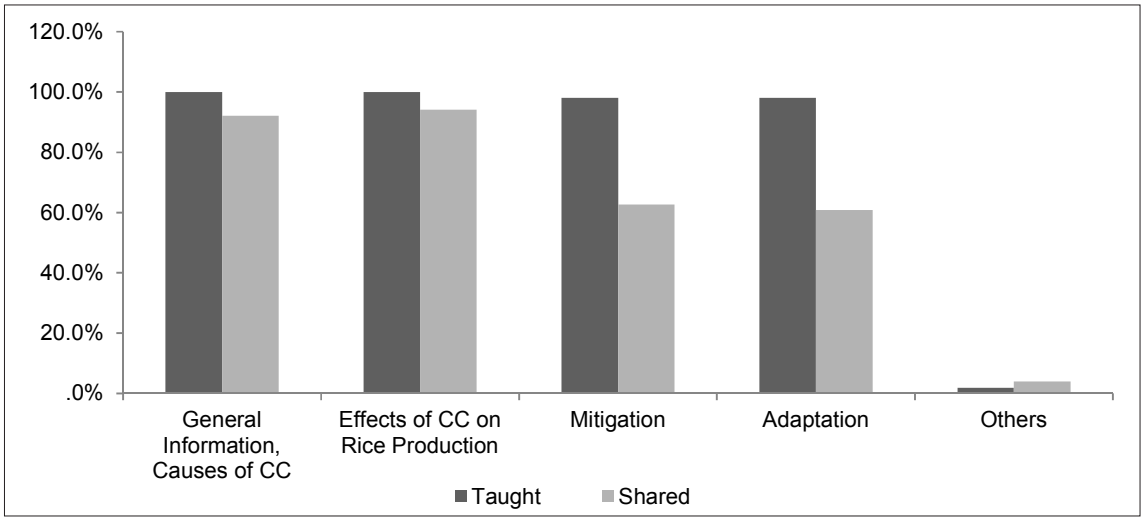
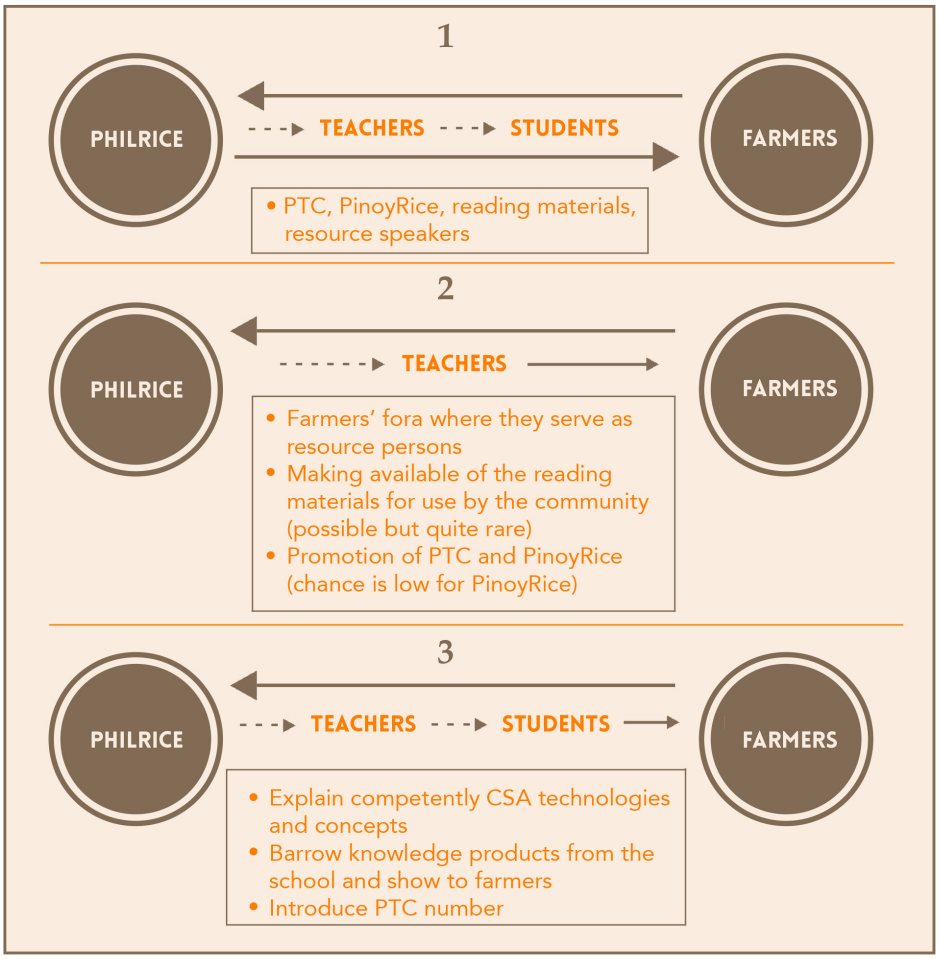


Figure 5. The infomediation process in sharing CSA information



based, not hard sell, strategies have higher chances of being appreciated (Whiting 2009). For the teachers, the findings are important in determining the topics that should be prioritized in their training programs.

The Infomediation Process

Originally, a linear and single communication pathway was expected (Figure 5). From PhilRice, the expectation was for the information to move straight to the teachers, then to the students, and then lastly to the farmers. This pathway (third pathway) is still true, but it is just among the three communication pathways documented in the campaign.

The first pathway is PhilRice straight to the farmers. This is made possible through the PTC, PinoyRice, reading materials, and resource speakers from PhilRice during forums in the community. This, however, will only be made possible through informal introductions of these resources to the community by the teachers and the students.

The second pathway also starts with PhilRice, then information goes straight to the teachers, and then the teachers go straight to the farmers. There are at least three ways by which information can go straight to the farmers from the teachers. First is through the conduct of community forums where the teachers

served as resource speakers. Second is making available communication materials for use by the members of the community. This is a bit ideal and rare, but one that is entirely possible. Third is by introducing PTC and PinoyRice. This one, however, is far easier to do for PTC than for PinoyRice. PTC is quite easy to use as it is basically just sending SMS. PinoyRice is a bit more complex and requires computer literacy, which many farmers lack.

In all three pathways, farmers do have the mechanism to go straight to PhilRice, which may be possible through the PTC (when they send in an SMS), and by chatting with PhilRice staff members through PinoyRice. Notice also that in all three pathways, the teachers are always present. Hence, they are central to the success of the infomediation process. In our previous papers, we have long recognized teachers as champions of the Infomediary Campaign (Manalo et al. 2014a; Manalo et al. 2014b; Manalo et al. 2015a). It is in this paper, however, that the realization of their roles as champions has become more cogent. In the two years of the campaign's national implementation, the center of analysis has always been the students—how they pass on information, factors that will affect the quality and speed of information transfer, among others. The roles of teachers has always been secondary to the analysis. Hence, there is a need to probe more on the roles that teachers play to ensure that no stone is left unturned in unpacking the infomediation process.

Evidence of Information Usage

This part shows instances of usage of the information passed on by the infomediaries. While the data collected for this part do not as yet constitute yield data, it can be surmised that

Table 3. Instances of adoption and/or adaptation of CSA technologies (random sites, nationwide)

School	Province	Adopted Technologies
Ilocos Norte Agricultural College	Ilocos Norte	Use of 40-kg technology for certified seeds (recommended seeding rate per hectare)
Claveria Rural Vocational School	Cagayan	Use of 40-kg technology for certified seeds
Bayanihan National High School	Aurora	Integrated pest management (cultural method of controlling pest such as use of attractants for rice bugs)
Ibona National High School	Aurora	Integrated nutrient management (application of zinc sulphate in low-lying fields); not burning rice straw
Panan National High School	Zambales	Use of 40-kg technology for certified seeds, controlled irrigation, integrated nutrient management (fertilizer application)
Balagtas National Agricultural High School	Bulacan	Integrated pest management (judicial use of pesticides)
Libon Agro-Industrial High School	Albay	Use of minus-one element technique, leaf color chart, and certified seeds; not burning rice straw
Dingle National High School	Iloilo	Use of 40-kg technology for certified seeds
Southern Samar National Comprehensive High School	Eastern Samar	Use of certified seeds
Leyte Agro-industrial School	Leyte	Use of certified seeds
Malalag National High School	Maitum, Saranggani	Use of certified seeds

through the adoption or adaptation of certain practices, the chance is high that farmers can have higher rice yield. For instance, if farmers use certified seeds, theoretically, there is a promise of 10 percentage yield increase compared with the regular seeds often used by farmers. Table 3 presents the instances of adoption/adaptation documented during the monitoring activities of the campaign. Farmers mostly adopted seeds and seed-related technologies or practices (Table 3).

In the campaign website, there is a video documenting how an infomediary, a high school student from Bulacan, was able to convince her uncle and father to reduce pesticide use. She explained the dynamics of helpful and harmful organisms in the rice field, which she learned from her training at PhilRice. In our interviews, students in Aurora were able to convince their parents to try readily-available attractants to manage pests such as black bugs.

In the interviews and in the data in Table 3, it is convincing that easy-to-follow technologies and those that do not require much input were adopted quite easily by farmers. This raises concerns and reinforces perennial issues of Filipino farmers' challenges in raising capital to finance their input-intensive rice farming operations (Arida 2009). This is something that the campaign can no longer cover, and hence, it would do well for other development interventions to come in.

Combined Stakeholder Theory and Livelihoods Approach and the Infomediary Campaign

This section of the paper explains the results of the Infomediary Campaign implementation and reception in host communities using the combined Stakeholder Theory and Livelihoods Approach. In assessing the implementation and reception in host communities, the team members considered the extent of information searching and sharing of information on CSA, the level of support extended by school officials, and the overall execution of the campaign in the sites evaluated.

Table 4 presents the summary of analyses made. The main headings are the assets considered important in the Livelihoods Approach. The last column shows the scores given by the authors to the participating schools.

Central to the analysis, the three assumptions of the combined theory are the following:

1. The extent of vulnerability set forth in the Livelihoods Approach will determine the behavior of the stakeholders toward a development initiative.
2. High vulnerability of stakeholders will result in negative repercussions on the campaign.
3. The level of intervention that will be extended to stakeholders will be influenced by their level of vulnerability.

Likewise, it would do well to operationalize vulnerability. In the context of this research, we wish to equate vulnerability with two things: (1) information poverty (i.e., having poor access to information on CSA); and (2) not practicing cost-reducing and yield-enhancing rice production technologies.

Assumption 1. The extent of vulnerability set forth in the Livelihoods Approach will determine the behavior of the stakeholders toward a development initiative.

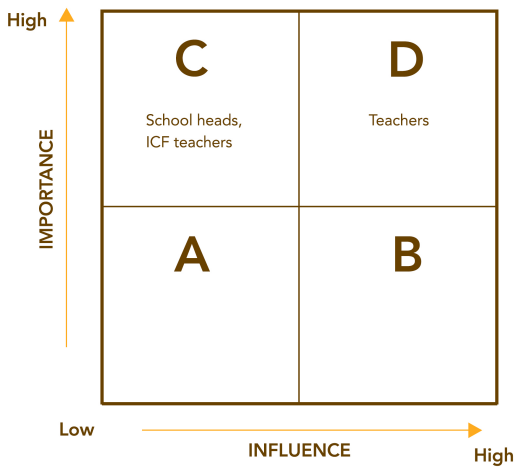
Vulnerability in all sites is somewhere between moderate and high intensity. In all sites, it can be said that the campaign was well-received, with some degree of variability. Hence, a conclusion that can be derived from the data concerning Assumption 1 is that more vulnerable areas will be more appreciative of the Infomediary Campaign or any similar initiatives. Aside from vulnerability, relevance is another important driver that can lead to a higher chance of appreciation of a development

Table 4. Characteristics of the campaign sites

School	Human Capital	Financial Capital	Social Capital	Physical Capital	Natural Capital	Team's Assessment*
Ilocos Norte Agricultural College (INAC)	Highly competent and cooperative teachers	Agricultural (rice and garlic)	Farmers' associations are present	Not sophisticated but working computers; intermittent internet connectivity	Rainfed	8
Balagtas National Agricultural High School (BNAHS)	Highly competent and cooperative teachers	Agricultural; mostly industrial	Farmers' associations are present	Working ICT infrastructure	Low-lying area, sometimes flooded	8
Libon Agro-Industrial High School (LAIHS)	Highly competent and cooperative teachers	Agricultural (rice and vegetables)	Farmers' associations are present	Working ICT infrastructure	Irrigated	9
Dingle National High School (DNHS)	Highly competent and cooperative teachers	Agricultural	Farmers' associations are present	Working ICT infrastructure	Rainfed	6
Southern Samar National Comprehensive High School (SSNCHS)	Competent teachers; with some administrative issues (e.g., teaching load assignment)	Fishing and agriculture	Seed growers present	Poor ICT infrastructure	Good for fishing and agriculture	6.5
Agusan Pequeño National High School (APNHS)	Highly competent and cooperative teachers	Non-agricultural (tricycle driving, construction work)	No evidence of agri-related organizations	With internet connectivityn, no computer laboratory	Not within a rice farming community; not suited for intensive agricultural operations	8
Malalag National High School (MNHS)	Highly competent and cooperative teachers	Agricultural	Farmers' associations are present	Working ICT infrastructure	No irrigation, weather extremes (very wet and very dry seasons)	9
Cateel National Agricultural High School (CNAHS),	Highly competent and cooperative teachers	Agricultural (vegetables and rice)	Farmers' associations are present	Poor ICT infrastructure	Irrigated	9

Note: * Team's assessment of the campaign implementation and reception; 1 (1–10, 10 highest)

Figure 6. Key stakeholders of the campaign plotted in Gavin and Pinder's (1998) influence-importance map



initiative. All sites, except BNAHS and APNHS, are predominantly agricultural; most of them are located in rice-farming communities. Hence, a campaign that talks about how to improve rice farming practices will be appreciated in these areas.

Assumption 2. High vulnerability of stakeholders will result in negative repercussions on the campaign.

Assumption 2 is not supported by the findings. As mentioned, all areas evaluated can be said to be highly vulnerable yet they all received the campaign quite well. Additionally, even the differences in natural capital did not seem to affect campaign implementation and reception in the areas. The cases of INAC, BNAHS, APNHS, all within not so favorable areas, show that unfavorable rice environments do not necessarily lead to negative reception of a development initiative. In fact, the opposite may be true because these areas will be needing more assistance on how to improve their rice farming practices.

Assumption 3. The level of intervention that will be extended to stakeholders will be influenced by their level of vulnerability.

Figure 6 shows how the different stakeholders can be engaged to optimize impact from this initiative. The campaign had several stakeholders, but for this purpose the focus will just be on the school heads, teachers of Internet Computing Fundamentals (ICF) classes, teachers of crop production classes, and students who were the key players in the campaign. As we write, we could not find stakeholders who would fall under Type A (those with low influence and low importance) and Type B (those with high influence but low importance). Type C (those with low influence, as they did not really have direct power over the students, but with high importance, as their participation can increase the chance that the project will be successful in the school) stakeholders are school heads and ICF teachers. For instance, in LAIHS, among the secrets of the successful campaign implementation was the fluid collaboration between the ICF teacher and the crop production teacher. The school heads can be instrumental in settling any ground politics within the school. The students also fall under Type C. While the students are very important to the success of this initiative, there are plenty of limitations that hinder them from performing their roles such as a self-imposed perception that they are not credible enough to talk about rice and because they were young.

Type C stakeholders must be closely engaged. For the ICF teachers, it is important that they be kept informed on the latest ICT-related aspects of the campaign. The school heads must be oriented on the goals of the campaign (so active forms of engagement are necessary) from time to time. This is something that requires repetition as school heads are often reshuffled. For the students, it is important that creative ways to engage them are in place lest they forget the good points of the campaign.

Crop production teachers are Type D stakeholders. They can very well influence several other stakeholders in the community aside from the students. Their relevance is something that was validated in the communication pathways section discussed earlier. These teachers must be retooled from time to time to ensure that they pass on correct and updated information (Table 4).

CONCLUSION

This paper has established several things. First, there is sufficient evidence to show that young people sought and shared information on CSA to farmers in their respective communities. Second, some of the characteristics of students who are most likely to share information on CSA were identified. Hence, these are good inputs in the further scaling up of this initiative. Third, the types of information relating to CSA that can be competently shared by the students were also identified, which serve as good inputs in segmenting the messages that should be focused for various stakeholders. This paper has argued that there are limitations to the types of messages that the students can competently convey to others. Fourth, this paper established the various communication pathways for CSA information to reach the farmers. Thus, the findings in this research have reframed the discussions concerning infomediaries. If before the focus was on the infomediaries (the high school students), this paper has argued that the teachers should be the focal point of discussion. Furthermore, there is a pressing need to look at the whole process of infomediation. Fifth, this paper presented instances of adoption of CSA practices and technologies passed on by the infomediaries.

Theoretically, researchers can continue to unpack the infomediation process. What we did in this paper is to start the call to shift focus of inquiry from the infomediaries to infomediation. This shift offers fertile ground for research. The characterization of the infomediaries can be continued by working on several variables and doing cross-tabulations. Researchers who are into intensive immersion work may do well to expound the work we have started on documenting new communication pathways for CSA information to reach farmers.

While the paper seems to suggest that plenty of good things have happened relating to this initiative, there is a need to look critically into some factors that can weaken its impact and sustainability. Reshuffling of school heads, changes in the teaching loads of teachers, and stability of institutional support are among these things. School heads having new assignments mean that new forms of engagement are needed to engage the ones replacing them. This is not always an easy thing to do considering personnel issues on the side of the implementers. The background of the new school heads should also be considered, as this will ultimately affect the way s/he sees the campaign. Changes in the teaching load of teachers are inevitable and among the major challenges in the Philippine public education system; and this one requires major policy interventions from DepEd. The stability of institutional support to this initiative is an important consideration. The campaign must be properly situated so it sits well within the major priorities of PhilRice or other institutions. In the final analysis, there seems to be no silver bullet, no easy answers on how to improve delivery of CSA information to the intended clients. The only thing that is certain is practitioners and researchers must keep trying because vulnerability to climate change is multifaceted, and therefore requires a multitude of strategies and approaches.

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