

MAKING TECHNOLOGIES WORK IN RURAL COMMUNITIES: THE CASE OF FLATBED DRYER APPROPRIATION IN STO. DOMINGO, NUEVA ECIJA, PHILIPPINES

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Citation: Vallejo, C.A.N. et al., 2021. Making Technologies Work in Rural Communities: The Case of Mechanical Dryer Appropriation in Sto. Domingo, Nueva Ecija, Philippines. *J. Asian Rur. Stud.* 5(2): 143-149

Abstract: This paper aimed to explain how rice farmers in Sto. Domingo, Nueva Ecija, Philippines managed to properly appropriate flatbed dryers. It also sought to identify the modes of appropriation of flatbed dryers and explain how the rice farmers appropriated the flatbed dryers. The study used the descriptive research design to gather information about existing conditions and to describe the nature of a situation as it exists at the time of the study. Data were gathered through a survey among 131 rice farmers and key informant interviews. Findings revealed that all of the respondents were aware of the existence of flatbed dryer in their community and claimed to have learned about it but only few became interested in using the technology. The rice farmers experimented and modified the features of flatbed dryers to better adapt the technology to their needs. The rice farmers have encountered problems in using the technology but have managed to employ adaptation strategies to address these problems which resulted to peer/group learning among them..

Keywords: Technology appropriation; Technology adoption; Farmers' technology adaptation; Philippines

1. Introduction

In the Philippines, various research and training institutions are mandated to create agricultural technologies that would help Filipino farmers attain better yield. For instance, the Department of Agriculture (DA), Philippine Center for Postharvest Development and Mechanization (PhilMech), and the provincial government of Nueva Ecija built 10 grain drying facilities at a total cost of 100 million or 10 million each, in the municipalities of Llanera, Sto. Domingo, Zaragoza, Quezon, Licab, Aliaga, Penaranda, San Leonardo, Cabiao and Jaen. Flatbed dryers were designed to help farmers dry their palay especially during rainy season to prevent losses. However, the Philippine's Commission on Audit (COA) has called out the provincial government of Nueva Ecija for this over 100 million worth of grain drying facilities in the province. COA's technical audit showed that the facilities were not operated long enough to recover the acquisition and operation costs because of several issues. Sixteen years after they were built, only 3 of the 10 facilities are operational. But the case is different among rice farmers in Sto. Domingo, Nueva

Ecija because they have managed to properly appropriate the flatbed dryers to make them work for their advantage.

Technology appropriation refers to “an active and creative process that ends in various usage and meaning patterns on both individual and social levels” (Wirth et al., 2006). It describes a process in which a technology is used for certain purposes and with certain intentions. According to Lund (2014), “appropriation is not just internalizing a technology but also involves being able to use such technology in human interaction”. Oftentimes, “these processes are never smooth, but full of tensions, friction and resistance.” Also, they are “closely intertwined with the social and cultural heritage in the settings they are part of, e.g. classrooms” (Lund, 2014).

Janneck (2009) explained that “appropriation involves the effort of users to make sense of the technology within their own context”. Compared to adoption which provides a background for understanding the decision to use a technology, appropriation seeks to explain the actual use of technology (Bar et al., 2007). Appropriation includes the ways in which people use new technologies after having adopted them.

This paper aims to: (1) describe the socio-demographic and farm-related profiles of rice farmers who appropriated the flatbed dryers; (2) identify the modes of appropriation of flatbed dryers; (3) explain how the rice farmers appropriated the flatbed dryers.

2. Method

This study used the descriptive research design. Descriptive method of research is designed to gather information about existing conditions and to describe the nature of a situation as it exists at the time of the study. As a particular form of descriptive research, this study employed the survey design.

The study was conducted in Sto. Domingo, a 3rd class municipality with 24 barangays in the province of Nueva Ecija, Philippines. It is bordered by the municipalities of Talavera and Quezon. As an agricultural town, Sto. Domingo is famous for its scenic agricultural landscapes. Rice is identified as the major crop in the area. Farmers in Sto. Domingo serve as intended beneficiaries of flatbed dryers. This study was conducted in three barangays in Sto. Domingo, Nueva Ecija, namely: Pulong Buli, Mambarao, and Malaya. These barangays were purposively chosen due to the presence of operational flatbed dryers and farmers who were using the technology or have used the equipment in the past. Random sampling was employed in choosing the survey respondents.

3. Results and Discussion

3.1. Profile of Rice Farmers

Majority of the study’s respondents were male (73%), married (79%), and educated up to high school level. Their mean age was 58 years while the average household size was 4. The data indicates that farming is still largely dominated by males; farming having been traditionally considered a strenuous job meant for men. Data on farmers’ age reflect an ageing population of rice farmers in Sto. Domingo, Nueva Ecija. According to the some of the respondents, it is common for younger population in their locality to go to urban areas to look for jobs whereas the older population remain in the village and constitute the majority of farmers. In terms of level of education, the data imply that all of the respondents had formal schooling and majority were fairly educated. This also goes

to show that farmers' education has improved compared in the previous years when farmers' education can only go up to some elementary years. The mean household size was 4, which is typical size of a Filipino family.

Mean size of respondents' farm land was 1.5 hectares; mean number of years farming was 32 years. This finding corresponds to Philippine data on farming which shows that Filipino farmers are small farm holders, i.e., farm size is 3.0 hectares or less. Data on number of years farming suggests that the rice farmers in the study have extensive experience in rice farming and that they could have been farming all their life.

Half of the respondents (50%) were not members of any organization. For those few who were members of organizations, three agriculture-related organizations were mentioned. These were: Viga Costra Irrigators' Association which is composed of farmers who benefit from the irrigation services provided by NIA; Pulong Buli Multi-Purpose Cooperative which deals with production and marketing of onion and rice; and Malaya Irrigators Association which is also composed of members who strive for sustainable operation and maintenance of irrigation systems.

3.2. Modes of Appropriation

3.2.1. Adoption

To discuss adoption as one of the modes of appropriation in this study, respondents were first asked whether they were aware of the existence of mechanical dryer in their barangay. Secondly, they were asked if they sought information upon hearing about the technology. Respondents were also asked if they have tried using the flatbed dryer and their reasons for using it. Lastly, in the actual adoption stage, respondents were asked if they continued/discontinued using the flatbed dryer.

3.2.1.1. Awareness

Awareness about the existence of a new technology is a pre-requisite for technology adoption, thus, respondents were asked when they first learned about the existence of flatbed dryer in their barangay. Table 1 reflects that 39 per cent of the respondents claimed to have learned about the technology during the period of 2011 – 2017. Hence, it can be observed that most respondents learned about the flatbed dryer years after they were built in their barangay since flatbed dryers were constructed in 2001. Those who have answered 1980 – 1990 were actually referring to the old model of flatbed dryer used during the Masagana99 Program of the government. This suggests a gap between period flatbed dryer was fabricated and the period farmers came to know about it. This gap can be a result of weak information dissemination about the technology. It can be noted that respondents who were actively involved in the usage of flatbed dryer were among those who learned about the technology earlier (2001-2010) while those who were not totally aware of its existence in the barangay learned about it from 2001-2017.

Table 1. Awareness on Existence of Mechanical Dryer

No.	Period (Year)	Frequency	Percentage
1.	1980-1990	7	5
2.	1991-2000	16	12
3	2001-2021	50	38
4.	2011-2017	51	39
5	Others (can't recall)	7	5
Total		100	100

3.2.1.2. Interest

Respondents were also asked if they actively sought information after hearing about the flatbed dryer. Findings revealed that majority (70%) of the respondents did not seek any information about the technology. Foremost among the reasons why the respondents did not seek further information is lack of interest (52%). According to the respondents, they no longer need to dry their harvest in the flatbed dryer because they need money to repay debts and to spend for household needs. Other reasons for not seeking information include: 1) satisfied with information received/know/information is enough, 2) sells fresh palay, 3) harvests small volume/small farm, 4) costly/high fee, 5) used to/satisfied with sun drying, 6) expects to learn from fellow farmers, 7) seen and operated dryer personally.

This finding reflects a low interest level among respondents. Interest is important if we want farmers to adopt a technology. The economic condition of farmers is also an important consideration in the introduction of any technology since farmers can only adopt what they are interested in and what they can afford. In the long run, richer farmers benefitted because they have the resources to buy flatbed dryer and more money to spend on rice hull. Rice traders were also using the technology to earn more. Cooperatives were used but these were not enough because members do not have enough money and the resources of the cooperative were very meager and were not enough to sustain/subsidize drying fees for the members. On the other hand, for those respondents (30%) who sought information about the technology mentioned that they sought information like how to use the flatbed dryer, its benefits and costs/fee. Others were interested to know how to own a flatbed dryer and become an operator. The most cited source of information was their fellow farmers followed by flatbed operators because they manage and operate the equipment. Respondents can easily ask them because they can see and experience the dryer first-hand.

3.2.1.3. Trial

As can be gleaned in Table 2, out of 131 respondents, only 54 (41%) have tried using the flatbed dryer after this was introduced to them. These respondents were mostly members of cooperatives, owned bigger farmlands and who were harvesting higher yields of rice than other respondents. These are actually the conditions for which the flatbed is intended for.

Table 2. Number of respondents who have tried using the mechanical dryer

No.	Have Tried Using Flatbed Dryer	Frequency	Percentage
1.	Yes	77	5
2.	No	54	12
Total		131	100

To cope with rainy season or typhoons was the common reason given by respondents who continued to use the flatbed dryer. Other respondents wanted to prevent spoilage of rice grains which would certainly lead to lesser income; hence, they opted to use a flatbed dryer. Other reasons mentioned by respondents were: 1) better quality and faster drying, 2) obliged as a cooperative member, 3) cope with changing weather conditions, 4) as an alternative to sun drying, 5) as a palay trader, 6) convinced by brother who tends the field, and flatbed dryer can be used anytime of the day.

The respondents who initially tried the technology have at some point stopped using the flatbed dryer. Their reasons are presented in Table 18 and were categorized into: 1) environmental, 2) economic and 3) technical/mechanical. Environmental factors refer to weather patterns which affected the use of the technology. Economic reasons deal with monetary constraints involved in using the technology. Technical/mechanical reasons are those related to the operation of the machine and the quality of dried palay.

Under the environmental factors, the weather condition was commonly cited by the respondents for discontinued adoption of the flatbed dryer. The respondents said that since there were no strong typhoons in the province in the past years, they opted to sun dry during dry season and sell their rice harvest without drying it during the wet season.

In terms of economic reasons, the respondents said that they stopped using the mechanical dryer and decided to sell their palay without drying it because they do not want to spend more money in drying their palay. Although, respondents shared that they could have generated more income if they sell dried palay because it would cost more. On the other hand, under the technical/mechanical reasons, respondents have shared that they quit using the flatbed dryer because of frequent malfunctioning of the equipment. Respondents also claimed that when it malfunctions, it would usually take much time to be repaired because spare parts are not readily available.

The above-mentioned reasons affected the adoption of the flatbed dryer among its intended-users. Based from the results, among farmers, adoption is not just a matter of deciding whether to use the technology or not. It involves carefully considering not only the economic conditions of the intended-users but also technical aspects of the technology to be distributed and the suitability of the technology to fit into different weather patterns. It can be noted that the respondents saw the flatbed dryer as a 'weather-dependent technology', that it is only useful during rainy season and they can always sun dry during the dry season.

3.2.2. *Adaptation*

Adaptation, one of the measures of appropriation, is important so that farmers can "fit" the technology into their farming practices and to their social and economic conditions.

First, technical/mechanical problems were encountered. Those who have tried drying their palay in the flatbed dryer claimed that their palay has smoke-like odor after being dried in the flatbed dryer. Some respondents said that their grains broke into chips when dried. To solve this problem, the operators experimented and dried only 80 cavans instead of the recommended 100 cavans capacity of the dryer. According to the operators interviewed, drying 100 cavans per batch caused uneven drying of palay while drying 80 cavans only resulted to better quality of dried palay.

Second, rice farmers were also faced with economic problems in using the technology due to expensive drying fee per cavan and cost of rice hull for fuel. The flatbed dryers were given free by the government to operators who were willing to donate a parcel of their land on where the units will be installed. The unit was given free but users will have to shoulder the expenses in drying their rice; this includes rice hull and gasoline.

Lastly, one social problem was also noted. During the peak of flatbed usage especially during typhoons, farmers experience long waiting hours before they can dry their palay. Since there was only one flatbed dryer in the barangay. To cope with this situation, they arranged their schedule in drying the palay to accommodate all farmers.

Based from these mentioned problems, it can be observed that despite of the shortcomings of the designed flatbed dryer, rice farmers chose to use it in unique ways. They did not remain to be passive recipients of the technology but rather made ways to make the technology useful in their local settings. This also implies that the success of a technology cannot be measured by mere adoption, rather, it has to be adapted to its users' needs and even more important to their social and economic development. It also noteworthy that the farmers' efforts in appropriating the technology led to the re-configuration of the flatbed dryer by service providers, that is, new designs were invented to address the limitations of the previous design.

3.2.3. Peer/group learning

According to FAO (2010), innovation takes place primarily in groups. For cooperative members interviewed, one of the opportunities where they were able to access timely and reliable information was through attending cooperative assemblies. During these gatherings, their leaders shared information about the flatbed dryer. This was also a venue where they shared their knowledge and experience in using the flatbed dryer to their fellow farmers. This is why most of the users of the technology were cooperative members because they saw the benefit of using the flatbed dryer from their fellow cooperative members.

Another opportunity for peer/group learning was through attending seminars and trainings. There was a very low number of rice farmers (24%) who had attended seminars and trainings related to flatbed dryer. This implies that even if the Municipal Agricultural Officer (MAO) of Sto Domingo and other national agencies adjacent to Sto. Domingo had been organizing trainings and seminars all these years, still a great number of farmers have not maximized these opportunities for learning and advancement of their rice farming practices. The farmers mentioned that they prefer to apply to their traditional farming practices. They were also passive and only wanted to be visited in their farms rather than be actively attending seminars and trainings. For some respondents, time is essential and they would rather spend it in their farm. In contrast, those with bigger farms had attended seminars and trainings because they have laborers tending their farm.

Moreover, few of the respondents interviewed were members of a Farmers Field School (FFS) that meet every Thursday. In the FFS, they learn more about rice production to help them increase rice productivity. The FFS was organized by PhilRice in partnership with MAO of Sto. Domingo.

It can be noted that the respondents learned more about the flatbed dryer through their cooperatives. For those who were not members of cooperatives, information flow usually happened with their fellow farmers and relatives. Generally, learning was more positive for farmers who were members of cooperatives because they were provided with up-to-date information since service providers usually target farmers in formal groupings.

4. Conclusion

Most of the respondents were male, aged 45-64, married have formal schooling, an average household size of 4. They own 1.0 hectare of farm; have high farm experience, but rarely attend seminars or trainings and only a few have organizational affiliations. The modes of appropriation in this study were: adoption, adaptation, and peer/group learning. All of the respondents were aware of the existence of flatbed dryer in their

community and claimed to have learned about it during the period of 2011-2017. Among those who were aware, only few became interested in using the technology. Also, a number of users quit using it as early as 2001 when it was newly introduced. The rice farmers have encountered problems in using the technology but have managed to employ adaptation strategies to address these problems which resulted to peer/group learning among them. Contrary to the common notion that farmers are passive users of technology, rice farmers in this study have actually modified the use of flatbed dryer to fit into their conditions. They also experimented, tried out possibilities, and modified its features to better adapt the technology to their needs.

Funding Support

This work was supported by the Philippine's Commission on Higher Education through the Faculty Development Program Scholarship. The authors greatly acknowledge the funding support given by CHED.

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