Comparative Analysis of Coffee Farming Practices Introduced by Government and the Private Sectors in Paksong District, Champasak Province, Lao PDR

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This study examined the differences between the government-supported farmers (GSF) and the private-led farmers (PLF) in Paksong District, Champasak Province, Lao PDR in terms of investigating the support system available to them and adoption of recommended coffee farming practices. The study is important given the worldwide growth of the coffee industry and the resurgence of interest in coffee bean production. With the thrust of exploring the potentials of private sector to provide critical extension services, it is imperative to investigate the strengths and limitations of both the government and private sector.

While private extension is considered an efficient alternative to government, results showed that there is no distinct difference in terms of the strength of methodology and adoption of practices between GSF and PLF. Group extension, a strategy adopted by both the government and private sector, shows promises of strengthening farmer power in facilitating the provision of needed support in information, credit and marketing. Moreover, given the fact that a large number of farmers do not adopt certain recommended farming practices, training of extension workers and farmer extension workers should be prioritized.

Promoting farmer's groups or training farmer leaders who will serve as extension workers might serve as a useful strategy to spread information and promote recommended practices

given the geographical condition of the area. Interventions may be addressed through participatory and group methods where farmers themselves play a central role in the education and regulatory aspect of extension. While extensive educational support is given to farmers, the Lao coffee farmers still have difficulty penetrating the export market due to problems in meeting international quality standards. Complementation between the private and government sector in terms of standard setting and provision of support services is particularly important.

KEYWORDS: adoption, extension support system, private led extension, participatory extension, farmer education

INTRODUCTION

The Lao People's Democratic Republic (Lao PDR) is a landlocked country in South East Asia bounded by Thailand, China, Myanmar, Cambodia, and Vietnam. It has an estimated population of 6.677 million growing annually at 2.8 percent. With a land area of 236,800 km², its population density of 22 people/ km² is the lowest in Asia (DOP, 2007). Eighty percent of the Lao population live in the rural areas and work in agriculture, fishery, and forestry sectors. The agriculture sector, which contributes 51% of the GDP, grows at 4 percent/annum (DOP, 2007).

Coffee is an important commodity and a substantial source of income for the rural population. The crop was first introduced to Lao by the colonial French in the early 1900s. It has been cultivated in the different areas of the country, but the Boloven Plateau in the Paksong District in Champasak Province has the most suitable conditions for coffee growing. The coffee growing tradition was generally weak until the 1980s when the government encouraged lowland farmers to start coffee production in the Plateau. By the mid 1990s, there were 49,508 hectares of coffee planted in Lao PDR and 66% of that total land area is in Champasak province (DOA, 2008). The number of coffee farmers and corresponding hectares devoted to coffee has since increased.

Coffee production is mainly carried out by small farmers with the government acting as a coordinator for the collection and export of the coffee. The coffee sector is under the supervision of the Ministry of Agriculture and Forestry (MAF) for all aspects linked to production and the Ministry of Industry and Commerce (MIC) for market issues. In the mid-1990s, the government began to encourage

private sector investment in Lao coffee production (DOA, 2008). One of the important private companies in the coffee industry is the Dao Heuang, which contracts smallholders with zero input and low yield management systems. The company is involved in the whole supply chain operations of coffee from field operations to roasting and export. It also has a coffee plantation covering about 300 hectares (Dao Heuang Coffee, 2007).

Over the past 20 years, the Lao government and various public and private development agencies have worked to introduce hearty, high yielding coffee plants to the Boleven Plateau to increase farmer income. Lao authorities have encouraged farmers to plant Arabica coffee variety through successive development projects in the Plateau (GTC, 2007). Both government and private agencies have also implemented extension programs for cultural production to support the input of high-yielding varieties. These included cultural practices in seed preparation, transplanting, fertilization, disease control, harvesting, and drying.

On the government side, the National Agriculture and Forestry Extension Service (NAFES) transfers appropriate technologies through regular training, field visits, and use of impact points, district agriculture center, and the group approach. On the private side, Dao Heuang provides extension services to small producers (2 to 3 ha) in the Paksong district through training, demonstration, and farm visits by expert technologists.

However, agriculture and agribusiness remain to be characterized by low productivity due to inefficient practices, inadequate technology, and lack of access to credit and markets due to poor infrastructure (DOP, 2007). Coffee export of Lao PDR has also fluctuated in recent years from 14,000 tons in 2000; 23,650 tons in 2004; 6,877 tons in 2006; and 16,365 tons in 2007. One of the major reasons for this fluctuation is the reduction in production due to inclement weather and lack of technology (GTC, 2007).

A more holistic approach to small-farm development is therefore required to raise the productivity and income of small coffee farmers. It is important to know the actual practices in coffee farming practiced by government and private-led farmers, given that literature would show that private led extension is seen as a better option (Rivera & Qamar, 2003). Studying the provision of extension from the private and public sector could lead to an understanding of the probable reasons for possible productivity in one and inefficiency in another. Proper extension interventions could then be implemented that could

lead to increased income and a better quality of life for the small farmers.

OBJECTIVES OF THE STUDY

The specific objectives are to (1) describe the socio-economic characteristics of government-and private-led coffee farmers; (2) describe the level of adoption by the government and private coffee farmers of recommended coffee farming practices; and (3) determine the relationship between selected socio-economic factors, extension methods and farming support factors, and adoption of recommended coffee farming practices.

THEORETICAL FOUNDATION

The landmark study that would eventually define the nature of agricultural extension research up to the 1980s was the 1943 diffusion research of Ryan and Gross on hybrid corn in Iowa, USA. Diffusion looks into the spread of innovations among groups or communities over time. According to Ryan and Gross, farmers adopt a new idea or practice after undergoing several stages in a process, namely: awareness, interest, evaluation, trial, and adoption or rejection (Rogers, 1983).

Later researches tried to answer what variables were related to innovativeness, the features of technology considered by adopters, the rate of adoption of an innovation and the factors that explain this rate, and the role of different communication channels in the various stages in the innovation-decision process (Rogers, 1983).

The continued use of diffusion theory in extension strengthened the belief that adoption of technology would ultimately lead to improvement of the quality of life of the people. This linear approach to agricultural development dominated agricultural development paradigm and led to the creation of government extension systems to transmit technological innovations to farmers. Engaged mainly in facilitating adoption of technological innovations, agricultural extension workers are adept at assisting farmers acquire attitude, knowledge and skills needed to use the innovation. Swanson and Clarr (1984) aptly defines extension as an "ongoing process of getting useful information to people and then assisting those people to acquire the necessary knowledge, skills and attitudes to utilize effectively this information or technology." However, given the crises

in extension (Rivera, 1999), the extension concern extends beyond diffusion of knowledge to studying the best way of capacitating farmers.

Organized during the rise of the scientific and industrial revolution, it is no wonder that extension would focus on dissemination of scientific information and technology as a means to increase food production. The success of the Cooperative Extension System of the USDA in increasing productivity and consequently, income of American farmers, further reinforced the view that subscribing to scientific body of knowledge and adoption of technology would bring about increase in productivity and income. With the entry of green revolution, this thrust became more evident as public extension systems were organized to promote the use of "a package of technologies" designed to bring about rice food sufficiency, and increased income.

The 1990s saw decreasing public budgets and demands for greater transparency and accountability. Extension as public institutions underwent major restructuring to address issues related to effectiveness and efficiency. Public extension organizations were either trimmed down, devolved, decentralized, privatized and/or explored other financing schemes. This restructuring was coupled with what Patton (in Coutts, 1994) referred to as "soul searching" as extension was embraced and there were more complex issues related to agriculture in addition to being preoccupied with its traditional role of technology transfer.

Given the fiscal crises faced by government institutions and the increased access of information through multi-media, privatizing extension has become a major alternative especially to developed countries. In other developing countries, partnership between private and government became an option. Innovations in service delivery extended in the fiscal system as organizations explored funding mixes which included private delivery and public funding in the form of contracting out, provision of subsidies to hire private extension workers, or selective funding of services for the poor and full payment for those who can afford (Rivera, 2004, Rivera & Qamar, 2003, and Smith, 2001).

The role of institutions in development cannot be discounted. To address the complexity of issues facing extension, Anderson and Crowder (2000 in van den Berg, 2001) calls for pluralism in concerns, service delivery and funding. This move recognizes that extension has ceased to be the sole domain of the public sector and thus, should

now catalyze on the multiple players in extension. However, one of the key principles in maximizing contributions of different institutions is to determine which among them can best provide the service or information and avoid duplicating one another.

CONCEPTUAL FRAMEWORK

Adoption of farming practices can possibly increase crop yield. The decision to adopt or not to adopt farming practices is believed to be caused by many factors such as socio-economic, farming support factors and extension methods used to disseminate or teach the technologies. These factors may be directly or indirectly related to adoption of new agricultural technology. This study believes that these factors influence the rate of farmers' adoption of agricultural innovation and the farming system that is eventually adopted. As indicated in Figure 1, socio-economic factors, extension method, and farm support factors are considered as fundamental in the adoption of agricultural technology and of the practices in farming system. In order to adopt coffee farming system technologies, the family household apportions certain types of input like land, labor, capital and management to help them attain and satisfy their goals and aspirations. It is also assumed that extension methods influence the farmers' knowledge about a farm innovation or agricultural technology. This is due to the fact that extension is a tool for teaching people to understand, accept, and use the new technology in their farm operations.

Methods include individual, group extension and mass media extension. Evidence from researches indicate that farmers who have contacts with extension agents respond more positively to new practices than those who do not have contacts. The proposed relationship between socio-economic factors, extension method, and farming support factors (independent variables) and the adoption of the recommended coffee farming practices (seed preparation, transplanting, fertilization, harvesting and drying (dependent variables) is illustrated in Figure 1.

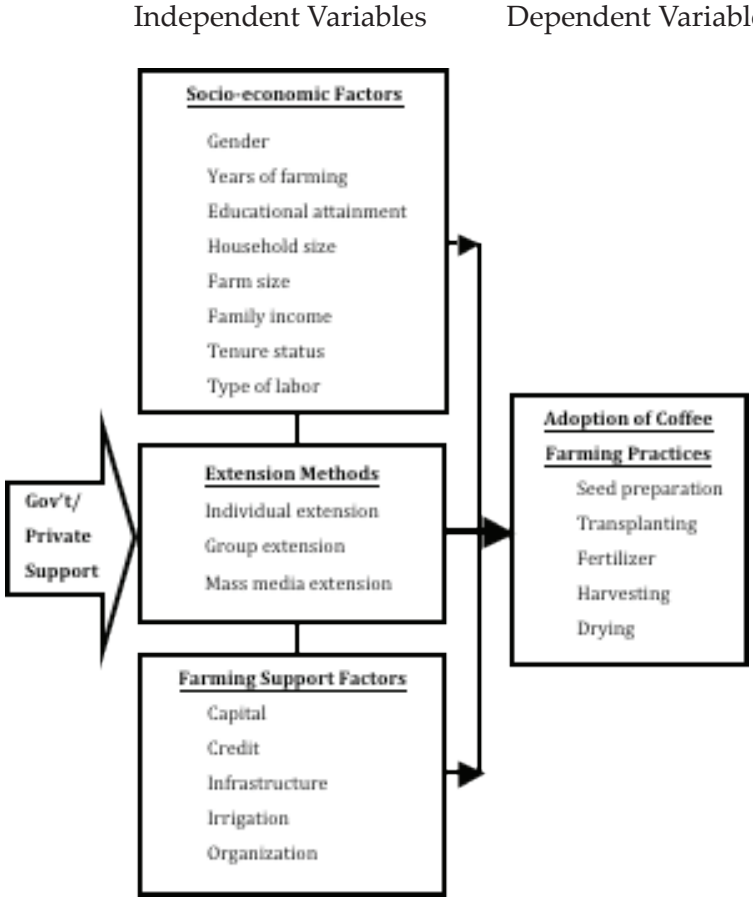

Figure 1. **Conceptual framework of the study**

METHODOLOGY

Study Site. The study was conducted in Paksong District in the Province of Champasak, Lao PDR, the center of coffee growing in Laos. It is located in the southern tip of the country, approximately 750 km from the capital city of Vientiane. The area encompasses much of the Boloven Plateau and is classified as a coffee farming system area. The coffee area of Paksong District, specifically in Salavan, Sekong, and Attapeu provinces have an area of about 24,780 hectares, representing about 50% of total coffee farm area of Lao PDR.

Respondents. The respondents were selected using multi-stage

random sampling. A total sample size of 137 respondents was identified, 69 representing GSF from three villages and 68 respondents representing PLF, also from three villages. In the selected villages, proportional allocation of the farmer-respondents was made from the 427 farming households using the minimum acceptable size of 10 percent margin of error (Slovin, 1980). The distribution of the respondents by sector and by village is shown in Table 1.

Table 1.

Distribution of respondents by sector and village

Sector	Villages	Number of Household	Sample Size
Government	1. Phou oy	75	24
	2. Katuate	70	22
	3. Lak 5	73	23
	Total	**218**	**69**
Private	1. Lak 11	76	25
	2. Nonglaung	68	22
	3. Lak 40	65	21
	Total	**209**	**68**

Total respondents = 137 people

Data Gathering Methods. Data were obtained from secondary and primary sources. Secondary data were taken from the Southern Coffee Research Center, District Agricultural and Forestry Extension Office (DAFEO) and Department of Agriculture (DOA). The study also used unpublished data gathered by other researchers who studied coffee farming. Primary data were collected through survey. In the evaluation of adoption rate, the recommended practices on seed selection, transplanting, fertilizer application, harvesting and drying were read and explained to them. Respondents were asked to rate their adoption rate using a scale of 1 – 3, with 1 as non adoption, 2 as adopting some of the recommended practices, and 3 as full adoption. The recommended practices were based on literature review and subjected to verification of both the private and public extension workers who confirmed adherence to the same set of recommended

practices.

Statistical Analysis. The following statistical tools were used in the study: (1) descriptive statistics such as means, ranges, percentages, and standard deviation to describe the characteristics of the variables of the study such as socio-economic factors, extension methods, farming support factors between government supported farmers and private led farmers; (2) t-test to compare the differences between adoption by government-supported farmers and private-led farmers on coffee farming practices; and (3) chi-square test to determine the relationship between socio-economic, extension methods, farming support variables and adoption of coffee farming practices of the government-supported farmers and private-led farmers.

RESULTS AND DISCUSSION

Socio-Economic Factors

Of the 137 farmers, majority of the GSF (56.1%) have been in coffee farming between 11 and 20 years, while the PLF farmers (39.4%) have been growing coffee for a maximum of 10 years. Significantly more GSF farmers had been farming for more years than the PLF farmers. Majority of the respondents are farm owners and have farm sizes of between 3 – 5 hectares. More than half of the GSF (71%) and the PLF (77.9%) used family labour as the human resource for their farms, a number used a combination of family and hired labor (26.1% for the GSF and 20.6% for the PLF) and a negligible number used purely hired labor.

Majority attended elementary grades (86% for the GSF and 78% for the PLF), and the highest educational attainment is high school level. Close to half (GSF-60.9% and PLF-45.6%) had household members between 4 and 6 persons. The average family income of GSF is 18,104,000 LKIP (US$ 2,130) and 17,663,000 LKIP (US$ 2,078) for the PLF. Both figures are not very far from the GDP per capita for 2009 estimated at $2,100 (CIA Factsheet).

Farming Support Factors

Farming support factors such as capital and credit, postharvest and irrigation facilities, organizational support, and extension methods affect the rate of the adoption of an innovation.

Capital and Credit Support. More than half (56.5%) of the GSF

indicated that they had enough capital compared to the PLF where only 42.6% concurred they have enough capital. Chi-square test (χ^2 = 8.962*) showed that the GSF (61%) had significantly higher level of knowledge about agricultural banks compared to the PLF (37%). However, the PLF (41%) had significantly more knowledge about private money lenders than the GSF (17%), a significant difference between the two groups of respondents in terms of knowledge of credit availability and creditors.

As a result, majority of respondents from both groups (GSF-79.9%; PLF-83.8%) have never availed of credit to finance farm operations. For the rest who availed of loans, a large portion (43.8% of GSF; 36.4% of PLF) borrowed from the Agriculture Bank in order to avoid paying high interests demanded by other banks and the private money lenders.

Post-Harvest and Irrigation Facilities. There was no significant difference between the GSF and PLF in their access and use of these facilities. Majority of the GSF (72.5%) and the PLF (77.9%) used mats for drying coffee berry after harvesting and milling, used their houses as storage facilities (GSF 75% and PLF 75.8%). Majority of the GSF (73.9%) and over half of the PLF (58.8%) used rainwater to irrigate their crops while 23.2% and 36.8% of the GSF and PLF, respectively, used water from pumps.

Organizational Support. Both groups were not significantly different in their organizational membership. Majority of the GSF (78.3%) and the PLF (77.9%) were members of village organizations. Majority of the GSF (81%) and the PLF (74.1%) were also members of a coffee production group.

Extension Support. As for the individual extension approach, significantly more (χ^2 = 8.008*) GSF (92%) consulted with the extension worker once a month compared to the PLF (75%). This is understandable as the government system has established a national, provincial, and district-level extension system. The Village Extension Worker (VEW) facilitates the activities of the Production Groups (PGs) at the district level. The groups, composed of only 10 members appoint a leader who liaises with the extension worker, hence they learn and exchange techniques in agricultural production. The District Agricultural and Forestry Extension Office (DAFEO) is organized into the extension, technology, training, administration, planning, and management sections. The DAFEO helps create linkages between farmers and the sources of expertise, inputs, and services offered by government agencies and the private sector.

Because of the above government extension set-up, significantly more PLF (79%) took part in coffee production groups where coffee

farm management was the usual topic of discussion compared to the GSF (68%). This was significant at $\chi^2 = 3.062$ at 0.5 level of significance. Meanwhile, majority of the GSF (71%) and the PLF (67.6%) were not able to attend any demonstration or field trip programs.

As for mass media support, only their exposure and readership of pamphlets and topics read were significantly different between the two groups of farmers. Significantly (χ^2=2.584) more GSF (44%) received more pamphlets on coffee production than the PLF (18%). However, significantly (χ^2=3.856) more PLF (66%) read more on coffee production than the GSF (40%). Despite the limited number of print materials, the farmers showed interest to read, although some information was sometimes hard for them to process because of their limited education.

Overall, among the information channels, exposure to groups/ organizations tended to be more appropriate to the rural people where the farmers have limited material support and limited education to enable them to understand unfamiliar technology.

Adoption of Coffee Farming Practice

For this study, the recommended coffee farming practices of the GSF and PLF were limited to seed preparation and seeding, transplanting, fertilizer application, harvesting and drying. A description of recommended practices is read to the farmers and they were asked if they followed all, some or none of the steps. The farmer who followed all steps was given a score of 3; the one who follows only some of the steps was given 2; and the one who did not follow any of the steps was given a score of 1.

Majority of the GSF and PLF are only partial adopters of recommended seed varieties, seed preparation, transplanting and fertilization practices, harvesting and drying practices (*Table 2*).

Using t-test to establish significant differences between the GSF and PLF, results showed that for the partial adopters, significantly more PLF (84%) than the GSF (81%) adopted proper seed preparation (0.03). However, significantly (0.01) more GSF (93%) adopted proper transplanting practices compared to the PLF (84%).

Results show that both groups of farmers do not apply fertilizer during transplanting and do not know the correct timing of fertilization nor the frequency of fertilization. In fact, only one of the PLF and none of the GSF fully adopted the recommended fertilization practice. They also do not know the details on the actual age of coffee beans that should be harvested nor the required frequency of turning coffee beans in a day and length of time required in drying the beans.

Table 2.

Level adoption of recommended coffee farming practices by the GSF and PLF

Coffee Production Practices	Non-adoption				Partial-adoption				Full-adoption			
	GSF		PLF		GSF		PLF		GSF		PLF	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Seed preparation												
Criteria in selecting seed	5	7.1	6	8.4	25	34.7	29	40.7	1	1.4	0	0
Process of eliminating bad seeds	7	10.3	4	6.3	31	46.5	28	42.1	0	0	1	1.5
Total	**12**	**17.4**	**10**	**14.7**	**56**	**81.2**	**57**	**83.8**	**1**	**1.4**	**1**	**1.5**
Mean		8.6		7.3		40.6		42.9		0.7		0.7
T-test		0.67 ns				0.03*				0.37 ns		
Transplanting												
Age of transplanting	1	1.4	3	4.5	21	30.2	22	33.9	0	0	1	1.5
Planting distance	3	4.4	4	6.3	32	47.6	26	38.6	1	1.4	0	0
Application of basal fertilizer	0	0	1	1.4	4	6.5	3	4.5	0	0	0	0
Use of organic fertilizer	1	1.4	2	2.5	6	8.8	4	6.8	0	0	0	0
Total	5	7.2	10	14.7	63	93.1	57	83.8	1	1.4	1	1.5
Mean		3.2		7.3		46.5		41.9		0.7		0.7
T-test		0.21 ns				0.01*				0.16 ns		
Fertilization												
Kind of fertilizer use	3	3.2	4	6.2	3	4.2	6	8.1	0	0	1	1.5
Timing of fertilizer application	8	8.4	5	8.4	7	11.4	4	6.0	0	0	0	
Frequency of fertilizer application per annual	7	7.4	3	4.7	8	14.0	8	15.2	0	0	0	

Continued...

Coffee Production Practices	Non-adoption				Partial-adoption				Full-adoption			
	GSF		PLF		GSF		PLF		GSF		PLF	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Manner of applying fertilizer	19	20.1	14	18.9	24	30.4	19	25.1	0	0	4	5.9
Total	37	39.1	26	38.2	42	60.9	37	54.4	0	0	5	7.4
Mean		19.5		19.1		30.3		27.2		0		3.7
T-test		0.48 ns				0.07 ns				0.04 *		
Harvesting												
Criteria use in harvesting	21	30.1	18	29.0	25	37.4	31	36.7	0	0	1	1.5
Age of coffee bean when harvested	9	13.4	12	15.1	14	19.1	15	16.2	0	0	1	1.4
Total	30	43.5	30	44.1	39	56.5	46	52.9	0	0	2	2.9
Mean		21.2		22		28.2		26.4		0		1.9
T-test		0.13 ns				0.57 ns				0.24 ns		
Drying												
Material used for drying	4	6.0	2	3.1	41	56.0	45	61.7	1	1.5	1	1.5
Frequency of turning coffee bean in one day	2	3.0	1	1.2	9	14.4	7	12.6	0	0	0	0
Length of time in drying bean	3	4.0	4	6.0	8	13.7	8	13.9	0	0	0	0
Total	9	13.0	7	10.3	58	84.1	60	88.2	1	1.5	1	1.5
Mean		6.5		5.1		42		44		0.7		0.7
T-test		0.43 ns				0.21 ns				0.11 ns		

* Significant at 0.05 level; ns (not significant)

Relationship of Independent Variables and Adoption of Coffee Farming Practices

Among the socio-economic factors studied, there was significant relationship between educational attainment and adoption of recommended coffee drying practices. Household size was significantly related to the fertilization practices of the GSF. Moreover, family income of the GSF also showed significant relationship with the adoption of transplanting practices. For the PLF, educational attainment and household size were significantly associated with adoption of recommended coffee transplanting practices (*Table 3*).

Table 3.

Summary of Socio-economic Variables That Show a Significant Relationship with Adoption of Recommended Coffee Farming Practices

Variables	Coffee Farming Practices											
	Seed preparation		Transplanting		Fertilization		Harvesting		Drying		Overall	
	GSF	PLF	GSF	PLF	GSF	PLF	GSF	PLF	GSF	PLF	GSF	PLF
Education	—	—	—	.00*	—	—	—	—	.03*	—	—	—
Household size	—	.00*	—	—	.01*	—	—	—	—	—	—	—
Family income	—	—	.00*	—	—	—	—	—	—	—	—	—

* Significant at 0.05 level; (—) Not significant

For the GSF, mean production level is 426.8 kg/ha, while for the PLF, it is 427.2 kg/ha. Analysis using t-test showed no significant difference between the GSF and PLF in terms of coffee production although chi-square test of the fertilization and harvesting practices show significant association with yield for both GSF and PLF while seed preparation show significant association to yield only for GSF (*Table 4*).

Table 4.

Relationship Between the Coffee Farming Practices and Coffee Yield.

Coffee Production Practices	Coffee Yield	
	GSF	PLF
Seed preparation	0.02*	0.45
Transplanting	0.67	0.67
Fertilization	0.03*	0.01*
Harvesting	0.01*	0.04*
Drying	0.67	0.67

* Significant at 0.05 level; ^{ns} not significant

For extension methods used by GSF, consultation was significantly associated with their adoption of recommended coffee drying practices. Attendance to training was significantly associated with adoption of coffee seed preparation practices. For the PLF, visitation by extension workers was significantly associated with adoption of coffee seed preparation, fertilization and harvesting practices. In addition the use of demonstration program and participation in group discussion by the PLF was significantly associated with adoption of coffee drying practices. Listening to information broadcast over the radio was also significantly associated with transplanting practices in coffee farming. Educational interventions are indeed important in improving farm practices or in this case, coffee farming practices (*Table 5*).

Table 5.

Summary of Extension Methods That Show a Significant Relationship with Adoption of Recommended Coffee Farming Practices

Variables	Coffee Farming Practices											
	Seed preparation		Transplanting		Fertilization		Harvesting		Drying		Overall	
	GSF	PLF	GSF	PLF	GSF	PLF	GSF	PLF	GSF	PLF	GSF	PLF
Individual Ext												
Consulting	—	—	—	—	—	—	—	—	.00*	—	—	—
Visiting	—	.00*	—	—	—	.00*	—	.00*	—	—	—	.02*
Group Ext												
Training	0.01*	—	—	—	—	—	—	—	—	—	—	—
Demon-stration	—	—	—	—	—	—	—	—	—	.00*	—	—
Discussion	—	—	—	—	—	—	—	—	—	.00*	—	—
Mass Media												
Broadcasting	—	—	—	.01*	—	—	—	—	—	—	—	—

* Significant at 0.05 level; (—) not significant

Most of them (GSF – 70%; PLF – 53.9%) were interested to read information materials. However, these were not available, thus their inability to read.

Organizational support for the GSF was significantly associated with adoption of coffee harvesting and drying practices. The availability of infrastructure support was also significantly associated with the adoption of coffee transplanting practices and irrigation support was significantly associated with adoption of coffee drying practices by GSF. From among the GSF and the PLF, 56.2 and 45.4%, respectively, borrowed from savings groups to operate their coffee farms, paying monthly interest rates ranging from only 1 to 2 percent. However, this funding support is limited to members and money that can be borrowed is dependent on one's contribution to the saving fund.

Both the GSF (43.8%) and PLF (36.4%) also borrowed from the Agriculture Bank in order to avoid paying high interests demanded by the banks and the private money lenders. For the PLF, credit

support was significantly associated with their decision to adopt coffee transplanting practices while infrastructure support was also significantly related to adoption of coffee drying practices (*Table 6*).

Table 6.

Results of the Test of Relation Between Farm Support Factors and Adoption of Recommended Coffee Farming Practices by the GSF and PLF.

Variables	Coffee Farming Practices											
	Seed preparation		Transplanting		Fertilization		Harvesting		Drying		Overall	
	GSF	PLF	GSF	PLF	GSF	PLF	GSF	PLF	GSF	PLF	GSF	PLF
Capital support	0.41	0.75	0.43	0.09	0.23	0.61	0.40	0.48	0.81	0.54	0.75	0.57
Credit support	0.76	0.47	0.16	0.00*	0.06	0.71	0.14	0.87	0.11	0.23	0.51	0.38
Infrastructure	0.51	0.53	0.04*	0.39	0.22	0.46	0.14	0.48	0.40	0.00*	0.39	0.23
Irrigation	0.48	0.75	0.67	0.62	0.10	0.83	0.25	0.81	0.03*	0.17	0.45	0.18
Organization	0.41	0.72	0.12	0.53	0.12	0.30	0.02*	0.21	0.03*	0.41	0.09	0.2

CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS

Based on the major findings and conclusion of this study, most of the recommended practices in coffee farming were not fully utilized and applied by the farmers. Majority were partial adopters of recommended coffee farming technology, whether these be GSF or PLF. The following implications and recommendations in extension delivery are advanced:

1. Encourage complementation between government and private extension providers. While the private extension system is perceived to be more effective and efficient than the government extension system, no definite support to this was shown in the study. There is no significant difference in the adoption rate of farmer groups from government and private extension providers. Given the importance of coffee farming in the Laos economy, the low educational attainment of farmers, the prevalence of partial adoption of important farming

practices, the current set up of providing government and private extension is considered necessary until such a time that small landholder farmers are organized. Delegating the provision of the extension service to the private sector at this point may hamper productivity growth considering the limited capacity of the farmers to access information or to negotiate prices of coffee beans.

2. Continuously Design Simple Educational Interventions. Given that both GSF and PLF have low educational attainment, continuous educational interventions should be implemented through group interventions. This will help ensure that what is learned is implemented and what is not yet understood will be clarified. Furthermore, continuing agricultural information campaign should be conducted. This is important because most of the farmers are either not aware of the benefits derived from these farm practices or do not realize the importance of these practices to enhance coffee production.

For this matter, the following specific recommendations in enhancing education are recommended:

Provide Additional Support for Printed Materials. Majority of the farmers did not receive any printed materials from government extension workers, and private agencies. Hence, printed content like leaflets, pamphlets and brochures should be made available to the farmers. However, such materials should be simply written in accordance with the low educational level of the farmers to promote easy understanding. Such reading materials should be printed with the cultural practices of the users being considered.

Maximize Use of Radio Broadcast. One-half of the respondents owned radio and television sets. Radio is a cheap communication tool which the farmers can afford. Therefore, radio broadcast on agricultural topics should be organized among the farmers to respond to farmers' needs and action implementation. This can further enable farmers to decide on questions or comments that can be sent to the radio station or to the extension officers. However, the schedule of the radio broadcast should be according to the availability of these farmers.

3. Strengthen Group Approach in Extension. It is very important to enhance farmers' knowledge and skills and ability to access information through different extension approaches. Results showed that there was significant relationship between consultation, visiting, training, and group discussion and adoption of coffee farming practices by

the GSF and PLF. For an extension approach to be effective, it has to be concerned with educating the farmers to ensure that they make informed decisions. However, results showed that most farmers are able to consult extension workers only once a month, and have limited opportunities to attend trainings or field trips. Moreover, only very few among them joined farm demonstration activities. These group extension methods are very important considering that both groups of farmers have very low educational attainment. Group approach is important since the majority of respondents did not fully adopt recommended coffee farming practices, and average yield is slightly lower than national averages.

In this light, it is important to strengthen farmers' organizations. Organizations serve as channels to spread more information within a shorter length of time and with less effort and money. Moreover, organizations can also enter into agreements with processing enterprises and entities that could provide services on input and output in the coffee supply chain. Production groups are able to negotiate better prices for coffee produce if they organized. However, data showed that a number of respondents did not belong to production groups.

Aside from technical and marketing concerns, both the government and the private sector should focus on improving farmer's access to necessary agricultural support systems like credit and irrigation facilities. This is better facilitated through farmers' organizations.

4. Improve Knowledge on Necessary Agricultural Support System. Compared to the PLF, GSF have better knowledge of credit facility. The government (DOA, NAFES, and PAFEC) should therefore come up with educational interventions that would inform and educate the PLF about existing credit facilities.

Both groups have very limited access to credit. Most of them borrow from private lenders who charge high monthly interest rates. Currently, both groups borrow from the savings groups of coffee production groups, with the GSF having better access to the savings groups. However, savings groups charge much lower interest rate, only a few are able to borrow from it because farmers are unable to increase their contribution to the savings groups. It is therefore recommended that extension workers strengthen educational interventions that would encourage the farmers to save through coffee savings group.

A critical factor during coffee flowering is the availability of water

supply. The rate of coffee flowering has a direct impact on the overall coffee productivity of the farmers. However, at the present, most farms are left to the exigencies of the weather. To ensure water supply during the dry season, a project to increase access to water pumps must be implemented.

IMPLICATIONS TO THE PHILIPPINES

Agricultural extension adopts a pluralistic policy in the provision of extension services. However, it is in the provision of livestock industry where the private sector remains most active. With the increase in consumer interest for specialty coffee, private companies in the Philippines have been encouraging farmers to go back to coffee production. In Batangas, traditionally a coffee producing area, farmers have divested from coffee production in favor of livestock production due to the failure to control "coffee rust," increase in cost of labor and low market price. Of late, the private sector has been encouraging farmers to plant coffee and become contract growers, yet interest has not been very positive (Personal interview, Municipal Agriculturist, San Jose, Batangas, Philippines). The challenge in Philippine coffee production therefore extends not only in ensuring productivity and quality but includes promoting interest in coffee production.

Given that majority of Filipino farmers are aging and have low educational attainment like the Lao farmers, both the private and the government sector would benefit well from the findings in the Laos study, which shows that group approach maximizes learning opportunities. Similarly, meeting international quality standards remains a problem for Philippine agricultural crops. Hence, innovative and participatory extension methodologies should be maximized to directly engage the farmers in promoting educational campaigns and ensure adherence to regulations to increase possibilities of better adoption of recommended coffee farming practices and attain increased production of quality coffee beans.

However, given that coffee is a traditional cash crop of the country and that private companies dominate coffee production in the country, the government will benefit more if the provision of technical knowledge in coffee production is left with the private sector while the government sector focuses on setting quality standards in coffee beans production and packaging.

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