

A RAPID SURVEY
on
Farmers' Perception of the Benefits of
Agricultural Extension Services, Irrigation Systems, and Rural Roads



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I. Introduction and Methodology

This rapid survey was conducted to assess the evidence of the impact of public spending (including of government and donor financed projects) in three types of interventions: agricultural extension services, irrigation systems, and rural road improvement. The field survey was undertaken between 22nd February and 2nd March 2010.

The survey focused on the effectiveness of these public interventions, relying mainly on farmers' perception. In particular, the survey was intended to assess the effects that agricultural extension services, irrigation systems, and rural road improvement have had on agricultural production and local livelihoods. It also assessed the key challenges and opportunities in these areas.

Nine villages of Cambodia's rural settings were selected for this survey. Three villages were selected to focus on each type of the interventions: extension services, irrigation systems, and rural roads. Each village was also selected to provide a variety of some typical characteristics of villages in Cambodia, such as wet-season rice, dry season rice, cash crop, and remote ethnic-minority villages. The selection of the particular villages as described above was done through consultation with and suggestion from the relevant functional authorities at the provincial and district levels. Therefore, the sample villages were supposed to be among villages that best performed in their own types: extension services, irrigation systems, and rural roads. Table 1 below summarises the sample villages in the survey.

Table 1: Sample villages

No	Village Types	Village Names	Provinces
Public Intervention on Extension Services			
1	Vegetable	Koh Toch	Kandal
2	Dry season	Chuntul Maek	Takeo
3	Wet season	Samreth	Kampong Speu
Public Intervention on Irrigation Systems			
4	Flood control	Voiyeav	Kampong Thom
5	Small scale	Trang	Battambang
6	Reservoir	Damnak Kanseng	Pursat
Public Intervention on Rural Roads			
7	Rice surplus	Angkal	Prey Veng
8	Cash crops	Choim Tamao Koeut	Kampong Cham
9	Remote ethnic	Puchrey Chang	Mondulkiri

Source: Household Survey (2010)

The survey collected data from three types of respondents in each village: key informants in the village, farmers (from farming households), and labourers. Different semi-structured questionnaires were used for each type of respondents. Each village was started with one group interview with 4-6 key informants. Then, thirty farming households were interviewed in each village and five labourers were selected among the sample farming households who had members working as labourers for further interviews to assess the impacts of public interventions on local demand for labour.

The selection of the thirty sample farming households from each village was done differently for the extension service, irrigation, and rural road villages. In rural road villages, the sample farming households were randomly selected among all village households while farming households in irrigation villages were also selected randomly, but only among the village households that have access to an irrigation system. The method in the latter case was employed because the survey aimed to demonstrate the benefits of irrigation while the data on coverage of (or access to) irrigation among village households could be collected from the interviews with the village's key informants. In the case of extension service villages, the sample selection was targeting the households that were contacted by extension services. However, because the number of contacted farmers is usually 20-30 per village, the survey aimed to interview all the contacted farmers and included some non-contacted farmers into the sample.

The questionnaires for interviewing the farming households contained questions about agricultural extension services, irrigation, and rural roads. In each village, the main focus of the interviews was on questions associated with the selected intervention types, but all respondents are also asked a subset of questions on the other types of interventions.

II. Agricultural Extension Services

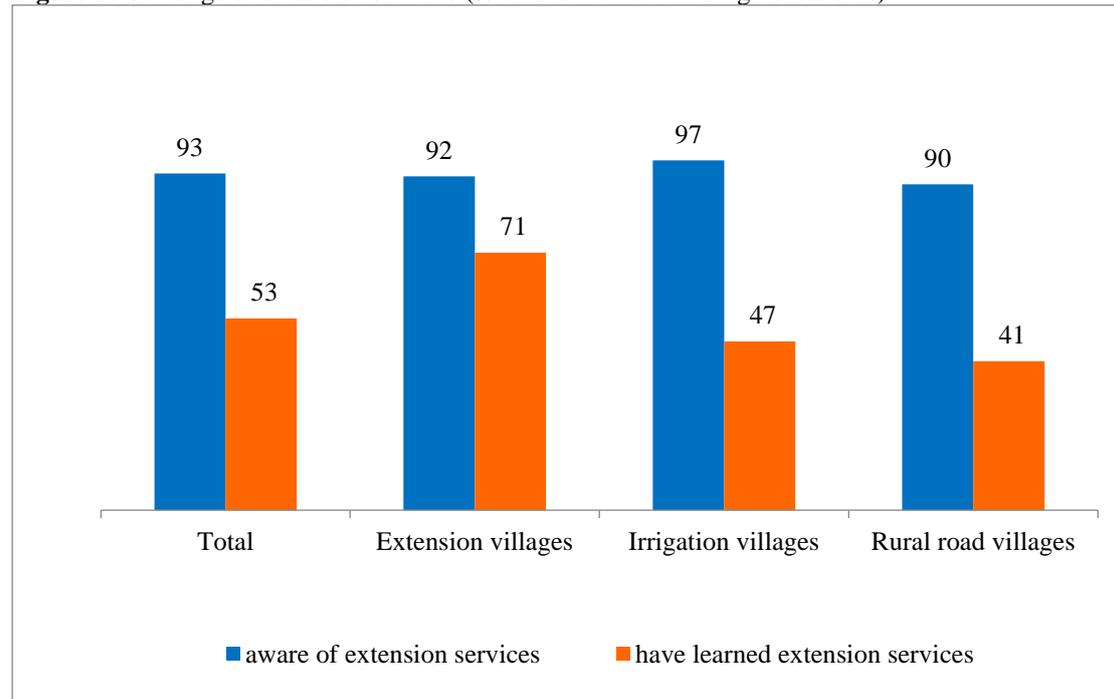
2.1. Coverage of extension services

Three villages were in particular selected to represent the type of public intervention on agricultural extension services; but, six other villages also reported having received extension services.

Overall, among the surveyed farming households, 53 percent have received agricultural extension advice (see Figure 1). The percentage of farming households having learned the extension advice is high in the three villages that were particularly chosen to represent the public intervention on extension services.

More than 70 percent of the interviewed households in the extension villages reported they had attended extension service trainings. The figure should not anyway be a surprise since the selection of the households in these three villages was purposively targeting those who had received extension service courses. While the survey aimed to interview 30 households per village, it attempted as much as possible to cover those farming households receiving the extension services. This simply means in extension service villages, the extension services reached about 20 farming households per village.

Figure 1: Coverage of extension services (% of interviewed farming households)



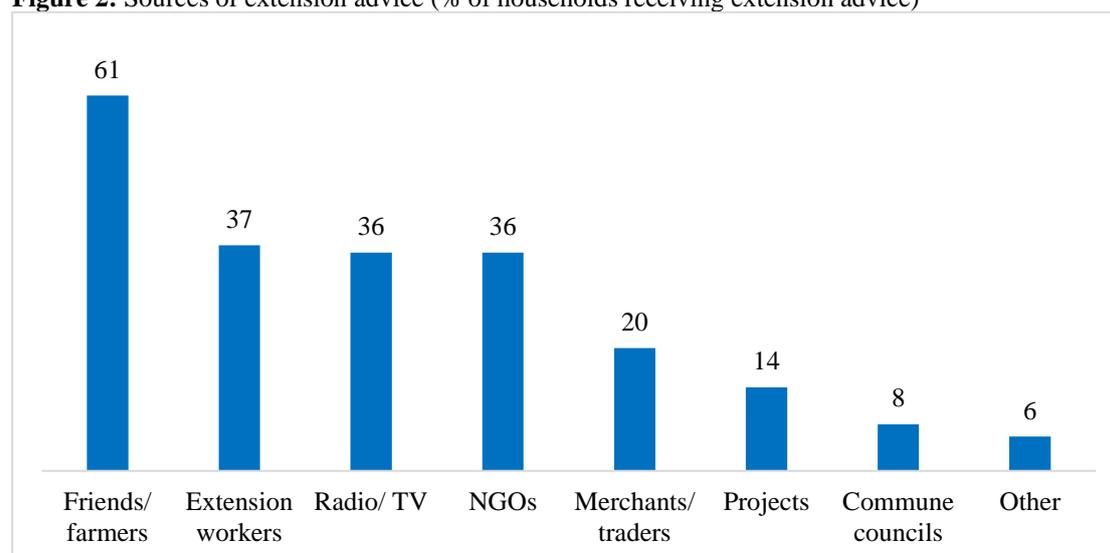
Source: Household Survey (2010)

The percentage of farming households having learned the extension advice still appears high in irrigation and rural road villages. Respectively, 47 percent and 41 percent of households in these two types of villages have benefited from the extension services. While the figure in irrigation villages can be influenced by the selection of the households that was in particular targeting those who have benefited from irrigation schemes, the statistics in rural road villages should be more representative given the random selection of the households in those villages.

The level of awareness about the extension services is generally high in all types of villages. Overall, 90-97 percent of the surveyed households were aware of the extension advice. The proportion of households being aware of the extension advice appears highest in irrigation villages (97 percent, which is about twice the proportion of farming households directly attending the extension trainings).

Farmers were aware of the extension advice through multiple sources (see Figure 2). The first major source was ‘farmers/friends’ – 61 percent of the interviewed households were aware of the extension advice through this source. Other major sources of extension advice were the government’s extension workers, NGOs, and radios/TVs. Notably, farmers also got the awareness of the extension advice from ‘merchants/traders.’ The extension advice from this source reached 20 percent of the surveyed households.

Figure 2: Sources of extension advice (% of households receiving extension advice)



Source: Household Survey (2010)

The extension services from the government and NGOs had a larger coverage in extension villages and to some extent in rural road villages. In extension villages, 58 percent of the households got aware of the extension advice from the government's extension workers and 52 percent from NGOs. In irrigation villages, more farmers tended to get aware of the extension advice from other farmers/friends and radios/TVs. Unlike in extension villages, the extension advice from merchants/traders and projects played a more significant role in irrigation villages. Forty-one percent and 37 percent respectively of farmer households in irrigation villages were aware of the extension advice through merchants/traders and projects. This implies that the availability of irrigation encouraged interaction between farmers and merchants/traders on agricultural extension.

Table 2: Types of extension advice that farmers received (% of households)

		Extension			Irrigation			Rural roads			Total
		Vill. 1	Vill. 2	Vill. 3	Vill. 4	Vill. 5	Vill. 6	Vill. 7	Vill. 8	Vill. 9	
1	Rice farming	26	95	100	85	86	100	85	0	13	71
2	Fertiliser application	74	90	95	69	79	67	55	11	0	68
3	Pest management	83	75	86	54	71	67	65	11	0	65
4	Compost making	57	70	95	77	79	67	30	11	0	59
5	Water management	43	70	71	38	50	47	40	0	0	46
6	Vegetable	100	25	71	62	50	13	5	22	25	45
7	SRI	0	80	86	31	43	80	30	0	0	43
8	Livestock	0	40	33	69	50	60	40	78	75	43
9	Organic farming	22	40	43	31	7	20	10	0	0	22
10	Cash crop	26	0	19	38	50	20	10	0	25	20
11	Post-harvest	74	0	5		29	27	10	0	0	20
12	Other	35	50	57	23	29	40	15	0	0	32

Source: Household Survey (2010)

The extension messages that farmers have learned were largely about rice production, application of fertilisers, pest management/control, and compost making. Among farmers having directly learned the extension advice, 71 percent reported having

learned rice production techniques, while the share of households having received the extension advice on application of fertilisers, pest management/control, and compost making ranges from 59-68 percent. About 43-46 percent of households attending the extension courses have learned vegetable cultivation, livestock raising, water management, and SRI. The coverage of extension services on cash crop production, organic farming, and post-harvest techniques is lowest, at about 20-22 percent of extension participants.

2.2. Effects of extension services

The adoption rate among farming households that were receiving extension services appears high, but they only managed to apply some parts of the extension package they had learned. About 67 percent of farming households partially applied what they had learned from the extension courses into their actual farming practices. Full adoption is very low (about 6 percent) and found only in two of the extension villages.

Among those having learned the extension advice, about 27 percent did not apply even part of the extension package they had received. They did not apply the extension advice because of a lack of working capital and agricultural inputs, which were their major constraints. Other reasons were because the adoption of the extension advice required extra labour work. Lack of water to supply the farmland also constrained farmers to adopt the techniques. Some farmers explained that they did not apply the extension advice because they didn't understand it or sometimes because they didn't believe in the extension advice.

Table 3: Adoption of extension services and its usefulness

	Contact rate (%)	Adoption rate (%)		Usefulness of extension* (%)				Effect on Yield**
		partially	fully	1	2	3	4	
Total	53	67	6	6	38	42	14	31
Extension villages	71	67	14	13	34	50	3	25
1 Koh Toch	77	78	0	11	37	44	8	17
2 Chuntul Maek	67	52	29	10	33	56	0	31
3 Sameth	70	68	18	16	33	49	2	25
Irrigation villages	47	87	0	0	33	40	26	40
4 Voiyeav	43	69	0	0	60	27	13	27
5 Trang	47	100	0	0	32	42	26	33
6 Damnak Kanseng	50	93	0	0	20	47	33	55
Rural Road villages	41	45	0	1	65	24	10	24
7 Angkal	67	60	0	0	60	27	12	24
8 Choim Tamao Keut	30	36	0	0	82	9	0	0
9 Puchrey Chang	27	31	0	0	100	0	0	0

Note: * 1=not useful, 4=very useful ** Percentage increase of yield

Note. The contact rate refers to the proportion of households that are aware of extension messages. The adoption rate refers to the proportion of household that adopt extension messages, either fully or partially. The usefulness score is a subjective score with 1 = not useful and 4 = very useful.

Source: Household Survey (2010)

Partial adoption is most commonly observed and the rate is highest in irrigation villages (87 percent), followed by extension villages (67 percent, excluding 14 percent of full adoption). This implies that the adoption rate of extension services is likely supported by the existence of irrigation systems. Though the adoption rate in irrigation villages is not far higher than that in extension villages, it is because those extension villages were also characterised by the availability of irrigation systems. Nevertheless, the adoption

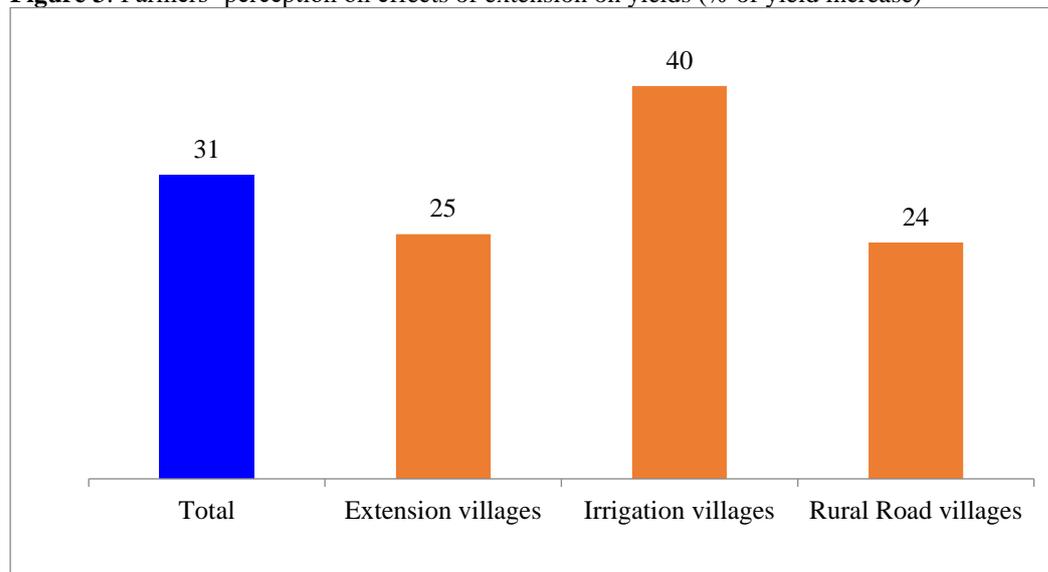
rate is far lower in villages that had no irrigation such as Puchrey Chang village (in Mondulkiri) or villages where irrigation was limited such as Choim Tamao village (in Kampong Cham). In villages with better availability of water supply from irrigation, the adoption rate is up to 93 percent such as Damnak Kanseng village (in Pursat), although much adoption is only partial.

In consistence with the prevalence of the adoption rate, the usefulness of the extension services is presented in Table 3, which is based on farmers' perception. Table 3 demonstrates that extension advice works better in irrigation villages than in the other villages, which again confirms the supporting role of irrigation schemes in the effectiveness of extension services. Though partially adopted, none of the farmers in irrigation villages found the extension services useless; 26 percent viewed the extension advice as very useful, and the rest have benefited in some degree from their adoption of the extension advice.

Farmers in extension villages also valued the usefulness of the extension advice in their farming practices, but the degree of its usefulness is less compared to that in irrigation villages. As extension villages also had irrigation and water, the lower degree of usefulness may on one hand be due to the dissimilar types of extension services and could on the other hand be explained by the fact that irrigation systems in these villages had long been in existence well before the introduction of the extension service. These to some extent might have reduced the perception of farmers on the usefulness of the extension adoption.

Figure 3 presents the effects of the extension advice on agricultural yields or productivity in particular. Based on yields before and after applying the extension advice reported by farmers, the same plot of land produced about 30 percent higher yield. Above all, the increase of yields or productivity is highest in irrigation villages, which had a yield gain of about 40 percent. The increase is not simply the single effect of the extension with support from irrigation, but also due to other unreported factors such as fertilisers, land preparation, and weeding that would also contribute to yield increase.

Figure 3: Farmers' perception on effects of extension on yields (% of yield increase)



Source: Household Survey (2010)

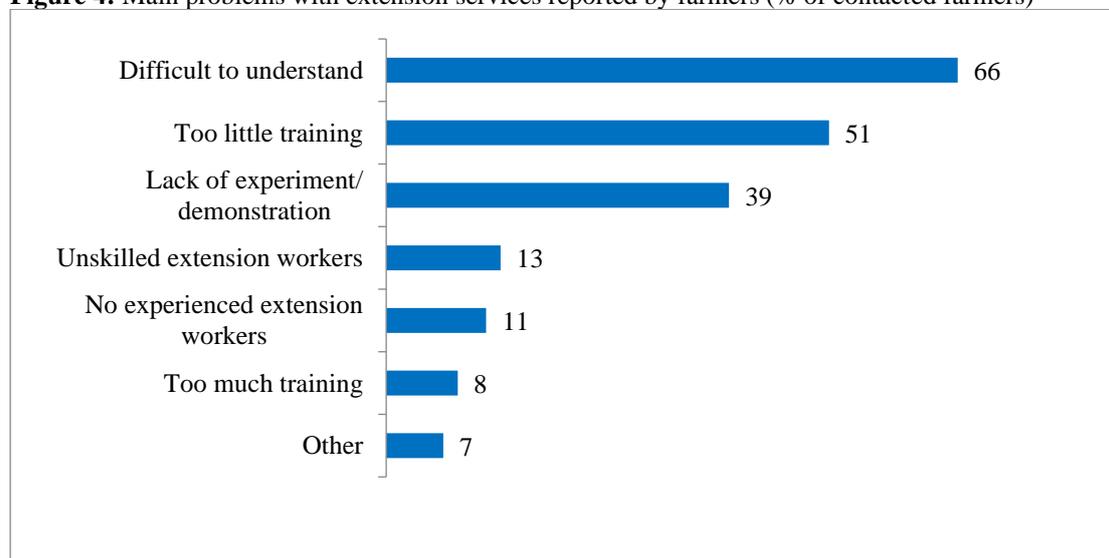
The effects of extension services on yields indicate that farms that partially adopted the extension advice provided higher increase in yields, compared to farms with a full adoption of the extension advice. The comparison shows that a partial adoption increased yields by 31 percent while a full adoption produced only 23 percent higher yield. Again, while many factors could determine the difference in the yield gain, the different extension types could be a contributing factor.

While farms with a partial adoption of extension services gained less yields, farms with a full adoption are likely to benefit more from lower production costs and reduce pest attacks. The survey shows that farmers fully adopting the extension advice reported their satisfaction with reduced production costs. However, this does not necessarily explain the net benefit of both types of adoption.

2.3. Key challenges

Figure 4 illustrates feedback from farmers regarding the extension services provided to them. About two thirds of the respondents said that the training of extension services was difficult to understand and about half of them found the training was too little. Furthermore, about 40 percent of the respondents complained that the extension services lacked experiment or field demonstration for farmers. This means that in many cases, extension services were just delivered in theory, rather than complemented by field trials to demonstrate real practices and benefits of the agricultural advice/techniques.

Figure 4: Main problems with extension services reported by farmers (% of contacted farmers)



Source: Household Survey (2010)

III. Irrigation Systems

3.1. Coverage of irrigation systems

All irrigation and extension villages had access to some forms of water sources and irrigation structures/means such as reservoirs, rivers/ streams, ground water, canals, and pumps. In rural road villages, Angkal village (in Prey Veng) had access to irrigation systems, Puchrey Chang (a remote ethnic village in Mondulkiri) had no access to any irrigation type, while Choim Tamao (Kampong Cham) had access to a traditional small stream that could be used for supplementary irrigation in the wet season and also for irrigating some dry season rice.

Table 4: Access to and use of water sources in surveyed villages

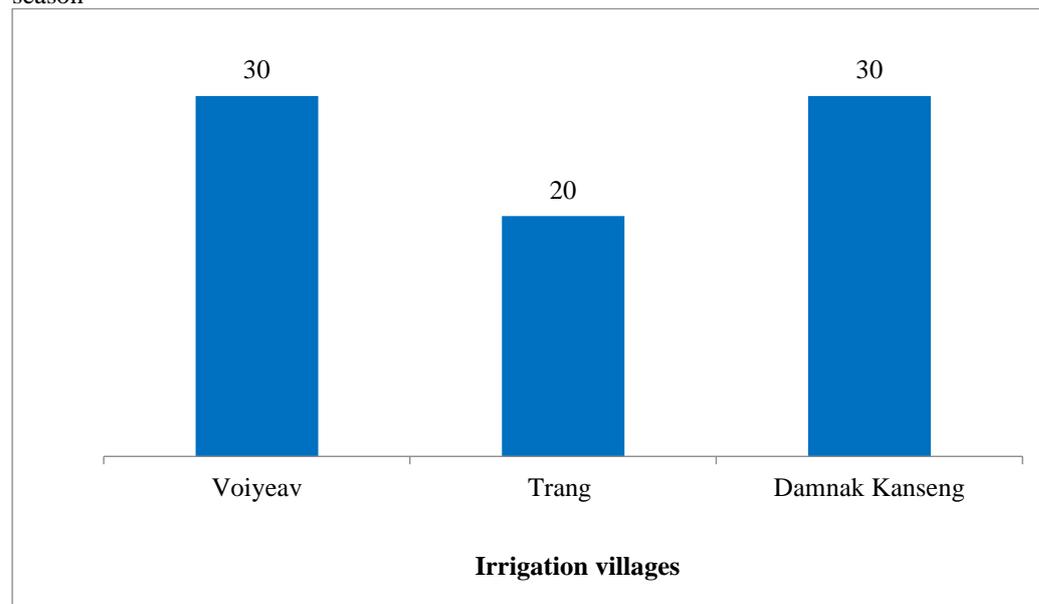
	Extension			Irrigation			Rural roads		
	Vill. 1	Vill. 2	Vill. 3	Vill. 4	Vill. 5	Vill. 6	Vill. 7	Vill. 8	Vill. 9
Water sources (other than rains) and irrigation system									
Reservoir		yes	yes	yes		yes	yes		
Groundwater		yes							
Cannels/small stream		yes	yes	yes	yes	yes	yes	yes	
Recession									
Pump/pumping station		yes	yes		yes	yes	yes		
Lake/pond	yes					yes			
River/ stream	yes		yes						
Use of water sources and irrigation system									
Wet season rice		yes	yes	yes	yes	yes	yes	yes	yes
Dry season rice	yes	yes	yes	yes	yes	yes		yes	
Early wet season rice			yes	yes	yes		yes		
Recession fam							yes		
Cash crop	yes		yes	yes	yes	yes		yes	yes
Vegetable	yes		yes	yes	yes	yes			
Other				yes	yes				

Source: Household Survey (2010)

In irrigation villages, the irrigation systems were mainly used as supplementary irrigation in the wet season and for farm production in the early wet season and dry season. Some farm households in these villages were able to do two crops per years. Farm households in Voiyeav village (Kampong Thom) and in Damnak Kanseng village (Pursat) used the irrigation for wet and dry season rice production while farmers in Trang village (Battambang) used it for wet and early wet season rice cultivation.

Despite the presence of irrigation systems, access to water in the dry season appeared limited in all three irrigation villages. About 30 percent (58 households) and 30 percent (40 households) respectively of the households in Voiyeav and Damnak Kanseng villages engaged in dry season rice farming. In Voiyeav village, about 60 percent of households could use water from the irrigation for some production of fruit trees and home gardening around their yards. About 20 percent (70 households) of the households in Trang village could participate in early wet season cropping.

Figure 5: Percentages of households having access to water from the irrigation systems in the dry season



Source: Household Survey (2010)

Two of extension villages, Koh Toch (Kandal) and Samreth (Kampong Speu) had access to river/stream water. All village households had access to these water sources through their individual private pumps. Farm households in these two villages used water for vegetable cultivation. According to key informants in both villages, all village households practiced vegetable farming using pumps as a means for irrigation. On top of vegetable production, Samreth village in particular used the stream water for other crops including wet season rice, early wet season rice, and dry season rice.

3.2. Effects of irrigation systems

Since the irrigation was mainly used for supplementary supply of agricultural water in the wet season, especially in the time of drought, the availability of water through the irrigation systems was meant to primarily protect the loss of agricultural outputs. Also, the availability of water should in theory encourage farmers to improve their land and water management, and adopt new farming techniques. This will eventually have the effect on the yields of agricultural production. Furthermore, access to irrigation systems should prepare farmers to increase the number of crops on their land.

Table 5 illustrates the behaviour of farmers in managing their farms in relation to access to irrigation and the impact on yields. In response to drought, farmers in irrigation and extension villages tended to make use of the water sources either immediately after drought or they waited for some time before starting to use the water sources. This behaviour of farmers toward water use was only commonly observed in villages where availability and access to water was not a constraint.

Farmers in rural road villages behaved differently. A majority (58 percent) of them had no choice other than waiting for the rainfall when facing drought in the wet season. In particular, all farmers in Puchrey Chan village (Mondulkiri) were fully dependent on rainfall. This was because they had no or limited access to the water sources. For

example, only 20 percent of the interviewed households in Angkal village (Prey Veng) could access water from the village irrigation systems.

Table 5: Land and water management (% of households)

	Access to irrigation	Strategy when drought		Irrigation effect	
		Use water sources	Fully dependent on rains	More cropping per year	Land improvement in past two years
Total	83	71	19	56	64
Extension villages	100	100	0	27	37
Koh Toch	100	100	0	0	7
Chuntul Maek	100	100	0	0	50
Sameth	100	100	0	27	53
Irrigation villages	100	91	0	99	99
Voieav	100	100	0	97	100
Trang	100	100	0	100	100
Damnak Kanseng	100	73	0	100	97
Rural road villages	50	22	58	22	58
Angkal	70	20	43	23	77
Chaim Tamao Keut	80	47	30	43	63
Puchrey Chang	0	0	100	0	33

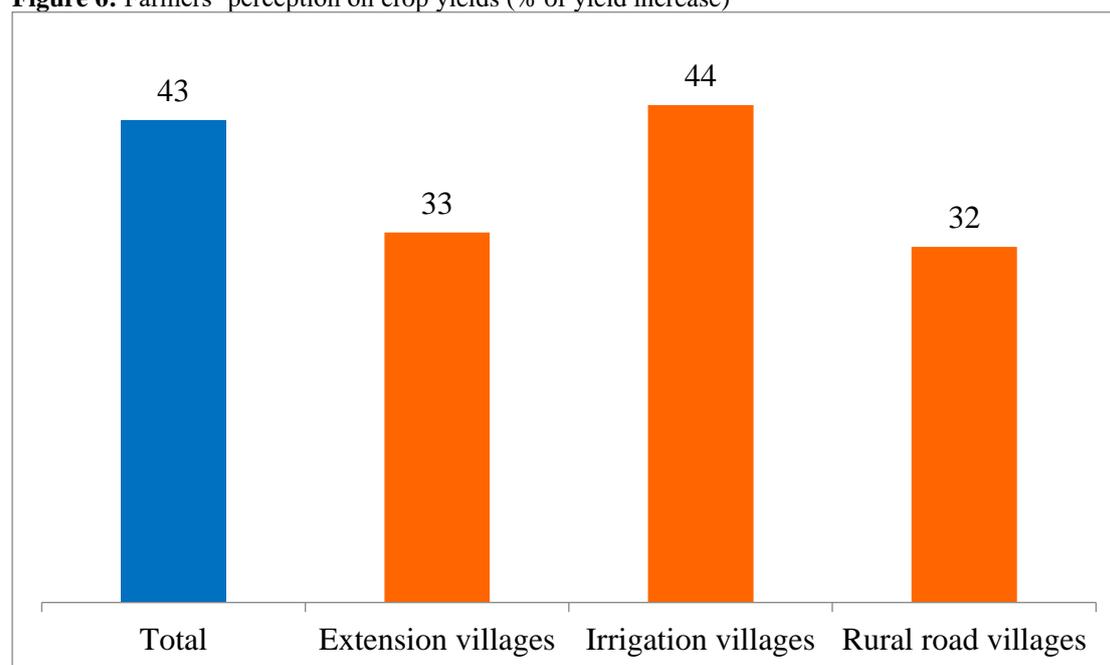
Source: Household Survey (2010)

In addition to irrigating agricultural farms in the wet season, the availability of irrigation schemes assisted farmers to double their crops on their land. In irrigation villages, almost all of the households having access to the irrigation schemes were able to double their crops since the existence of the irrigation schemes. In the case of Damnak Kanseng village (Pursat), some households were even trying their third crops to test the capacity of water supply. Farmers in the village expressed their willingness to farm the third crop, but complained about the limited capacity of water supply and as well the lack of secondary and tertiary canals.

Farmers' ability to increase the number of crops appeared lower in rural road villages (22 percent) and extension villages (27 percent). However, it is unsurprising since it reflects a lesser coverage of irrigation in rural road villages. For Koh Toch village, all farmers practiced vegetable cultivation and had been dependent on pumping water from the river as their tradition. Therefore, farmers did not report changes in the number of crops on their land. In Samreth village, although farmers accessed river water (without a reservoir) through pumps, the rehabilitation of the reservoir allowed 27% of the village households to increase the number of crops while the rest benefited from easier access to reservoir water.

When trying to understand whether farmers managed to improve their farmland, it reveals that 99 percent of the interviewed households in irrigation villages, in particular those who had access to irrigation systems, were able to improve their land in the last two years. About 50-70 percent of the surveyed households in other villages improved their farmland, except in Koh Toch (7 percent) and Puchrey Chang (33 percent) villages.

Figure 6: Farmers' perception on crop yields (% of yield increase)



Source: Household Survey (2010)

In terms of the effect on yields, as reported by farm households it is observed that farms in irrigation villages gained the highest yield increase, which was on average 44 percent higher than before the existence of the irrigation. The increase in farm yields in rural road villages was not much different from that in extension villages where the average yield increase was 33 percent. While the land improvement may have had the effect on the farm yields in rural road villages, the yield gains in extension villages could also be supported by the farm access to water. However, this yield increase was basically farmers' perception on the effect of public interventions and was subject to many other factors such as seeds and other inputs that were not controlled in this survey.

Table 6: Farmers' perception on factors influencing yields of agricultural production

Factors influencing yield	Effect* on yield (% of HH)				Strong effect
	No effect	1	2	3	
1 Irrigation/ water management		4	9	29	58
2 Pest control		4	24	49	24
3 Chemical fertiliser		1	33	42	23
4 Weather/ rainfall		0	35	46	20
5 Organic fertiliser/ compost		8	32	45	15
6 Land improvement		0	42	44	14
7 Farmer skills/ techniques		1	54	35	11
8 Seeds		1	40	51	9
9 Other		0	27	56	18

* 1=no effect, 4=very effect

Source: Household Survey (2010)

Table 6 shows a number of factors that the survey tried to understand from the perception of farmers on the level of influence that each factor may have had on yields. Of all surveyed households, 73 percent reported that the yield of their agricultural production has increased (100 percent in irrigation villages, 73 percent in extension villages, and 47 percent in rural road villages).

The effect of the irrigation and water management appeared more outstanding compared to other factors, followed by pest control, chemical fertilisers, and good weather/rainfall. About 60 percent of the respondent households found irrigation and water management having a strong effect on yields of agricultural production. All other factors also had an effect on yields. The degree of effects that the other factors contributed to the yield increase looked fairly good.

About 23 percent of farmers reported that the yield of their agricultural production was not better. About 44 percent of them explained that pest infection was the major cause of yield stagnation while 26 percent pointed out drought as the factor. Furthermore, farmers in Choim Tamao Keut village (Kampong Cham) and Puchrey Chang village (Mondulkiri) in the northeastern Cambodia found that too much rain undermined their cash crop and rice production, or even destroyed their farm crops.

3.3. Key challenges

According to the reporting from respondent households, farmers in Koh Toch and Samreth villages did not notice any significant problems or challenges in relation to the irrigation in their villages. Both villages are located on the bank of a river, and thus accessed river water for their farm production by using pumps. All households in both villages practiced vegetable cultivation, but Samreth also used river water for rice farming, while Koh Toch did not. Farmers in Puchrey Chang did not report problems associated with irrigation because there was no irrigation in the village.

Table 7: Main problems associated with irrigation systems (% of households)

Problems	Extension			Irrigation			Rural Road			Total
	Vill. 1	Vill. 2	Vill. 3	Vill. 4	Vill. 5	Vill. 6	Vill. 7	Vill. 8	Vill. 9	
1 Lacking water	n/a	100	n/a	45	93	82	96	83	n/a	85
2 Lacking distribution cannels	n/a	7	n/a	70	52	96	35	17	n/a	48
3 Lacking diversion system	n/a	0	n/a	90	44	57	26	17	n/a	39
4 Poor water management	n/a	27	n/a	35	44	43	44	17	n/a	36
5 No maintenance	n/a	27	n/a	30	22	11	44	17	n/a	25
6 Lack of funding support	n/a	33	n/a	5	11	7	26	0	n/a	16
7 Incooperative villagers	n/a	17	n/a	10	7	14	17	0	n/a	12
8 Lacking labour	n/a	7	n/a	0	0	0	13	0	n/a	4
9 Discrimination of water use/ acces:	n/a	3	n/a	5	0	4	0	0	n/a	2
10 Other	n/a	0	n/a	0	33	21	22	8	n/a	15

Source: Household Survey (2010)

As reported by farmers, the major problems with irrigation/water management included a lack of water in the irrigation systems, a lack of distribution canals, both secondary and tertiary canals, and a lack of water diversion systems. The lack of water in the irrigation systems was pointed out by 85 percent of the respondents, followed by the lack of distribution systems (48 percent) and the lack of water diversion systems (39 percent). This implies that while the functioning of the supplementary canals (secondary and tertiary cannels) was limited, or even absent in some cases, the availability of water in the main canals was still undersupplied.

Issues related to the management of water and maintenance of irrigation systems were also problems reported by farmers. Both poor management of water and a lack of

maintenance were likely explained by a lack or non-existence of management committees or particular responsible agencies. As reported by key informants in the villages, the existence of FWUC was not common in these study villages. Only one village (Trang) in Battambang province had an established FWUC and it tended to work well in collecting and managing water user fees as well as taking responsibility over the operation and maintenance of irrigation systems.

IV. Rural Roads

4.1. Coverage of rural road improvement

Among the nine villages selected for the survey, rural roads have been improved in eight villages. Koh Toch is the only village whose roads have never been rehabilitated in the past 10 years. Most roads in the study villages were last improved 2-3 years ago.

Most of the responses from the surveyed households indicate that the road improvement was mainly financed by the commune fund, the government, and the community's contributions. Very few households found NGOs, the private sector, and political parties as financing sources for rural road improvement projects.

4.2. Effects of rural road improvement

All respondents in the survey agreed that rural road improvement did have a positive effect on the local livelihoods. Based on farmers' perception, the degree of effects of rural road improvement in irrigation villages was higher than in extension and rural road villages. About 60 percent of the respondents in irrigation villages reported that the road rehabilitation had much improved the livelihood of people in the villages.

Table 8 presents the types of benefits that the rural road improvement has brought about. To the perception of farmers, the degree of impacts of the rural road improvement was high in terms of reducing the time of transport, increasing the number of traffic or journeys on the road, generating more economic activities in the villages, allowing more traders to come to the villages, and improving access to local hospitals and schools. The perception on better access to local hospitals and schools was rated higher compared to other benefits of the rural road improvement. People also perceived that the road improvement helped reduce the cost of transportation, but the degree of impacts was lower. About 25 percent of the respondents found the road improvement did not help reduce the transportation cost. However, this might be because of the increased oil price that caused the transportation cost to increase despite the road improvement. These 25 percent respondents agreed that high prices of fuel did have effects on the increased transportation cost.

Table 8: Benefits of rural road improvement

Benefits	No effect	Degree of effect*				Strong effect	Mean Score*
		1	2	3	4		
		% of households					
1	Easier to get to hospitals/ schools, ...	0.0	10.8	38.8	50.4		3.4
2	Less time for transportation	0.0	13.8	50.4	35.8		3.2
3	More traders	1.7	23.3	50.0	25.0		3.0
4	More traffic/ journeys	1.3	24.6	45.4	28.8		3.0
5	More economic activity	0.0	29.6	46.3	24.2		2.9
6	Cheaper transportation cost	25.8	31.7	30.0	12.5		2.3

* 1=no effect, 4=strong effect

Source: Household Survey (2010)

As better road conditions facilitated the arrival of more traders to the villages, almost all of the respondents agreed that more traders coming to the villages created more competition and that this enabled villagers to negotiate better prices. About 16 percent of the respondents found the arrival of more traders helped farmers a lot to gain a better price for their agricultural produce.

Table 9 illustrates the benefits of the rural road improvement as perceived by the villagers in terms of time and cost per travel. In general, people in all villages experienced shorter travel time, compared to the time before the road improvement. Farmers spent a lot less time to travel the same distance since the road was rehabilitated. By their motorbike to the nearest market, villagers now spent only half of the time they used to travel before the road rehabilitation. Among the surveyed villages, the reduction of travel time ranged between 40-60 percent.

Table 9: Time and costs of transportation before and after road improvement (% change)

	Time per travel by motorbike	Cost per travel by motodup	Cost per travel by car/lorry
Total	-54.4	-15.3	-41.3
Extension villages	-46.9	5.5	100.0
1 Koh Toch	n/a	n/a	n/a
2 Chuntul Maek	-44.5	8.9	100.0
3 Sameth	-49.4	2.1	
Irrigation villages	-54.9	-25.0	-16.4
4 Voiyeav	-52.2	12.1	-16.4
5 Trang	-60.0	-35.3	
6 Damnak Kanseng	-52.5	-52.6	
Rural road villages	-58.8	-18.0	-55.1
7 Angkal	-52.4	-12.8	
8 Choim Tamao Keut	-63.3	0.7	-57.1
9 Puchrey Chang	-60.5	-44.1	-55.0

Source: Household Survey (2010)

Overall, the cost of travel/transportation was also reduced. Unlike travel time, not all villages experienced a similar cost reduction. While villagers in Damnak Kanseng village (Pursat) and Puchrey Chang village (Mondulkiri) found the cost per travel by motodup to their nearest market reduced about 50 percent, farmers in Choim Tamao Keut village (Kampong Cham) and Samreth village (Kampong Speu) saw almost no difference between travel costs before and after the road improvement. In some

villages, farmers even reported a higher cost of transportation, but it was the increased fuel price, not the road improvement itself, that was responsible for the increased cost.

According to the key informants across the sample villages, key stakeholders that stood to benefit most from the road improvement included farmers, the general public (consumers), traders, and transporters. Labourers also received the benefit, but to a lesser extent, through farm and non-farm employment.

4.3. Key challenges

As discussed above, the rural road improvement yielded a number of benefits to local villagers and these benefits made their livelihoods better. However, villagers also reported some key challenges associated with the road rehabilitation. From their viewpoints, the main challenges included the poor quality of roads, for example, because of a very thin layer of laterites. About 80 percent of the respondents agreed that the quality of the road rehabilitation was very limited and about 38 percent of the respondents were concerned about the lack of ongoing maintenance of the roads.

In relation to the concern over the road maintenance, villagers witnessed that roads were continuously deteriorated by overloaded trucks. Better roads encouraged more traffic. However, while the quality of roads was rather limited, overloaded trucks easily ruined the road condition. People further explained that rain also contributed substantially to the deterioration of the road condition, especially during the wet season.

Poor road quality and speedy deterioration of the road condition determined the sustainability of roads and the benefits that people were enjoying. When asked whether the benefits of the road improvement would be sustainable, less than half of the respondents were optimistic that the benefits would stay long with them. Only 30 percent of the respondents in irrigation villages said 'yes' to the question, which implies that roads would be ruined even more quickly in these villages. In some cases, people did not believe that the benefits from road improvement would last longer. Only 17 percent and 3 percent respectively of the respondents in Puchrey Chang and Chuntul Maek villages agreed that the benefits of road improvement would continue.

V. Impacts on Local Labour Markets

Based on the perception of labourers in the villages, Table 10 below provides changes of labour demand in the past years in relation to the presence of the public interventions (extension, irrigation, and rural roads) in the communities. In general, labourers agreed that there were more jobs available in their communities. About 60 percent of them reported that there has been higher demand for their labour. About 20 percent of them found the demand for their labour has been constant while the other 13 percent reported that the demand for their labour has been less.

Table 10: Availability of labour work in the villages

	Extension	Irrigation	Rural Road	Total
What changes have happened to local demand for your labour? (% of interviewed labourers)				
Fewer jobs	0.0	13.3	26.7	13.3
No change	33.3	13.3	13.3	20.0
More jobs	66.7	66.7	46.7	60.0
A lot more jobs	0.0	6.7	13.3	6.7
Do you work longer hours per day compared to past years? (% of interviewed labourers)				
Fewer hours	0.0	13.3	0.0	4.4
No change	86.7	53.3	86.7	75.6
Longer hours	6.7	26.7	13.3	15.6
Much longer hours	6.7	6.7	0.0	4.4
Are you working harder compared to past years? (% of interviewed labourers)				
Less hard	0.0	6.7	6.7	4.4
No change	80.0	60.0	73.3	71.1
Harder	13.3	33.3	13.3	20.0
Much harder	6.7	0.0	6.7	4.4

Source: Household Survey (2010)

Although there have been more jobs available in the communities, the majority (76 percent) of the interviewed labourers didn't find themselves working longer hours. Their working hours tended to be unchanged. Consistently, labourers didn't find themselves working harder either. About 71 percent of them reported they worked as hard as they used to. Only about 20 percent said they have worked harder and the other 16 percent said they worked longer hours. This implies that the reported increase of new jobs in their villages might have been available to new labourers.

Table 11 illustrates the local wage that labourers earned over the past five years. In all circumstances, the wage was increasing in the past years. The increase was highest between the last two years and last year, when the increase was about 60 percent.

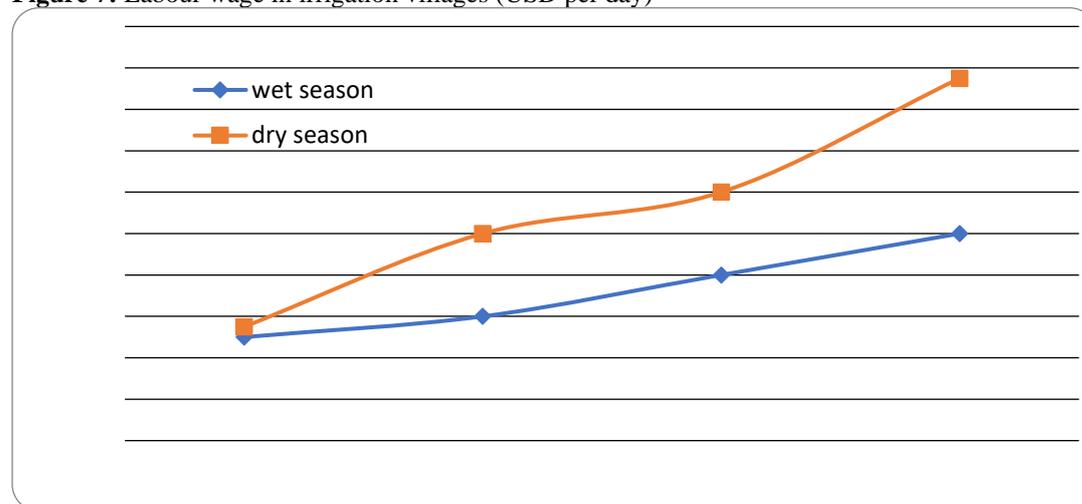
Table 11: Evolution of labour wage in the localities

	5 years ago	2 years ago	1 year ago	Last season
wet season (median wage in USD per day)				
Total	1.25	2.00	2.50	2.50
Extension villages	1.25	2.00	2.50	2.50
Irrigation villages	1.25	1.50	2.00	2.50
Rural road villages	1.13	1.88	2.50	3.00
dry season (median wage in USD per day)				
Total	1.25	1.75	2.50	2.50
Extension villages	1.00	1.63	2.50	2.50
Irrigation villages	1.38	2.50	3.00	4.38
Rural road villages	1.25	1.75	2.50	3.38

Source: Household Survey (2010)

It is observed that the labour wage in irrigation villages was higher in the dry season, compared with that in the wet season. This indicates a higher demand for labour in the dry season required by the dry season farm activities through availability of irrigation water. In the dry season, the labour wage in irrigation villages was also higher than that in extension and rural road villages. Labourers in extension and rural road villages earned a similar amount of wage. Also, in both types of villages, the wage in the wet season was as much as in the dry season, though there was a tendency to increase over time.

Figure 7: Labour wage in irrigation villages (USD per day)



Source: Household Survey (2010)

Generally, there was a labour shortage in farm households. About three quarters of the interviewed farm households experienced a labour shortage for their agricultural production. Therefore, farmers found both the labour was becoming more expensive and it was more difficult to hire labour workers for their farm activities.

Table 12: Farmers' experience about local labour supply (% of households)

	Households experienced labour shortage	More expensive to hire	More difficult to hire labour
Total	73	97	65
Extension villages	78	91	61
1 Koh Toch	83	80	63
2 Chuntul Maek	83	93	50
3 Sameth	67	100	70
Irrigation villages	73	100	74
4 Voiyeav	70	100	63
5 Trang	90	100	90
6 Damnak Kanseng	60	100	70
Rural road villages	68	100	60
7 Angkal	77	100	83
8 Choim Tamao Keut	67	100	57
9 Puchrey Chang	60	100	40

Source: Household Survey (2010)

Table 13 presents labourers' perception on the influence of agricultural extension services, irrigation, and rural road improvement on their labour demand. The table shows that all of the three sub-sectors had impacts on local labour demand although the effect of extension service appeared lowest compared to the other two factors. Labourers rated the rural road improvement had the highest degree of effect on their labour demand. The average score for rural road improvement is 2.6 (1=low impact and 4=high impact), which is higher than the score for irrigation (2.2).

Table 13: Perception of labourers on factors generating jobs in the communities

	no help	1	2	3	4	help a lot	Mean Score
	% of labourers (row %)						
Agricultural extension service	48.8	22.0	19.5	9.8			1.9
Irrigation/ flood protection	44.2	14.0	18.6	23.3			2.2
Rural road improvement	29.3	12.2	31.7	26.8			2.6
Extension villages							
Agricultural extension service	66.7	6.7	26.7	0.0			1.6
Irrigation/ flood protection	78.6	0.0	14.3	7.1			1.5
Rural road improvement	66.7	0.0	26.7	6.7			1.7
Irrigation villages							
Agricultural extension service	0.0	36.4	27.3	36.4			3.0
Irrigation/ flood protection	0.0	14.3	21.4	64.3			3.5
Rural road improvement	0.0	9.1	27.3	63.6			3.5
Rural road villages							
Agricultural extension service	66.7	26.7	6.7	0.0			1.4
Irrigation/ flood protection	53.3	26.7	20.0	0.0			1.7
Rural road improvement	13.3	26.7	40.0	20.0			2.7

Source: Household Survey (2010)

Consistently, the impact of rural road improvement on labour demand was highest in all three categories of villages. However, it is important to note that the degree of impacts of all public interventions was rated high in irrigation villages. This suggests that irrigation contributed higher value added to the local labour demand, compared to the impacts attributed to the other two factors: rural roads and extension services.

VI. Conclusion

Per the analysis of farmers' perception on public interventions (in particular, the extension services, irrigation, and rural roads), it suggests that all three types of interventions offered positive impacts on improving the livelihoods of the rural farmers and tended to complement each other. The impact of rural road improvement was rated highest by farmers. Besides their impacts on farm production and prices, the extension services, irrigation, and rural road improvement were noted to have generated more jobs in the local communities, therefore extending the positive impacts on the employment and wage of local labourers who were among the landless and land-poor households.

Farmers found the extension services helped increase their farm yields by about 20 percent, which accordingly helped raise the household income. Although the farm yield increase in irrigation villages appeared higher (40 percent), it represented the combined effect of both the extension services and irrigation, which meant the irrigation provided additional benefits to the gain from the extension and vice versa. The combination of the effect of the extension services and irrigation on yields would mean farmers could earn about 20-40 percent higher incomes from their farm produce. However, this was subject to the variation of the production costs. The evidence suggests that while farmers may have to pay fees for water from the irrigation systems, their perception suggests that adopting the extension advice did not necessarily increase the farm production costs.

Furthermore, the benefit of rural road improvement was highly rated by farmers. In rural villages, the road rehabilitation added more value to the extension services and irrigation. Besides reducing travel time and costs, the road improvement facilitated more economic activities and allowed more traders to come to the villages. Farmers perceived that the arrival of more traders to their villages helped them negotiate better prices for their farm produce.



Centre for Policy Studies

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