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Status of Payment for Electricity for Water Consumption in Dongphosy-Thaphanongphong Pumping umping Irrigation Project, Hadxaifong District, Vientiane Capital

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Subject: Status of payment for electricity for water consumption in Dongphosy-Thaphanongphong Pumping Irrigation Project, Hadxaifong district, Vientiane Capital

Abstract: ***The productivity of the sample was lower than the plan with significant level to 0.05; excessive use of electricity makes the cost of electricity per production area very expensive; actual water fee collecting compared to the expected figure from the actual production area is still low. Actual electricity cost payment compare to electricity in the bill is very low. Water fee is expensive. Although farmers pay all the cost in the water bill and money do not share the cost of managing the project, the money collected is not enough to pay for electricity. Low-cost alternative energy pumps; improve new irrigation infrastructure; comprehensively improve agricultural extension work, including private sector involvement; consider setting up farmers' groups or cooperatives to improve the value chain for rice production (rice mills); improve marketing and guarantee rice prices; annually evaluate the implementation; promote potential modern machinery; and strictly protect agricultural land in irrigated areas.***

Keywords*:* Productivity, cost of electricity, water fee

1. Introduction

Vientiane Capital is the center for social-economic, culture-tourism, and international relationship development. Economic development, including the expansion of small industry factories, has resulted in the use of more water for production processes to supply daily consumption and personal use, support the growth of the service sector, and provide for agricultural production, among other things. The Mekong River flows through the capital land area in the west, and the Nam Ngum River flows through the capital land area in the north-east. These rivers have the potential to support the development of pumping irrigation schemes for rice cultivation in the Vientiane plain. Since 1990, the Vientiane capital authority has invested in the development of pumping irrigation schemes along the Makong and Nam Ngum rivers to provide support water for dry rice cultivation.

Irrigation sector investment aims at rice production and food security. Both flow and electricity irrigation schemes were developed in Vientiane capital. However, irrigation operation and maintenance, especially the many problems associated with pumping irrigation schemes, are found. **The highlight issue is the amount of electricity debt,** which is the overhead of the project's capacity to pay. The electricity cost of pumping irrigation schemes around Vientiane capital debt was more than 116 billion kip at the time.

Pumping irrigation scheme electricity debt has been an ongoing issue and debt for many years. The main problems that were reflected by the irrigation project staff were: old pumps that did not function well; water pump capacity of the schemes was low; irrigation scheme maintenance is not good; the scheme has an earth canal and a lot of water leaking; low production productivity; low enforcement of water use regulation; and farmers did not active in water fee payment.

2. Objective

The objectives for this study are (1) to study the production productivity of the sample farmers and (2). to study the status of electricity payment.

3. Methodology

This study has been chosen for the Dongphosy-Thaphanongphong pumping irrigation scheme, which was classified as a medium irrigation scheme. Farmers' benefits from the Thapanongphong irrigation scheme are 83 households. The sample size is determined by the calculation formula of Yamance. The sample size is 69 households with an error of 0.05.

Field data collection: Project staff have been interviewed about the project background, rice cultivation plan, area implemented, and rice yield during the past five years. The project manager was also asked.

In the field data collection, there were face-to-face interviews with representatives of the farmers who get benefits from the project. The structured semi-structured questionnaires have been used for this interview

Data analysis: The data collected has been checked, organized and analyzed by using the Microsoft Excel program. The descriptive statistics used for this research include frequency, mean, percentage, standard division, and so on. The mean of yield has been tested by using the actual yield compared to the yield planned for the sample Vientiane capital set target of 4.68 T/ha for this period of time. The t-test statistics have been used.

$$t = \frac{\bar{X} - a}{S/\sqrt{n}}$$

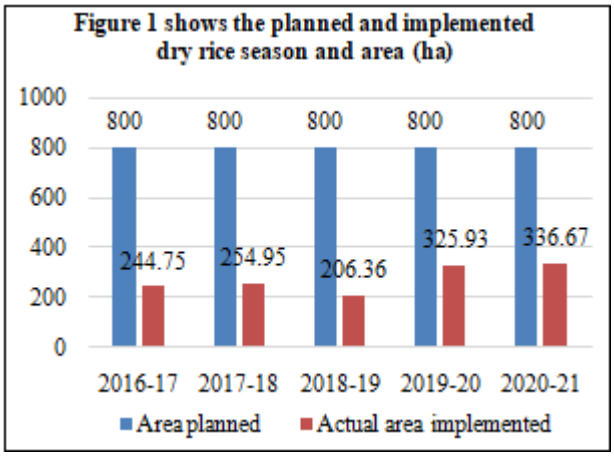
where
a =Theoretical population mean
$\bar{X}$ = Obeseved sample mean
σ=Standard division of population
S=satandard division of sample
n=sample size

4. Study Result

Project background: The project is located in Thaphanongphong village, Hadsaifong district, Vientiane Capital. The head work has 4 pumps, each of which has 150 KW. The headworks pump water from the Mekong River to support the irrigation area. The main canal is 8, 344 meters long; the second canal is 22, 738 meters long. The main canal is the earth canal, which does not meet the standard, leading to dis-convenient delivery of water to the field. There are 27 conveyance structures, including bridges, culverts, gates, and others. The canal structures are well functioning. The project was completed in construction and operated in 2005

Project management: Project operation and maintenance is directly the responsibility of district irrigation staff under the supervision of the district irrigation unit. The project management structure includes a project manager, a project advisory committee, an accountant, and six farmer representatives from six villages that are responsible for their own water delivery to farmers in their own village.

Dry rice cultivation plan: The dry rice season plan for the last five years from the year of 2016-2017 to 2020-2021 was 800 hectares, but the minimum area implemented was 206.4 ha (25.8%) for the year of 2018-2019 and the maximum implemented was 336.67 ha (40.7%) for the year of 2019-2020 (figure 1).If compared to the cultivation plan, it shows that the area cultivated did not meet the plan because the canal could not deliver water to the field as the project was designed. The project staff reported that the productivity of rice was between 4 and 5.1 T/ha[1].



Finance management: The project has a person who works as an accountant and cashier. This staff is responsible for finance management under the control of the project manager. The payment amount was agreed and approved by the project manager. The payment includes water user group management, electricity costs, district agriculture and forestry office administration, and irrigation system repair and maintenance.

In the last five years, the maximum water fee collected was 45.6% of the planned in 2019-2020, and the minimum water fee collected was 13.6% of the planned in 2016-2017. For farmers who were in debt, the project staff together with the water user group committee recorded and both parties identified the date and time for repayment. The water fee collected has been paid for electricity in the last five years, an average of 60.0% of the total money collected each year. In 2019-2020, the maximum percentage of electricity cost paid to Electricity du Laos was 16.9% of total electricity cost, while the minimum percentage of electricity cost paid to Electricity du Laos was 4.3% in 2016-2017. Electricity cost payment versus electricity cost in bill does not reach 10% in 2019-2020.

The maximum water fee that can be collected compared to the water fee to be collected based on actual area service each year was 45.8% in 2019-2020, and the minimum water fee that can be collected was 13.6% in 2016-2017. In general, the water fee that can be collected did not reach 30% if compared to what is needed to be collected based on the actual area serviced each year.

The electricity cost in the bill that was calculated by Electricity Du Laos and the estimated water fee to be collected based on actual area service (calculated by 600, 000 kip per hectare) shows that even though the water user committee and project staff collected all water fees from farmers with no farmers in debt, all fees collected were not enough to pay the electricity cost in the bill of Electricity Du Laos each year. The balance cost between 90 million kip and 146 million kip (table 1).

Table 1 shows the cost of electricity in the bill and the estimated water fee to be collected based on actual area service.

[1] Report by project staff on September 17th, 2021

Cost of electricity in the bill		Estimated water fee to be collected based on actual area service	Different
year	Lak Kip	Lak Kip	Lak Kip
2016-17	281, 803, 500	146, 850, 000	134, 953, 500
2017-18	299, 211, 000	152, 970, 000	146, 241, 000
2018-19	268, 031, 940	123, 816, 000	144, 215, 940
2019-20	317, 168, 500	195, 558, 000	121, 610, 500
2020-21	274, 107, 680	183, 672, 000	90, 435, 680

In the last five years, the bill to actual rice practice in a hectare ranged between 895, 425 Kip and 1, 298, 856 Kip. In contrast to the irrigation transfer policy, this stated that rice cultivation was funded by a water fee of 150 kg of hard rice per hectare. The market price of hard rice was 2, 300 kip/kg in the year of research, so the water fee under the irrigation transfer policy was 345, 000 kip. In this case, comparing the electricity cost and the transfer policy shows that the actual electricity cost was more than 3 times higher than the water fee in the irrigation transfer policy. If 40% of the water fee collected is used for administrative work in the project and 60% for payment of electricity costs, the annual electricity payment capacity will be reduced (table 2).

Table 2 shows the cost of electricity in the bill and cost per hectare of rice cultivation that has been implemented.

Electricity bill cost in the bill		Area implemented	Electricity cost/ha
Year	Lao Kip	Lao Kip	Lao Kip
2016-17	281, 803, 500	244.75	1, 151, 393
2017-18	299, 211, 000	254.95	1, 173, 606
2018-19	268, 031, 940	206.36	1, 298, 856
2019-20	317, 168, 500	325.93	973, 118
2020-21	274, 107, 680	306.12	895, 425

Sample information: The sample for this study was 69 farmers, of which 16 were females (23.2%) and 53 males covered 76.8 %.

Rice Cultivation information: The dry rice cultivation in the irrigated area of the sample in the last season has been surveyed. The average dry rice area of the sample was 0.8 ha, the minimum area was 0.1 ha, and the maximum area was 2 ha. The average yield of the sample in the last dry season of rice cultivation was 3, 128 kg/ha, of which the highest yield was 4, 286 kg/ha, and the lowest yield was 1, 563 kg/ha, of which the standard division was 711 kg (figure 2).

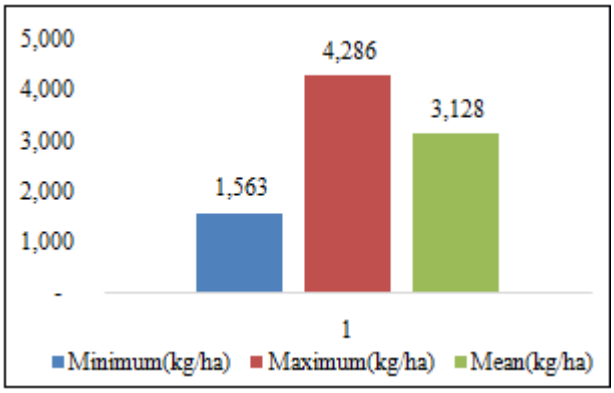


Figure 2: Rice production yield

The eight (8th) - five year agriculture and forestry development plan (2016-2020) for Vientiane Capital set the goal for dry rice yield/productivity at 4.68 T/ha by 2020. To test the dry rice productivity/yield of the sample farmers by the t-test statistic, we found that the t-value calculated from the sample was 18.11. If compared to the t-value obtained from the statistic table at df 68, which is 2.0 at the 95% confidence interval (significant of 0.05), we found that the t-value calculated from the sample was higher than the t-value in the statistic table. We concluded that the actual dry rice productivity/yield is different from the dry rice productivity identified in the 5 year agriculture and forestry development plan, and the actual dry rice productivity is less than the dry rice productivity as planned at 95% confidence interval (significant of 0.05).

The average dry rice season area of the sample was 0.8 ha, which meant an average investment of 4, 740, 007 kip. If the calculated investment cost per hectare was 5, 925, 000 kip/ha.

The average cost for irrigation water fee paid by the sample farmers was 584, 964 kip for 0.8 ha. If converted to ha, the average cost for irrigation water fee paid was 731, 205 kip/ha. The standard division is 620, 546 kip. The irrigation transfer policy mentioned that the rice cultivation was paid for a water fee of 150 kg of hard rice per hectare for electricity pumping irrigation scheme. The market price of hard rice was 2, 300 kip/kg in the year of research, so the water fee under the irrigation transfer policy was 345, 000 kip. The t-test has been used to test the cost of water fee payment and the cost of water fee identified in the irrigation transfer policy. The t-test results found that the t-value calculated was 5165.9, if compared to the t-value in the statistic table at df=68 at 95% confidential interval (significant of 0.05), shows that the t-value calculated was higher than the t-value in the statistic table at 2.0, so we conclude that the actual irrigation water fee of payment was higher than the water fee identified in the irrigation transfer policy at 95% confidential interval (significant of 0.05).

5. Conclusion and Explanation

The actual dry rice productivity/yield is lower than the dry rice productivity/yield identified in the 8th-5 year agriculture and forestry development plan (2016-2020). The electricity power used is over the need because the electricity cost per hectare service is too expensive. The actual water fee collected compared to the estimated figure to be collected based on the actual area cultivated is still low. The actual electricity cost paid compared to the electricity cost in the bill is very low. Even though farmers did not default and water fees collected did not share the cost of irrigation project administration, the total amount collected is still not enough to pay for electricity in a bill.

6. Recommendations

They should instead find other pumping power options with a low cost; comprehensive agriculture promotion improvement, including private sector agriculture promotion for higher rice productivity and yield; rice price guarantee to reduce marketing risk; annual project implementation

evaluation; conserving agriculture land in irrigation projects; potential and appropriately modern agriculture machinery promotion; and finance management improvement.

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