

CONCEPT OF SERVICE FEE PUSAIR WATER WHEEL IRRIGATION

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ABSTRACT

In 2006, approximately 33 units of PUSAIR water wheels were set-up in the province Sumatera Barat. These water wheels need to be maintained and preserved in order to be functional and ready for operation. Cost for the maintenance and operation is not provided by the government. Efforts are to be made on cost allocation, so that the irrigation network can be served sufficiently. What kind of service fee concept would be most suitable for the water wheel irrigation?

This paper shall discuss the concept of service fee for the operation and maintenance of PUSAIR water wheel and farmer water users contribution.

Key words: PUSAIR water wheel, water wheel irrigation, water wheel service fee, farmer water users.

1. INTRODUCTION

Background

Water supply for the irrigation system in paddy and ‘palawija’ cultivation is very substantial and a successful harvest depends very much on the supply of irrigation water. Paddy is not classified as a water plant although this plant needs plenty of water for its growth. Many efforts of providing irrigation water have been carried out already and a small scale irrigation system had introduced the water wheel irrigation. The water wheel placed in the river shall rotate on its axle by force of the river flow. A water wheel can take and supply water as long sufficient water is available in the river.

Local tradition had constructed water wheels in the provinces Sumatera Barat, Jambi, Sumatera Utara and Jawa Barat since many hundreds of years in the past.

These traditional water wheels however apart from having a relatively small water intake capacity (0.8 l/s – 2.0 l/s), have also a short life time of only one or two seasons and are very susceptible to damage by floods.

Water wheels do not operate on fuel, whereas water pumps for the provision of irrigation water use fuel for its operation. Currently, farmers do not prefer to use these water pumps due to the high price of fuel and the farmer's incapability of spending much on operation cost.

Considering the operation problems of traditional water wheels, Pusat Litbang Sumber Daya Air/Pusair had carried out a series of research on this. In 1995, these researches started with a model at the laboratory of hydraulics. This model was constructed of iron, PVC pipes, and an iron axle with bearings. The model was then applied and studied in the field and showed a water wheel technology with a number of advantages like an installation system that can be set-up in parts making transportation and building it up easily on site (weight of 1(one) water wheel is approximately 800 kg); greater water intake, up to 15 l/s/ per unit; stronger and stable as well as durable because being made of iron.

Since 2006, many regions in Sumatera Barat had developed the water wheel technology. For example, Kabupaten Limapuluh Kota and Kota Payakumbuh had set-up 16 (sixteen) Pusair water wheels, Kabupaten Pasaman and Pasaman Barat 10 (ten) units, Kabupaten Sawahlunto Sijunjung 3 (three) units, Kabupaten Agam and Tanah Datar respectively 2 (two) units. Construction cost for all these water wheels were taken either from the regional or central budget.

In 2007, Sumatera Barat planned to built 66 (sixty six) units and 250 (two hundred fifty) units up to the year 2010.

One water wheel can supply 10 l/s – 15 l/s irrigation water. If for instance one water wheel shall supply only 10 l/s, 250 units may provide irrigation water for 2500 hectares.

The construction of Pusair water wheels shall consequently need maintenance and preservation of structure in order to be reliable for operation and functioning. Operation and maintenance funds however are not provided by the government, so that efforts are to be made to collect these funds from other sources and

irrigation water made available. What kind of service fee concept would then be most suitable for the water wheel irrigation? Concerning the question, this paper shall discuss some conditions related with the establishment of farmer groups as users of irrigation water generated by the Pusair water wheel, and the contribution of service fee needed for the operation and maintenance of water wheel.



Picture 1. Water intake from lower surface and supply to higher areas by water wheel

Problems

Since operation and maintenance cost is not provided by the government, the problem may arise on how to find sufficient funds for the operation and maintenance of these water wheels so that sufficient irrigation water will be available. What kind of concept of service fee may provide the funds, so that operation of this system can be self-supporting.

Objective and Aim

1. Objective

The study shall provide a concept of service fee for the provision of irrigation water generated by Pusair water wheel.

2. Aim

Output of study is a recommendation of service fee so that operation and maintenance of the structure and its appurtenances can be implemented effectively, efficient and proper.

Methodology

The methodology in this study had focused on literature study, data collection and information, and interviews with farmer groups and concerned institutions, starting with data collection which is followed by field survey in order to collect more detailed information. The flow chart of activity is depicted in Fig.1.

Data were collected by primary and secondary survey. In primary survey, data were directly collected on site whereas in secondary survey, data were obtained from institutions like Dinas Pertanian and Dinas Sosial or from the Kepala Nagari. Interviews were held with farmers, leaders of farmer groups and community leaders.

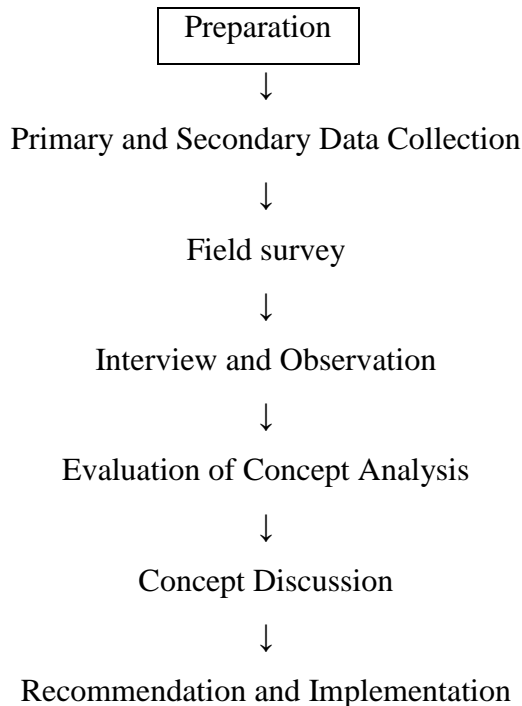


Fig.1 Flow Chart of Activity

Scope of Activity

The scope of activity includes:

- 1) Preparation and data collection
- 2) Field survey, and problem identification
- 3) Observation of the operation and maintenance of Pusair water wheel
- 4) Evaluation and analysis
- 5) Reporting

Location

The concept of Pusair water wheel irrigation service fee was for the very first introduced at Padang Japang and Koto Kociak Nagari VII Koto Talago, Kabupaten Limapuluh Kota, Sumatera Barat. Three water wheel units funded by the national budget and implemented by Pusat Litbang Sumber Daya Air were set-up in this location.

At Padang Japang, where a pipe irrigation network was set-up for the system, water was directed into storage ponds and distributed into the paddy fields by pipes.

2. IRRIGATION NETWORK SYSTEM

Pipe Irrigation Network

Construction of the pipe irrigation network at Padang Japang and Koto Kociak was carried out simultaneously with the construction of Pusair water wheels, so that a study could be done of the pilot project for paddy growth by SRI method. Water stored in ponds is directed into each paddy field provided with an inlet and outlet for the regulation of irrigation water supply and draining (right, Picture 2).

Other locations that had applied the water wheel irrigation use an open channel system. Water intake by water wheel is directed to nearest located paddy field and then distributed to another paddy field.



Picture 2 Flow from water wheel directed into irrigation channel (left) and flow from water wheel into paddy field (right)

Operation of the water wheel irrigation network system

The water wheel irrigation network system usually does not receive funds from the government for operation and maintenance. The operator of water wheel is also responsible for the irrigation network. A traditional water wheel irrigation system in general does not cover a very extensive area and usually one water wheel unit supplies water for 1 to 2 hectares. Operation of a traditional water wheel is also very simple and done by the owner.

On the contrary, one Pusair water wheel can supply irrigation water for an area of approximately 10 hectares. An example is the water wheel in the pipe irrigation system at Padang Japang. Such vast area is usually owned by many people whereas the water wheel is state owned. However, the community can be benefited from a water wheel. The problem occurring is who will operate and be responsible for the operation of a water wheel constructed by the government and what is the operation system applied. Who will be responsible for the maintenance and safety of structure?

3. FARMER WATER USERS

Irrigation Water Management

Land cultivation for paddy is an old tradition carried out by the people in Sumatera Barat. The long time experience of irrigation has made farmers in

Sumatera Barat to develop technical skill in operation of the irrigation system. Their knowledge is particularly concentrated at micro level which is related with the water benefit for farmers, water distribution, water right of each farmer and technical problems. On macro level, problems are related with water distribution among various irrigation network systems which are located along one river system.

In finding a solution of the irrigation problem in a technical network system which is considered as one natural source that needs mutual responsibility of farmers has promoted the establishment of organizations able of carrying out the aspiration and capability of farmers concerning irrigation water management. One legal organization is the farmer group P3A, whereas a traditional organization of irrigation management in Sumatera Barat is the Tuo Banda.

3.2 Management of the Pusair Water Wheel

Up to the present, traditional operation of water wheels and the irrigation network system is carried out by the owner. Farmers could easily take water from its sources with the use of a traditional water wheel and similarly supply the water to the paddy fields so that farmers are not aware of the importance of establishing an organization of irrigation water management. Usually, farmers only need to carry out repair of the water wheel when it is damaged by flood and repair of the water channel at the time paddy fields are prepared for planting, and when people are involved with the repair of damaged water wheels after floods. On the other hand, illegal or legal organizations have not been established to cope with the irrigation problem in a water wheel irrigation network system.

Such measures are difficult to be applied in the management of Pusair water wheel and irrigation network, considering that a water wheel is owned by the government, the irrigation area more extensive if compared with the traditional water wheel area, and other communities demanding the same water rights because the water wheel was constructed by the government.

In general, fair water distribution is the main principle in constructing Pusair water wheels. Attempts are made for irrigation water to be distributed evenly

based on the extent of paddy field. Thus, establishment of a management responsible for the maintenance of water wheel structure and its irrigation system is very important

Such organization is preferably to be established following a mutual agreement between farmers who benefit from the Pusair water wheel irrigation system. This organization does not need to be too complicated, and one chairman and members will be adequate. Supervision is carried out by the Wali Jorong and Wali Nagari who are given the responsibility by the government for the management of water wheel and irrigation system.



Picture 3 Discussion on improving paddy production



Picture 4 Attempts of improving paddy production by SRI Method

4. PUSAIR WATER WHEEL IRRIGATION SERVICE FEE

Objective of the Pusair Water Wheel Irrigation Service Fee / PWWISF

What role are water users of the Pusair water wheel holding in the matter of water services, so that they may feel secure of receiving the service they have paid for, and that the contribution they are paying is not exceeding their capacity.

Based on the above question, PWWISF concept has to combine several considerations as the following:

- Good services may allow a high service fee, whereas bad service a low contribution.
- Receivers of service must have the right to express their opinion on services rendered.
- The principle to be followed is that fair water distribution is to be based on the extent of area.

The PWWISF is therefore one way of paying for irrigation water services. It is advisable that all water users have to join the organization of Pusair water wheel irrigation water users.

If the PWWISF concept is meeting requirements, it may contribute to following conditions:

- Involvement in water allocations as part of service formulation and the intention of paying PWWISF.
- Maintenance of water wheel structure, its appurtenances and irrigation system
- Problem solving related with the irrigation system.
- Management of funds, including discussions on operation and maintenance cost, fee collection and its bookkeeping.

Thus, general aim of the PWWISF is to collect contribution from farmers for the operation and maintenance cost of water wheel structure, its appurtenances and irrigation system. Padang Japang and Koto Kociak, Kabupaten Limapuluh Kota, Sumatera Barat were selected as locations of socialization and application of concept because many Pusair water wheels are already used in these areas.

Determination of the Amount and Mechanism of Service Fee (PWWISF)

1). Concept

This concept is made in order to request contribution of water users because of the benefit they are obtaining from the Pusair water wheel irrigation system. Amount and mechanism of payment in the concept shall include:

- PWWISF based on service
- PWWISF paid by water users as receiver of services

- Amount of PWWISF based on mutual agreement between receiver of services, and the persons managing the Pusair water wheel operation.
- PWWISF is collected by the persons managing the Pusair water wheel operation, who are appointed by the Jorong/Nagari administration.

2). Amount of PWWISF

Amount of PWWISF is not based on the budget needed for yearly operation and maintenance but on mutual agreement between farmers receiving irrigation water service and the Jorong/Nagari administration managing the Pusair water wheel.

This mutual agreement shall decide on the amount of PWWISF or basic fee (BF) of 10 % from paddy harvested by the farmers. The collected amount shall be submitted to the persons managing the Pusair water wheel.

The basic fee (BF) is then divided into service fee (SF), operation and maintenance cost (OP), contribution for the development of Nagari or Nagari cost (NC), and Nagari administrators (PC).

Thus,

$$BF = 10 \% \times \text{paddy production} = 100 \%$$

$$SF = 30 \% \times BF$$

$$OP = 40 \% \times BF$$

$$NC = 20 \% \times BF$$

$$\underline{PC = 10 \% \times BF}$$

$$\text{Total } 100 \%$$



Picture 5 Discussion on PWWISF

5. CONCLUSION AND SUGGESTIONS

- 1). The Pusair water wheel has already been used in many kabupatens throughout Sumatera Barat.
- 2). A concept has been introduced on PWWISF for the operation and maintenance of water wheel based on services paid by the water users as the receivers of services. Amount of

PWWISF was decided on mutual agreement between receivers of services and the persons managing the Pusair water wheel.

- 3). The mutual agreement decided on the amount of PWWISF or basic fee (BF) of 10 % of paddy harvest.
- 4). It is suggested that above method of service fee payment can be used as reference and introduced to other Pusair water wheel irrigation network systems throughout Sumatera Barat.

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PICTURES



Planting pattern interval of 30 cm x 30 cm



Paddy stalks – 12 days



Clearing away weeds



Pilot project Payakumbuh



Paddy stalks – 30 days

DEMPLOT BUDIDAYA PADI TANAM SEBATANG (METODE SRI)	
VARIETAS PADI	: CIHERANG
KODE PETAK	: I ₃
LUAS PETAK	: 473,85 m ²
TANGGAL TANAM	:
JUMLAH RUMPUN	:
JENIS PUPUK	: ORGANIK KOTER (A ₁)
APLIKASI PUPUK	: Kg
PEMBERIAN AIR	: GENANGAN DANGKAL TETAP (B ₁)
IRIGASI KINCIR AIR PUSAIR	
SALURAN IRIGASI PIPA	

Ciherang variety at Padang Jampang pilot project