

SUSTAINABLE FINANCE POLICY FOR MANAGEMENT AND OPERATION OF IRRIGATION SYSTEMS: INTERNATIONAL EXPERIENCE AND LESSONS FOR VIETNAM

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Abstract: *So far, the management of irrigation systems have basically met the actual requirements because of fundamental reforms in institutions and policies, especially since the promulgation of the Law on hydraulic works in 2017. However, limitations in the management have been remained as the current financial policy still supports farmers in the indirect form through enterprises and water user organizations. This leads to unguaranteed financial sustainability of these organizations. Therefore, it is necessary to develop a sustainable financial policy so that operational organizations of irrigation systems can afford their activities. This article analyzes and synthesizes international experiences in the development and application of sustainable finance policies in irrigation management. Principles and approaches to sustainable financing learnt from international experience are recommended to Vietnam.*

Keywords: *Policy, sustainable finance, management and operation, irrigation systems*

1. INTRODUCTION

Various studies on water management indicate that because of efficiency and equity in water use, water should be managed as an economic goods and this has been confirmed by the Dublin declaration [1]. In addition, some studies also suggest that sustainable development in some countries in the short-term will face barriers due to water-related problems and finance policies for water resources has been considered as one of the fundamental tools to solve this problem.

Globally, the annual amount of water used for agricultural production accounts for 70% of the total amount of water extracted and used [2]. In Vietnam, the amount of water used for agriculture production accounts for 80% of total water use [3], [4]. While competition between water needs is increasing, meeting the increasing water use requirements for agricultural production to ensure food security is really a big challenge for many developing countries

including Vietnam. To address this issue, many countries have used irrigation financing policy as a key tool to manage and enhance water efficiency in the irrigation sector [5].

In Vietnam, the financial policy in the management and operation of irrigation systems had been applied since 1962 and regulated through a series of Government Decrees. The policy on irrigation service fees (ISF) has promoted service-oriented management and operation of irrigation systems in Vietnam. In Vietnam, ISF consists of two components: Headwork ISF or system-level ISF covering operational and maintenance (O&M) cost of head-works and main structures, which are managed by Irrigation and Drainage Management Companies (IDMCs), and on-farm ISF covering O&M cost for field-level structures, which are managed by Water User Organizations (WUOs) [6]. Although the collection of irrigation service fees was still low, it had created an important source of funding for the management and operation of irrigation systems [7]. As a result, operational organizations of irrigation systems could cover

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part of management and operation expenditures. Molle and Berkoff [8] stated that irrigation service fees in the Red River Delta could cover from 70% to 85% of operating costs. Responsibility in irrigation management had been improved, while people's awareness of water saving had been enhanced. Therefore, the quality of irrigation services and the efficiency of water use in irrigation systems was partially guaranteed [9], [10].

However, since 2008, the ISF policy in Vietnam has been changed significantly to ISF exemption through several decrees issued by the government. Notably, the system-level ISF component has been exempted. Under this exemption policy, farmers are subsidized by the system-level ISF [6]. The change in irrigation fee policy has brought about both beneficial and negative impacts. Cook et al. [11] argued that with the ISF exemption farmers could save about 2% of their annual income. However, this policy increases the state budget and constrains the service-oriented functions and incentives of irrigators in water management [7]. This policy reduces the incentive for farmers to use water efficiently and has also led to less participatory irrigation management [10]. It has weakened the link between farmers, WUOs, and IDMCs in managing their water resources [12].

In the context of restructuring the agricultural sector and climate change, improving the performance of irrigation systems is very necessary as many of these systems have failed to function fully their capacity as designed. One of the reasons causing this issue is that there are still many shortcomings and subsidies in irrigation management. Lack of appropriate mechanisms and policies, especially finance policies, to create motivation and promote the strength of economic sectors, social organizations and communities involved in investment, management and operation of irrigation systems [13]. Therefore, it is necessary to accelerate the improvement of mechanisms

and policies on irrigation management, promote and mobilize the participation of all relevant stakeholders in investment, management and operation of irrigation systems.

Vietnam has promulgated the Law on Hydraulic Works and taken into effective since 2018. This law has formed the foundation for the development and management of a modern and financially sustainable irrigation systems. This Law stipulates a legal framework for improving irrigation services as well as the performance of irrigation systems, toward the market-oriented mechanism. An important issue still remains is the development and application of sustainable finance policies for irrigation services, but Vietnam has little experience in this field to ensure the right track of market-oriented mechanism in the management of water facilities.

In fact, the government has issued a number of finance policies for irrigation services including a series of decrees and circulars on ISF and mechanisms for exemption and reduction, supporting irrigation management. The most recent is Decree No. 96/2018/ND-CP, stipulating in detail the prices of irrigation products and services and supporting fund for using irrigation products and services. Accordingly, the price of public irrigation services is the price that users of products and services must pay to the product or service supplier. Also, according to the provisions of the Law on Hydraulic works, one of the basis for pricing irrigation services is the available budget of the government and affordability of farmers. However, in reality, the implementation of this policy is facing many difficulties because the financial support mechanism is increasing the burden on the state budget.

Meanwhile, it is said that irrigated agriculture can attract the involvement of relevant stakeholders from the production of cash crops with high value such as flowers, medicinal herbs, coffee, pepper, cashew in the midlands,

mountainous areas, and the Central Highlands. However, hydraulic work systems often functions to provide public services (drainage, flood and natural disaster prevention), so in fact it is very difficult to mobilize participation in the investment and management of hydraulic work systems. Therefore, it is very important to study and propose appropriate and sustainable finance policies for irrigation services in public irrigation systems in Vietnam in the context of implementation of the Law on Hydraulic Works.

2. METHODOLOGY

Qualitative method is used in this study including: (i) Review research results on financial policy in management and operation of irrigation systems in Vietnam and overseas countries; (ii) Synthesize data on finance policies for irrigation services to analyze cases of sustainable finance policies for irrigation services; (iii) Systematize the scientific basis and evaluate international experiences related to sustainable finance policies for the irrigation service. Propose approaches to develop sustainable finance policies for irrigation services in accordance with the conditions of Vietnam.

3. RESULT AND DISCUSSION

3.1. Review on finance policies on management of irrigation systems

One of the important contents of this study is the meaning of sustainable finance for the management of irrigation systems. No irrigation service is free, there must be someone to pay for this service. But who pays and what is the difference in financial structure between countries around the world. These two questions have a very profound impact on the institution and effectiveness of the management of irrigation systems. The fact that water users pay directly for irrigation services, based on the volume and quality of water used, will significantly affect how efficiently water is used. Users who pay for services directly or indirectly will have a

major impact on the incentives for the service provider to ensure that the service meets the needs of the customer. Some types of finance for irrigation services over the world are summarized as follows:

Free irrigation services. This is a quiet common case and the irrigation service is provided by the government without any direct fees from users. Therefore, there is no relationship between cost of water service provision and the economic value of water to users or to other potential users. In these irrigation systems, water is often used inefficiently, and the quality of facility maintenance and operation services is frequently problematic. Forms of indirect cost recovery, such as product taxes, are often used to recover the cost of irrigation service, but there is no link between payment and service delivery.

Partly payment of irrigation service cost. Usually the users have to pay a fee that covers part of the service cost, not the whole cost: such as operation and maintenance costs not included investment. Apart from the affluent countries of Europe and North America, it is rare to find the service fees based on amount of water used, or the economic value of water. Payment evasion by a large number of users is also not uncommon, as regulatory enforcement is difficult. As a result, the fund were not enough to cover all operation and maintenance costs, leading to poor maintenance and require high subsidy for upgrade or repair of water facilities.

Users directly pay all costs for irrigation services. For government irrigation systems, it is rare for users to pay the full cost of the service (including operation, maintenance and investment costs). However, for the private system, the service users must pay the full cost of the irrigation service. When farmers have to pay the full cost, especially if other agricultural inputs are not subsidized, they tend to cultivate high-value crops otherwise they may not afford for the irrigation service.

Mixed cost recovery system. This is perhaps the most common scenario, for example, in

South Asia, "free" irrigation services from public systems exit at the same time with privately funded and owned irrigation systems. While irrigation service users do not have to pay directly or only a fraction of the cost, other drinking water users and industrial water users pay significantly. In some cities suffering from water scarcity, the poor with the worst services have to pay high prices for low-quality water, while farmers and sometimes the rich pay from little to nothing. As countries move towards market-based water allocation, especially in the context of increased competition among water-using sectors, water allocation comes under increasing pressure as irrigation services are subsidized.

3.2. Sustainable finance policy for operation and management of irrigation systems

3.2.1 Sources of financing for operation and maintenance

Funding to cover activities of management and operation of irrigation systems include 4 main sources, including: (i) Revenues from irrigation service prices for activities using water from irrigation systems; (ii) Revenues other purposes/activities exploiting the irrigation systems and other revenues of organizations managing irrigation systems; (iii) Support or subsidies from the government; and (iv) Contribution of water users [14].

3.2.2 Sustainable financing for irrigation systems

Determining and allocating costs for management and operation of water infrastructure for service users and other users is an important issue from the perspective of policy planning and implementation for water sector. In Asia, about 90% of the hydroelectric systems with the headwork of reservoirs and dams were constructed as multi-purpose systems with mainly for irrigation [15]. Many irrigation schemes provide great transport and fisheries value, and also is important for flood control. For this reason, it is quite complicated to allocate the operating cost among different

water users from the irrigation facility. Farmers will not have to bear the burden of unfair cost allocation, and the budget for irrigation management should be calculated based on costs but from government agencies [15], [16], [14].

In irrigation sector, another issue needs to be considered is whether the price of irrigation services is aimed at full cost recovery, including capital costs, or just focusing on annual operation and management costs. For most irrigation systems in Asia, full cost recovery including capital investment is an unrealistic goal. Governments have traditionally financed capital investments in the form of non-refundable, or, in the case of long-term loans, considered it as a debt that cannot be repaid. In practice, this can be applied as irrigation infrastructure providing services functioning as a public goods or is seen as part of a government policy on food and society. However, the experience from other countries around the world also shows that it is possible to recover a part of the investment capital and this can be guaranteed economically and financially.

It should be necessary to consider what types of services in the irrigation system to be selected with the service price for cost recovery including part of the investment cost. In most of countries, especially in Asia, irrigation service prices are set at the full O&M costs including the main and branch canals (secondary or tertiary. In some countries, such as Sri Lanka and Nepal, there is no service fee for irrigation to cover O&M costs [16].

Financing policy on irrigation can be used to improve water use efficiency in agriculture and to make users aware of the water value especially in the context of current water price subsidy in agriculture. Different water pricing instruments can be implemented to achieve different objectives e.g. cost recovery, efficient use, reallocating water use [17]. Low prices can have a negative bearing on the

effectiveness of irrigation systems and water use. They result in poor maintenance and consequent inefficient operation of existing irrigation systems, limited capacity for improvements of infrastructure, and waste of water at the farm level. For cost recovery of the irrigation systems providing sustainable irrigation services, the service price would be likely high [18].

Management activities should be considered as a separate category because this is an indirect and fixed cost unlike operating and maintenance costs. Therefore, it is not surprising that this expense accounts for the majority of the recurrent budget for O&M and is prioritized when financial resources are constraint. According to a recent survey report [14], state-owned irrigation management organizations often have excess staff and most of the funds allocated to O&M are actually paid for staff salary. The remaining budget for the actual maintenance of the system is very limited. Some countries have reduced the administrative staff for irrigation management (typically no recruitment or early retirement). However, this leads to staff shortage, especially the junior and senior staff who have high qualifications and experience.

However, in fact this problem is mainly due to lack of total budget for irrigation management (including management, operation, and maintenance (MOM) Costs) and is not because of large management costs. From an analysis of an irrigation system, Burton [19] shows that in a well-maintained and well-performing gravity system, the cost of maintenance accounts for up to 70% of total MOM costs. When the funding for the management and operation of the system is insufficient, the proportion of administrative costs will account for a relatively high proportion compared to the total cost of operation and management and compared with the maintenance costs (Figure 1). However, when funding is sufficiently provided for actual maintenance, the same portion of administrative costs will

correspond to a more reasonable proportion than the other components and total costs.

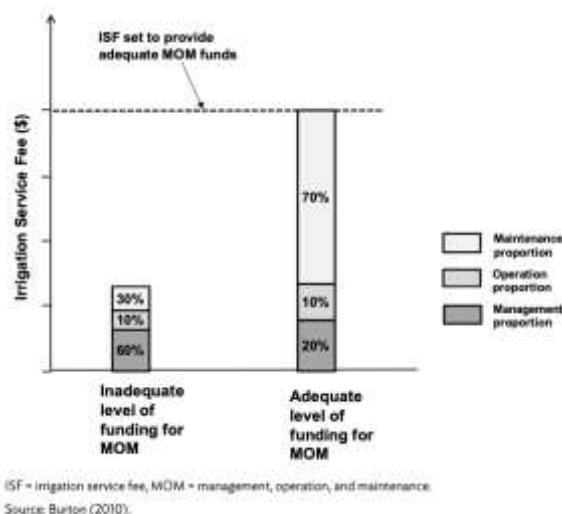


Figure 1: Components of management, operation, and maintenance (MOM) costs

3.2.3 Structure of financing flow

Other important issue is how payments are made, i.e., how financial flows are structured. There are three basic types: (i) No direct payment for irrigation services; (ii) Indirect subsidies; and (iii) Direct payment from users to service provider.

Indirect financing for irrigation service. In many countries, for example in South Asia, if users pay for irrigation services, this payment is not directly to the managing bodies but to the government. ISF is mainly based on the area of irrigated cropland, very rarely on the amount of used water. This ISF is collected by a government agency and transferred directly to the state treasury. Funds are allocated from the treasury to the irrigation authorities based on criteria that are not related to the amount of payment. Therefore, there is no connection between user's payments and services received. So, whether organization provides a good or poor service it has no effect on employee's income or incentives.

Direct financing for irrigation services. Many studies have shown that financially autonomous irrigation management agencies whose direct irrigation fees are paid by water

users are more effective than indirect financing. That is because they do not depend on government treasury [20]. If an irrigation agency is financially autonomous and a significant portion of its income directly depends on the service price paid by customers, there is high incentive to provide good service.

In the long run, however, it is important that the irrigation management agency has the power to modify its price structure as needed and can flexibly adjust staff to incentivize employees to work effectively. This relates to a management issue if the irrigation company has the power, there should be a transparent system to monitor and manage its services and costs, as well as have accountability for payments.

3.2.4 Estimation of proper operation and management costs

Even operation and management costs are estimated and allocated appropriately according to sound principles, difficulties often arise in measuring and estimating the total budget and service prices. Many irrigation authorities lack a full understanding of the O&M costs involved and do not know how much is spent on O&M [21]. Some governments set the levels of budgetary support for irrigation O&M in a top-down manner that is arbitrary and remote from what is actually needed. A recommended solution for irrigation management agencies is to apply life cycle management plans of the facility assets (including optimal total operation and management budgets) to more accurately assess and provide finance for the full cost of their asset management over time [22].

3.2.5 Budget allocation by the government

The situation in many large irrigation schemes in Asia is lack of any systematic procedures for estimating the actual O&M requirements of the systems. The budgetary allocations are made on an ad hoc basis determined generally on the basis of financial resources available with the government and not on the basis of

actual requirements. The funds allocated for O&M by the government and those collected from water users in the form of cost recovery are determined independently of each other [16]. As a result, many irrigation systems especially in Asia suffer from a lack of sufficient funds for adequate O&M.

3.2.6 Farmer affordability

ADB studies demonstrate that farmers' incremental incomes from irrigation projects normally greatly exceed any existing or proposed irrigation service fees. Molle and Berkoff [8] cite a 1990 study of 150 systems showing that in all but one case water charges were less than 10% of net farm income excluding water charges. According to another study [16], irrigation charges represent a small percentage (2%–14%) of the net value of output, 0.7%–6% of the gross value of output, and 0.8%–12% of total operating costs. The authors conclude: "...there is no lack of ability of the farmers to pay for the irrigation water.... It is the lack of willingness- to-charge rather than lack of ability or willingness to pay that is keeping the irrigation water tariffs at low levels."

All recent new irrigation projects involve some development or renovation of infrastructure that will improve service and enhance willingness to pay. A number of recent ADB projects contain complementary components - transport, extension services, marketing, and other features of "integrated" projects - that are likely to boost farm productivity and willingness to pay for water. Finally, unaffordable irrigation charges may signal an ineffectively designed project [23].

3.3. Principles and approaches to develop sustainable finance policy

3.3.1. Principles of sustainable finance policy for irrigation management

Studies on financial policy in irrigated agriculture in particular and in water sector in general show that the principle of determining the price of irrigation services according to

marginal cost (economic price) is not applicable to developing countries. Pricing does not follow a set of rules or standards. Water prices vary between countries, regions, and systems. Even within the same system, water prices change over time. Pricing water is based on social, economic and political factors. There are great differences between countries in terms of economic and political environment, weather conditions, cropping pattern, importance and role of irrigation ownership, and equity issues.

Determining and applying water prices requires careful study and assessment of the institutional, socio-political impacts of alternative methods and strategies. Some principles (Figure 2) need to be taken into account to ensure financial sustainability for irrigation management organizations as follows:



Figure 2: Principles of determining irrigation service prices

(i) Because the demand for water is increasing, the imbalance of water supply-demand is also rising, so it is necessary to determine the demand for the volume of water used, and to set water prices for all water services. At the same time, the development of

water markets is encouraged with exchangeable water use rights and measures to manage water demand.

(ii) Applying the principle that water users or services using water must pay water prices/fees, especially with irrigation services being the largest users of water. Water pricing needs to take into account economic efficiency or at least the revenue from water users should be equal to the total cost or the average price equals the average total cost.

(iii) Irrigation service pricing should be applied according to the volume of field water used. However, it is necessary to require a roadmap. First, acreage pricing for crops can be varied depending on the water demand of the plants in the system. Prices may vary between systems depending on water usage requirements. Where water use values are high and water availability is measurable, farmer income is high, it is advised to apply to volumetric water pricing (in Junjab and Haryana, India).

(iv) Volumetric water pricing should be based on costs and benefits from water metering. The benefits of water metering for volume pricing are obvious but require significant costs to invest, operate, protect equipment and significantly increase water prices.

(v) The financial policy must also ensure service level or quality of service. It is to ensure the technical parameters of the service provided to each household in terms of: (i) Seasonal volume of water supply; (ii) Water supply point, pressure and flow; (ii) Schedule of water supply or how people access water, time of each season; (iii) Reliability of water services; (iv) Fairness of services; and (v) Cost basis.

(vi) Subsidies for irrigation services should not be nationwide. Consideration should only be given to applying restrictions by region, to crops with clear goals and criteria.

Therefore, in order to improve the performance of the irrigation system, to ensure the finance for cost recovery, it is necessary to identify and separate the management and operation costs from the financial budget of

the government. It also requires the irrigation management organization actively generates revenues from providing irrigation services. It is necessary to establish a binding financial link between the irrigation management organization and users through determining the prices of irrigation services.

3.3.2. Approaches to sustainable financing policy

Ensuring revenues from irrigation service prices

There is extensive literature on irrigation service fee to substantiate the view that ISFs mostly fail to cover even the O&M costs of these services, and this result is a product of low nominal charges and poor collection rates [24], [8].

One of the reasons for the low service rates and collection rates is that there is confusion about the different purposes and roles of irrigation service prices. In fact, the price of irrigation services has 03 functions including: (i) *Economic function*: When determined at a meaningful level, the price of irrigation services represents economic value (scarcity level, opportunity cost) of water to promote the most efficient use; (ii) *Environmental function*: The price of irrigation services by volume has an environmental function when set at a level that discourages wasteful use of water in conditions of scarcity, does not affect the ecological environment and long-term sustainability of water resources; *Financial function*: This is reflected in the revenue of the irrigation service price, which increases the revenue for cost reimbursement, to cover the operation and maintenance of irrigation services in a sustainable way.

Thus, when setting the price for irrigation services, it is necessary to clearly define the objectives to be achieved according to these functions to ensure feasibility and suitability. With the goal of ensuring sustainable finance for the management and operation of irrigation systems, the price should ensure the financial

function to cover the operation and management activities and may be part of the investment cost. While determining the price level for the economic efficiency target from the perspective of the national economy, it is necessary to take into account the economic price level. In the context of increasing water scarcity, the price of irrigation services must also take into account environmental requirements to ensure sustainable development.

Results-based financing and Output-based support

There is increasing interest in the use of a results-based financing approach by irrigation management organization to encourage the more efficient implementation and operation of irrigation facilities. The successes that have been confirmed from this approach will pave the way and create a premise for sustainable financial policy for management and operation of irrigation systems. In addition, to ensure sustainable finance for operation and management, it is necessary to increase the application of commercial financial measures through more integrated service activities in the irrigation sector.

Some cases of financial results-based financing in Asia include the Nanyao and Bayi irrigation systems in China. The two systems applied the principle of results-based funding to financially motivate irrigation systems and staff to perform according to predefined criteria for O&M management and revenue generation. fees from irrigation services [14]. However, the effective application of this method depends on an honest, accurate and transparent monitoring system of the performance results as well as the efficiency and effectiveness of the agencies managing the water system. This is a very difficult mission as there is usually an incentive to falsify the actual data of the monitoring system with the goal of increasing the results or products and operational efficiency to receive funding from the government.

Another example of results-based financing is the project to build an advanced water-saving irrigation system for 7,000 households in Karnataka. Seventy percent of the total investment of the project's \$63 million will be provided by the local government, and the remaining 30% by the irrigation management organization will be paid after the system achieves the objectives as designed. The company will also be responsible for O&M for a period of 5 years [14].

Output-based support is similar to results-based financing. This is a disbursement measure by supporting agencies (government) and international financial institutions. Whereby disbursements (usually grants) are conditional upon compliance by the implementing agency or beneficiaries with specific performance criteria, usually output specified through quantifiable data. The purpose of output-based financing is to develop incentives for funding agencies and grantees to conduct effectively investment management and facility operations because funds are disbursed only when there are specific results. Similarly, the grantee (managing authority) tends to shorten the time from project initiation to first disbursement through the use of their own funding. This is because the organization is subject to financial risk.

4. PROPOSING THE DEVELOPEMENT OF SUSTAINABLE FINANCE POLICY FOR IRRIGATION MANAGEMENT IN VIETNAM

Based on the research results on sustainable finance policies on irrigation sector in the world mentioned above, a number of options for the development and application of sustainable finance policy on management and operation of irrigation systems in Vietnam in the context of the Law on hydraulic works is proposed as follows:

For investment in construction and upgrading of irrigation systems

It is required to develop irrigation investment

policies with clear criteria, ensure focused and effective investment, avoid spreading to realize the objectives of efficient allocation and use of water resources, ensuring national water security. Apart from current funding sources for investment from government and international financial institutions, it is necessary to increase financing sources by making the investment of irrigation infrastructure more attractive and reliable for public finance. Also, it is important to diversify investment sources by creating favorable conditions for commercial finance, including private entities. In addition, it is needed to propose a mechanism for encouraging the participation of the private sectors and relevant stakeholders in investment and development of irrigation structures, and to expand appropriate services related to exploitation of water sources in the irrigation systems to increase revenue for management organizations.

For management and operation of irrigation systems

A number of required activities is given as: (i) Review and develop a sustainable finance mechanism to ensure post-investment efficiency, ensure adequate funding for management, operation and maintenance of irrigation infrastructure as well as services related to the water sector; (ii) Finalize the current policy on irrigation service pricing to ensure feasibility in application to increase revenue and to ensure affordability to users. Improve the provision of reliable and regular funding for management and operation from irrigation service prices and other sources, while reducing government subsidies; (iii) Integrate investment and recurrent funding by combining investment plan, O&M costs and other contingency costs, thereby minimizing investment needs in the future and ensure sufficient fund for maintenance.

Furthermore, policies on water management and irrigation services toward the demand management approach should be developed,

including: (i) reuse of water within and outside the system, (ii) using technologies of water saving, especially end-water-users and households, (iii) land use planning especially at the basin level, (iv) educating and training on water saving for water users; and (v) water pricing.

Financial sustainability should not be separated from missions that make irrigation management organizations function more efficiently and accountably. These missions includes the following: (i) Create a fully autonomous organization (in terms of both financial and administrative aspects) in operation and management of the irrigation facilities, which may require changes to operational regulations and the apparatus of these organizations; (ii) Introduce and apply an internal management system for these organizations to bring about higher efficiency and financial autonomy. This internal management system includes asset management planning; (iii) Maintenance of existing infrastructure should be ensured to maintain service provision to users at an adequate level and to allow irrigation facilities to function properly throughout the design life cycle; and (ii) Establish and maintain a clear and effective relationship between the irrigation organizations and service users, especially farmers.

One of the important contents in irrigation management is the service level must be based on the consultation with the users and should not be unilaterally imposed from the irrigation management organization or higher agency. The level or quality of service of an irrigation system is one of the decisive factors affecting the efficient and productive water use on irrigation systems. Appropriate and well-established service levels contribute significantly to improved water delivery services in terms of flexibility, reliability and equity throughout the irrigation system. There is also evidence that clear and consistent service levels between operators and users

contribute to intensification (increasing agricultural output) and increasing water productivity [14].

Establishing a monitoring and evaluation system for irrigation management

To ensure efficient distribution and use of water resources, it is necessary to build a monitoring and evaluation system in the management and operation of irrigation systems. Including: (i) data system on water sources and water demand from irrigation systems; (ii) Monitoring and evaluation system with specific criteria in terms of technical aspects (measurement of water sources, water delivery in the irrigation system), institutional aspects (law enforcement), economic (cost, investment efficiency, water price, income increase) in the management and operation of the irrigation system.

5. CONCLUSION

Financial policy in the management and operation of irrigation systems plays an important role in improving water use efficiency and enhancing user's awareness about water value. This is especially true for irrigated agriculture that consumes huge amount of water but is often subsidized. Ensuring sustainable finance for organizations managing and operating irrigation systems is therefore essential. Through out the world, there are many successful lessons on sustainable finance policies for irrigation management activities. It is the identification of financial sources from which to develop policies to ensure the availability of financial resources in the form of direct or indirect financing. International experience shows that the financial sustainability needs to set irrigation services prices with the lowest level for full O&M cost recovery. This also implies that direct finance policy is more effective than indirect finance as it does not depends on the government. Affordability of water users especially farmers have a great influence on sustainable finance policies, so it should be considered during the process of development and implementation.

Based on principles and two approaches to sustainable finance policies for irrigation services, the conditions to apply to the formulation and implementation of finance policies in irrigation management in Vietnam are proposed. The proposed contents for the development of a sustainable finance policy for the irrigation management in Vietnam in accordance with the Law on hydraulic work includes three points: (i) The first one is finance policy to ensure fund for investment, repair and upgrading of irrigation facilities by various forms of capital mobilization,

expansion and diversification of irrigation service activities to increase revenue; (ii) The second are sustainable finance mechanisms and policies to ensure post-investment efficiency, ensure sufficient funding for the management and operation of the systems based on applying irrigation service prices and strengthening the irrigation management organizations and ensuring the level of irrigation services; (iii) The third is to build a monitoring and evaluation system to ensure the effective irrigation management.

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