Original Article

Building Labor Level In Management And Operation Of Water Works System In Hung Yen Province, Vietnam

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Abstract

The labor norm is a critical economic and technical norm in managing, exploiting, and protecting irrigation works. Labor norms are the basis for the units to arrange the use of labor in a reasonable way and the basis for the management levels to plan and take over the assigned public tasks. According to the Law on Irrigation and guiding documents, establishing norms is essential. However, only a few provinces in the country currently establish norms for grassroots irrigation organizations, including labor norms. In this article, the authors present approaches, methods, and research results to develop labor norms for managing and exploiting irrigation works by irrigation organizations in Hung Yen province. Yen managed, thereby drawing experiences for implementing this work in practice. The research results are lessons for the development and application of normative tools in management to improve the efficiency of irrigation works management and exploitation of grassroots irrigation organizations.

Keywords: Labor level, water works systems, Vietnam

1. INTRODUCTION

By the spirit of the Law on Irrigation (Clause 3, Article 34) and specific provisions in Decree No. 96/2018/ND-CP dated June 30, 2018, of the Government. Organizations and individuals exploiting irrigation works shall organize the formulation of economic and technical norms as a basis for the pricing of irrigation products and services (irrigation products and services) and perform general operations management. Process by the process, ensuring efficiency, safety, and protection of irrigation works. The system of irrigation works is calculated from the delivery of irrigation products and services between the supplying organizations and individuals and the organizations and individuals using irrigation products and services to the location of the irrigation works. The focal point in the starting position managed by the MANAGEMENT units of irrigation results in the provinces has predominantly been built up with economic and technical norms under the guidance of the province's Ministry of Agriculture and Rural Development. Decision No. 2891/QD-BNN- TL dated 12/10/2009. However, the system of works calculated from the point of delivery of irrigation products and services to the arable land under the responsibility of organizations and individuals using irrigation products and services has yet to be studied, built, and defined—at economic and technical levels.

According to statistics from the General Department of Irrigation, Ministry of Agriculture and Rural Development, grassroots irrigation organizations manage more than 25,000 small irrigation projects, in-field irrigation, and more than 140 thousand km of canals—Inland ditch.

Irrigation organizations in Hung Yen province exist in the following forms: i) Agricultural service cooperatives (cooperatives); ii) Water use cooperation groups (water use cooperation); iii) Commune People's Committee (People's Committee). Due to the difference in the size of the area, the system of works, and the management organization model. It is necessary to have specific regulations for the use of resources for the

management and operation of irrigation works to ensure consistency in the direction of irrigation works. Irrigation management in Hung Yen province.

2. METHODOLOGY

2.1. Approach

Managing Irrigation works depends significantly on the results' natural conditions, topography, and current status. Therefore, to build a set of labor norms in the management and exploitation of irrigation works managed by irrigation organizations, it is necessary to approach in the following directions:

a. By project type

Based on the list of works and the service scale of each project, classify the results according to each category: Reservoir, Weirs, pumping stations, canals, etc., then study the regulations in management talking for each type of work and construction of waste levels (in terms of labor) for each type of work.

b. According to the product from the management of Irrigation works

Waste levels are determined for each type of work by selecting representatives for calculation based on the current state of operation management in the area and current product regulations. Irrigation services and select suitable product units to calculate labor norms for each type of work.

2.2. Research Methods

To study and build labor norms in the management and exploitation of irrigation works managed by irrigation organizations, the authors used the following methods:

a. Analytical methods

Dividing the production and labor process into several stages, and studying the factors affecting the level of human waste, thereby determining the destruction of human resources to complete the content of each management job. , operating, and maintaining irrigation works... by the normative process, the level of production organization, labor organization, and technical requirements.

b. Standard method

The content of this method is based on the standards and regulations of the State to determine the composition of work in the management of Irrigation works.

c. Statistical methods - experience

Summarize and statistics on labor waste according to one cycle or many cycles of a type of work that has been performed and is being performed by representative units. Based on statistical data, analyze and process data to verify the results of norm calculation.

d. Field survey method

Summarize the list and service scale of each project in Hung Yen province managed by irrigation organizations (according to the decentralization of the provincial People's Committee), grouping works according to the characteristics of each category works, Specifically:

- Reservoir works: Classified according to capacity (m^3) and opening and closing machines of water intake culverts;
- Pumping station works are grouped according to station flow (m^3/h);
- Weir works are grouped according to the dam height (m);
- Canal works are grouped according to channel bottom width (m).

For each group of works, select representative results (in terms of specifications, project characteristics, and service scale) to conduct detailed surveys of mining management.

3. RESEARCH CONTEXT SITUATION

3.1. Current status of irrigation works system Hung Yen province, Vietnam

Up to now, the whole province has invested in building and putting into operation 638 pumping stations (26 low-head pumping stations), of which: 454 stations specialize in irrigation (9 low-head pumping stations), 38 specialize in drainage (4 stations). low-head pumping stations) and 146 combined irrigation stations (13 low-head pumping stations). The province's intra-field canal system has been completed from the main works to the field surface, with a total length of more than 6,289km; in which: Bac Hung Hai system's axis river is 93.5km, inter-district axis canal, and central irrigation and drainage canal is 1,195km; irrigation canal more than 5,000km. The method of irrigation works in the field is divided into four areas serving irrigation for people's living, agriculture, and economic sectors, specifically:

a) Bac Kim Son area: The total number of works serving irrigation and drainage is 173 pumping stations, of which: 129 specialized irrigation stations (3 low-head pumping stations), five dedicated drainage stations, and 39 combined irrigation stations (2 stations). The main river axes and canals responsible for conducting irrigation water of the area are connected and interconnected, such as Luong Tai, Ba Sinh, Ban - Vu Xa rivers,...

b) Chau Giang area: The total number of irrigation works is 141 pumping stations, of which: 104 specialized irrigation stations, 11 specialized irrigation stations, and 26 combined irrigation stations (1 low-head pumping station). The main river axes and canals responsible for conducting irrigation water in the area are connected and interconnected, such as the Thai Noi River, Tam Ba Hien, Muoi river, Dong Que river, Tu Ho - Sai Thi,...

c) An Thi area - road 39: The total number of irrigation works is 155 pumping stations, of which: 109 stations specializing in irrigation (1 low water column pumping station), three dedicated irrigation stations, and 43 combined irrigation stations (7 low-head pumping stations). The main river axes and canals responsible for conducting irrigation water of the area are connected and interconnected, such as Bun River, Quang Lang,...

d) South Cuu An area: The total number of irrigation works is 169 pumping stations, of which: 112 specialized irrigation stations (5 low-head pumping stations), 19 specialized irrigation stations (4 low-head pumping stations), and irrigation. Combined drainage of 38 stations (3 low-head pumping stations). The main river axes and canals responsible for conducting irrigation water of the area are connected and interconnected, such as Hoa Binh River, Uncle Ho, Reed - La Tien, Le Nhu Ho, River 61, Dong Lo River, Cao Xa - Phuong Tuong,...

3.2. Capacity for irrigation and drainage for agricultural production:

a) Water supply for irrigation: The primary source of water is taken from the Red River through Xuan Quan sluice into the Bac Hung Hai river system, and the main rivers supplying water to serve the people's lives and economic sectors of the province and create sources for pumping stations. Serve to irrigate crops, taking advantage of the tide to get water from the Luoc River, increasing the water source serving mainly for Tien Lu and Phu Cu districts through the Vong Phan sluice.

The total area of regular irrigation is 43,189ha/46,990ha, accounting for 91.9% of the total area of dynamically balanced irrigation as planned, in which:

- North Kim Son area: The stable irrigated area is 9,638 ha/9,638 ha, reaching 100%.
- Chau Giang area: Stable irrigated area is 9,193 ha/12,577 ha, reaching 73.1%.
- An Thi area - Road 39: The area of regular irrigation is 9,210 ha / 9,627 ha, reaching 95.6%.
- Southwest area - Cuu An: Stable irrigated area is 15,148ha/15,148ha, reaching 100%.

b) Regarding water drainage: The total area of direct drainage to the Red River and Luoc River is 24,155ha, belonging to the basins of Lien Nghia, Nghi Xuyen, Bao Khe pumping stations (urban drainage), Trieu Duong A and B, Mai Xa A and B, La Tien A and B; total drainage area flowing into Bac Hung Hai river is 2,500 ha, mainly concentrated in districts of Van Lam, My Hao, Van Giang, Khoai Chau; The force drains the remaining area to Bac Hung Hai river to Cau Xe and An Tho sluice gates to Thai Binh and Luoc rivers.

The total area to be drained stably is 76 615 ha/80,728 ha, reaching 94.9% of the total area to be drained by the dynamics according to the plan, of which:

- North Kim Son area: The area to be drained is stable at 16,885ha / 18,429ha, reaching 91.6%.
- Chau Giang area: The area to be drained is stable at 20,211ha/20,751 ha, reaching 97.4%.
- An Thi area - Road 39: The area is stably drained 13,465ha/15,494ha, reaching 86.9%.
- Southwest area - Cuu An: The area is stably drained 26,054ha/26,054ha, reaching 100%.

3.3. Capacity to serve water drainage for people, industry, and other economic sectors:

Currently, most drainage pumping stations and canal systems have been invested in and built for a long time, with the task of designing mainly for water drainage for agricultural production. For industry and urban areas,... (the drainage coefficient for industry and urban areas is about 2.5 times higher than that for agriculture), many canal systems and pumping stations are overloaded. Lack of service capacity with the existing power of irrigation works can only meet about 60% of the water drainage needs of industrial parks and urban areas.

3.4. Apply irrigation for upland crops in the province:

Advanced and water-saving irrigation methods for upland crops currently applied in the region mainly use local spray irrigation, drip irrigation, and economical irrigation in net houses and greenhouses. The total area of upland crops applying advanced and water-saving irrigation is about 3,724 hectares, of which:

- Area for local spray irrigation: 3,098 ha (reaching 83%).
- Drip area: 25 ha (reaching 0.7%).
- Area for water-saving irrigation in net houses and greenhouses: 601 ha (reaching 16.3%).

3.5. Regarding the management and exploitation of irrigation works:

- From 2011 to 2020, irrigation works in the province were managed, exploited, and maintained by State-owned enterprises (02 companies using irrigation works) and 154 agricultural service cooperatives—construction protection. Implementation of Resolution No. 12-NQ/TU dated March 21, 2013, of the Standing Committee of the Provincial Party Committee, Action Plan No. 50A/CTr- People's Committee of April 26, 2013, of the Provincial People's Committee on the improve the efficiency and effectiveness of state management; strengthen the effective handling of violations of encroachment on irrigation works in the province, in the period from 2016 to 2018 the area has handed over all irrigation pieces by service cooperatives. Agriculture management about one member limited liability company exploiting provincial irrigation works to manage, control and protect.

Organization and apparatus of one member limited liability company exploiting provincial irrigation works: The machine for management and exploitation of irrigation works is lean, with few clues; operating in a professional and efficient organization, the organization includes: Office block of the Company, nine enterprises exploiting irrigation works directly under the Company to now manage, control and protect hydraulic jobs—benefits in the areas of districts, towns, and cities and to clusters and stations.

- Qualifications of officers, employees, and workers capable and professionally trained in the right major; operate irrigation works and systems to ensure effective and safe processes, regulations, and irrigation and drainage management. Currently, the total number of officers and workers of the one-member limited liability company exploiting provincial irrigation works is 2,265 people, of which:

+ The number of officers, employees, and workers on the Company's payroll is 861 people; There are 12 people with a post-university degree, 227 people in university, 16 people in college, 72 at an intermediate level, and 534 people who operate pumping stations.

+ Number of workers working under seasonal contracts 1,404 people (working in the management and operation of pumping stations received from agricultural service cooperatives to the one-member limited liability company operating hydraulic works) provincial benefits).

3.6. Difficulties and limitations:

- In the dry season, the water level of the Red River needs to be higher, much lower than the designed water level of the in-field irrigation works, causing many difficulties for production service and affecting people's daily life.

- Many pumping stations have been built for a long time, have not been invested in renovation and upgrading, and machinery and equipment have deteriorated. The system of canals and canals is mainly earth canals which are often eroded and deposited; the flow cross-section is narrow, and the equipment for the operation of the works is outdated, leading to low irrigation efficiency and difficulties in application—advanced irrigation methods, saving water for plants.

- Industry, urban areas, and traffic develop rapidly, increasing demand for water drainage and putting tremendous pressure on the system of irrigation works; many irrigation works and procedures need to meet the requirements—drainage demand in the current period (lack of drainage capacity).

- Objects for irrigation and drainage of many works have been changed so far, leading to the task of the results and the canal system no longer suitable; the efficiency of irrigation works could be higher.

- In recent years, the area converted from inefficient rice to vegetables, crops, flowers, ornamental plants, and fruit trees has taken place firmly, so the demand for irrigation is very different. On the other hand, the area of upland crops applying advanced water-saving irrigation methods still needs to be higher, accounting for 18.5% of the total area of 20,091.8 hectares of dry crop production; Irrigation measures need to be more appropriate and effective.

- Discharging untreated wastewater from industrial parks, urban centers, residential areas, and craft villages into the irrigation works system causes water pollution more seriously, especially upstream of Kim Son river (Bac Hung Hai system), location of Xuan Thuy sluice (Cau Bay river).

- Violation of irrigation works, even though they have been drastically prevented and handled by all levels, still exists and must be thoroughly treated.

- The number of officials and workers directly managing and operating pumping stations with qualifications to meet the requirements specified in Decree No. 67/2018/ND-CP dated May 14, 2018, of the Government regulating expenditure. Some articles of the Law on Irrigation still need to be expanded.

- The level of payment for workers, seasonal contract employees with one member limited liability company exploiting irrigation works in the province currently needs specific regulations.

3.7. Reason

- In recent years, extreme weather events have occurred, the rainy season rarely occurs, causing prolonged drought, and in the rainy season, storms and low pressure often appear, driving heavy rain.

- Some people's awareness of protecting irrigation works is low. The state of discharging and dumping waste into irrigation pieces still exists and is increasing and needs to be paid attention to treatment.

- Funding sources for investment in construction, renovation, and upgrading of irrigation works to meet the needs of irrigation, drainage, and drainage for the subjects are limited and need to be more timely.

4. TECHNICAL PROCESS OF LABOR-LEVEL CONSTRUCTION

4.1. The process of formulating labor norms

Labor norm is the necessary labor expenditure (from preparation to completion) to complete a product unit or a specific volume of work by technical and quality standards in the organization's particular functions and techniques. To build the labor norm, it is necessary to define and divide the cycle of management of mining Irrigation works according to the following stages:

Stage 1. The production stage is to create a water source for irrigation/irrigation. Building a labor norm to operate the focal works or collect water from the intersection points is necessary for this stage. We receive water from Hung Yen Irrigation Works Management One Member Limited Liability Company.

Stage 2. The circulation-distribution stage bridges production and consumption; the circulation stage starts from behind the water intake at the beginning of the central canal of the focal work (or the water delivery point), and the water flows. Through the channel at all levels and led to the foot of the production household's field, this stage needs to build a labor norm for the management and operation of the canal and the works on the channel.

Stage 3. Product consumption is the final stage in the production, circulation, and consumption cycle. Water is brought to the field to ensure that a large area is irrigated and does not cause waste; this stage needs to develop labor norms for irrigation management.

Labor norms include a detailed labor norm is the necessary labor expenditure to complete a specific volume of work by a group of workers in each stage (one sluice operation, one critical time monitoring, one-time maintenance,…) by the process, work content and technical requirements of operation management and the general

labor norm is the necessary labor waste to manage and operate a plant: Process, a system of works by-product unit for each season or the whole year.

4.2. The order of building labor norms

Step 1: Synthesize and classify works (statistics, synthesis, classification, and grouping of results).

Works managed by grassroots irrigation groups include reservoirs, small weirs; pump stations; culverts, and small areas regulated by the People's Committee of Hung Yen province.

Step 2: Build detailed labor norms:

i) Division of labor process and classification of labor (according to 3 stages of production, circulation-distribution, consumption);

ii) Develop detailed labor norms according to 4 main work groups (monitoring, operation, maintenance, inspection, and protection) in each stage;

iii) Summarize detailed labor norms by main job groups in each stage.

Step 3: Build the aggregate labor cost:

Calculate general labor to manage and operate each type of work (reservoirs, weirs, pumping stations, ditches, canals and works on channels, field management) for each season and year. The department sums up the amount of work done for four main tasks:

i) Operation;

ii) Monitoring;

iii) Maintenance work;

iv) Inspection and protection work.

Step 4: Calculate the aggregate labor norm:

Total labor is determined by year for each type of work, and according to the volume of products, the representative works are selected to serve for each season or the whole year.

5. RESULTS

Based on the current status of the system of works that have been grouped, based on the process and implementation order, the research team develops norms according to the results tables (from table 3 to table 8) for each group project category:

Table 1. Labor norms for reservoir management and operation

Unit: Work/reservoir/yea

No	Scale of works by volume group (V)	Quota		
		Using collapsible machine V5	Using collapsible machine V3	No using collapsible machine
1	$V \geq 500.000\ m^3$	208,3	204,6	190,8
2	$300.000\ m^3 \leq V < 500.000\ m^3$	194,7	192,4	175,4
3	$200.000\ m^3 \leq V < 300.000\ m^3$	178,5	178,1	159,5
4	$100.000\ m^3 \leq V < 200.000\ m^3$	167,3	165,1	148,4
5	$V < 100.000\ m^3$	157,7	155,4	138,9

Table 2. Labor norms for the management and operation of dams

Unit: Work/50m dam length/year

No	Scale of works by dam height (H)	Quota (Work/50m dam length)	
		Soil Dam	Solid Dam
1	H > 8m	32,18	40,32

2	5m ≤ H ≤ 8m	26,06	42,42
3	H < 5m	21,88	25,93

Table 3. Labor norms for the management and operation of pumping stations

Unit: Work/pumping station/year

No	Project scale according to pumping station flow (Q)	Quota
1	Q ≤ 540 m^3/h	379,90
2	540 m3/h < Q ≤ 1.000 m^3/h	584,37
3	Q > 1.000 m^3/h	616,04

Table 4. Labor norms for channel management and operation

Unit: Work/km of canal/year

No	Scale of works according to channel bottom dimension (B)	Quota	
		Land channel	Solid channel
1	B>2 m	48,850	40,620
2	1 m < B ≤ 2 m	45,110	37,840
3	B ≤ 1 m	42,480	35,890

Table 5. Labor norms for the management and operation of sluice gates

Unit: Work/work/year

	Quota according to the collapsible machine (V)			
Collapsible machine	V5	V3	V2	V0-V1
Labor grade 4/7	34,40	33,07	24,97	11,04

Table 6. Labor norms for field management

Unit: Cong/100ha/yea

No	Content	Quota/type of area (ha)					
		<20	20-50	51-100	101-150	151-200	>200
1	Get source creation	79,33	65,50	55,50	60,90	61,30	56,20
2	Actively source water	8,51	8,10	7,20	5,50	4,30	3,40

6. DISCUSSION

The results of labor norms for each type of work by a group of specifications are the basis for the management units to determine the total labor cost for the management and operation of the results under the team's control. This is also the basis for the cost items to pay salaries for operation managers according to the volume of work performed; in addition, the labor norms along with other cost components are also the basis for determining The price of in-field irrigation products and services is the basis for agreeing on the rates of collection of irrigation products and services for users.

To apply norms to the management of works, it is required to define the technical parameters of the results and the basis for determining those specifications. In the context of irrigation works managed by grassroots irrigation organizations with a very long construction period, many projects still need specific specifications. Still, the operation is entirely based on the experience of the farmers. Therefore, applying norms will be a big challenge for all levels of project management.

The management and exploitation of irrigation works managed by grassroots irrigation organizations are currently primarily assigned to officials of local organizations operating in a part-time form, such as commune police, social women, veterans association, youth union, the village head, village head, fatherland front, people's committee, etc. Therefore, most need professional qualifications in construction management, which can significantly impact construction efficiency. In fact, in Hung Yen, there has been a close association between Hung Yen Irrigation Management One Member Limited Liability Company and district and commune management units of irrigation works through training sessions. Expertise in exploitation management, besides; the district officials in charge, also regularly exchange and evaluate the actual situation, thereby promoting the efficiency of exploiting the works from the focal point to the field.

7. CONCLUSIONS AND RECOMMENDATIONS

The management and exploitation of irrigation works have been improved in terms of institutions and policies since the Law on Irrigation was promulgated. The management and exploitation of irrigation works managed by organizations that are one-member limited liability companies, the most economical and technical norms have been developed for irrigation organizations. It depends heavily on each region's natural conditions, socio-economic characteristics and customs, practices, and cultures, so management methods and processes must also be flexible. However, currently, in addition to the system of works from the point of delivery of irrigation products and services to the focal pieces that the State is supporting with the price of irrigation products and services, the activities of irrigation organizations must mobilize the contribution of water users, which significantly affects the efficiency of the management and exploitation of the works because it is not possible to secure funds to carry out maintenance and repair activities according to technical requirements. Developing economic and technological norms suitable to the region's characteristics and meeting the specialized needs of the system of works managed by the irrigation organizations is necessary to help the management gradually determine common standards.

Only a few provinces have researched and developed technical and economic norms, including labor norms for irrigation organizations (An Giang, Hung Yen, etc.) effective in management. Through the results of the study to develop labor norms for the management of Irrigation works managed by irrigation organizations in Hung Yen province, the research team recommends the local agencies (the Provincial People's Committees, Departments of Agriculture and Rural Development, Sub-Departments of Irrigation, ...) across the country soon organize the development of a set of economic and technical norms in the management and exploitation of irrigation works for irrigation organizations to create convenient in operation as well as in State management, contributing to improving the efficiency of exploitation of irrigation works.

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