

ICH 2019**International Conference on Humanities****KEY SUCCESS FACTORS IN WATER MANAGEMENT FOR
SUSTAINABILITY IN PHRAE PROVINCE, THAILAND**

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Abstract

The research aimed to investigate a case study of water management by the Phrae Provincial Administrative Organization (PAO), which is the major local government in Phrae province in Thailand. The PAO was first runner-up in the Good Governance Awards for Local Government in the Fiscal Year 2018, presented by the Thai Prime Minister's Office, as a result of demonstrating their innovation in water crisis management. The researchers applied a qualitative research methodology, which consisted of in-depth interviews, group interviews, and non-participatory observation. As a result, the researchers found that the case study proved successful in handling the water crisis in a sustainable way, which led the province towards sustainable development. The PAO established Water Management Schools, which represented self-reliant management to encourage people to co-produce this public service. The literature review, by cross-synthesizing the keywords between the co-production approach and sustainable development, demonstrates the linkage of the two concepts and provides significant keywords. Further, the case study identifies the most outstanding elements that proved to be key success factors in water management for sustainability, namely self-reliance and self-efficiency of the population, democratic participation, community engagement, a collaborative approach and partnership, and a leadership and contingency approach.

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1. Introduction

Phrae province is situated in the north of Thailand. It is one of many areas that suffer frequent natural disasters. In particular, the province encounters yearly water crises, alternating between floods and drought. For example, the so-called "Great Flood" in 2011 caused several billion Thai baht of damage (2011 Thailand Flood Executive Summary, n.d.) across many sectors. The early flooding broke out in Phrae province, which was subsequently accused of causing the severe flood. Due to Phrae's geographic attributes, comprising several ranges of high mountains and steep mountain valleys, the local government, Phrae Provincial Administrative Organization (PAO), has to deal with such crises every year and has to prepare both protective and preventive plans. The PAO provides public services for the people living in the province. It is a major local government body that supervises and collaborates with the smaller administrative organizations in the area. For these reasons, it plays an important role in managing the yearly problems that have the potential to affect all people in the country and to cause tremendous damage to the national economy.

Besides the problem with the geographical water sources, drought is caused by the scarcity of natural large-scale water storage facilities such as dams. There are only medium-size sources: no large-scale storage is available. This restricts water supplies for household consumption, agriculture, and industries. In terms of water supply to the community for household consumption, the crisis leads to conflict among people in the affected areas. Due to an inadequate irrigation system and poor management, villagers find water management very hard to deal with. People cannot restore and retain appropriate quantities of water for their own use, but some people exploit the irrigation system. Even worse, some cannot access water at all. This causes further conflict among communities.

For these reasons, the PAO realized that they needed to develop systematic procedures to initiate a solution to the problems. After the Great Flood in 2011, they launched a project to handle all the water crises in the area. They geographically surveyed the area to seek the true causes of both floods and drought. Subsequently, they created a Phrae water map by using Information Technology called "Geographic Information System or GIS", founded the Information Water Management Centre, and in 2017 they built up a self-reliant water management school. The school became an innovative tool to solve the water crisis sustainably.

1.1. Innovation for Public Service – The Self-Reliant Water Management School

The self-reliant Water Management School project was the first runner-up in the large local administrative organization sector of the Good Governance Awards for Local Government in the Fiscal Year 2018, presented by the Office of the Permanent Secretary, Thai Office of the Prime Minister. It demonstrated an approach that goes beyond mere civic participation. People not only participate in service provision but also coproduce the service: that is, they manage water solutions by themselves. For example, the school has taught residents to survey the natural resources in their areas, such as forest and water sources. They created simple water maps and planned a plain water retention system, comprising permanent and temporary check dams, weirs, dikes, etc. The cost of the construction was more than the PAO could cover on their own. The school encourages the villagers to be responsible for the environment, themselves

and their communities. Co-production can also attract help and partnership from other parties, such as private institutes, to empower the work of the PAO and the citizens. After the initial PAO projects, the people are now able to run the retention systems by themselves, and they usually receive collaboration from their partners to complete the water management tasks.

1.2. How the School Functions

The concept of the water management school is to enable citizens to understand the water problem in their areas and communities and to be capable to cope with their situation. The concept pushes people to be self-reliant with the help of the PAO as a facilitator. The PAO provides information, data, and technologies, such as the data from the Water Management Centre. Schools have been founded in several districts and sub-districts of Phrae province. The first one was established in 2017 in the Baan Lau Nuea community, in Amphor Soong (Soong District), Phrae province. It taught citizens about the causes of the water crisis in the province and how to use technology to study the issue. Another three such schools were later founded in other districts. The schools were founded simply: they borrowed the premises of an old elementary school and the PAO officers themselves served as teachers. The students were people in the community. The first lesson started with a survey of the water itinerary utilizing a GIS so that the students knew the water paths. Thereafter, they were able to plan the water retention and detention system. The construction of check dams was planned, and more than 250 check dams were built in each village.

The PAO called for a public hearing, problem discussion and brainstorming among citizens and participants in the project. This demonstrates the importance of the project. Through such activities, citizens became willing to participate and co-produce water management. They co-produced the service in many forms, but mostly by building check dams to help with water retention by themselves. Once the people understood the water itinerary and the importance of water retention and detention for their consumption, the local government no longer needed to perform this function. The PAO was not the sole player, as the people in the area also took action to cope with the chronic crisis. The following interview excerpt from the group interview shows that the project was successful and had positive impacts on water management and on reducing conflicts among the communities in the neighbourhood.

Now, since the school has been established, the construction of the check dams has become more useful and correct. We gain the most benefits from them and this has allowed increasing numbers of people to participate in the project. Conflicts among neighbours have declined. In the past, people fought for the water; people tried to keep the water. Therefore, there was none left over for others. We fought a lot, but now our relationships have been getting better.

In the subsequent phase, the PAO has continued to establish schools in other areas. Moreover, they seek collaboration and partnership from other organizations. Their partners are from both private and public organizations, including civil societies. The collaboration seeks to develop the project in terms of quantity and quality so that it becomes more sustainable. We can conclude that the school has become an innovative tool to solve the water problem and to provide services to the citizens in Phrae province.

2. Problem Statement

To investigate the key success factors in the Water Management School project, we looked back at the concepts of service provision. We saw that the PAO applied the New Public Service (NPS) approach, which underlines how they encouraged people and sought cooperation to manage the water crisis. The first level involves looking for the best practice of service provision and disseminating the model to other organizations. The next step is to consider the key factors that support success. Then, the last phase is to consider whether the practices can reach sustainability and be sustainable. Having reviewed the literature about co-production and sustainability, we found interesting connections between the two concepts. These links imply that co-production encourages sustainability. What factors underline the success of a self-reliant Water Management School? Why has the school proved to be an innovative tool to solve the problem and what theory underlies its success? To answer these questions, the researchers studied the definition of the co-production approach.

Co-production becomes a form of delivering public services whereby the state and citizens collectively produce public goods and public services (Wyborn et al., 2019, p.7). Strokosch and Osborne (2016, p. 674) divided co-production into three levels: consumer co-production, participative co-production, and enhanced co-production. Consumer co-production is a somewhat basic level because it is inevitable that service consumers become a party to product provision. However, participative co-production goes beyond consumption to planning, developing and evaluating existing forms of public services. Finally, enhanced co-production shows advancement in the service users' contribution of their expertise to co-design and co-create service innovation, which develops new forms of public service.

To further study the main point of the paper, namely sustainability, it is necessary to define the term. "Sustainability" means "the ability to make development sustainable to secure the needs of the present without compromising the capacities of future generation to respond to their needs" (World Commission on Environment and Development, 2009). Sustainability is a broad concept that includes aspects such as sustainable development, sustainable policies, sustainable consumption, and sustainable economic activities (Raggamby & Rubik, 2012). The self-supporting economy is growing in society, as democratic participation involves sustainable policies that are gradually increasing in many dimensions. For example, the United Nations created a framework for International Corporations to achieve sustainability, namely the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs). Sustainability has become a global concern and also a framework to follow. This paper will discuss how co-production can be a method to reach this goal.

The literature on the relations between co-production and sustainability shows that there are linkages between the two concepts. Repeated keywords demonstrate this relationship, as set out in Table 1, below.

Table 01. The linkages between the co-production approach and sustainable development

Keywords	Sustainable Development	Co-production	Correlated indicators
A. Self-reliance and self-efficiency of the population	√	√	yes
B. Democratic Participation	√	√	yes
C. Cultural adaptation	√	√	yes

D. Interdependence	√	√	yes
E. Equitability	√	√	yes
F. Goal of Sustainable future	√	√	yes
G. Healthy and productive life	√		no
H. Harmony with nature	√		no
I. Interdisciplinary approaches	√	√	yes
J. Communities engagement	√	√	yes
K. Formal, Non-formal and informal education	√		no
L. Mutual Benefits	√	√	yes
M. Good Governance		√	no
N. Collaborative approach and partnership	√	√	yes
O. Technology and Media Usage	√	√	yes
P. Leadership and contingency approach	√	√	yes

Source: Adapted from Table 2.4: Synthesized keywords of SD, ESD, and Co-production, in Nuamcharoen, S. (2017). A Study on the co-production approach to the implementation of education for sustainable development [Doctoral Thesis, Mahidol University]. p. 72

The researchers found twelve correlated indicators from the literature that link SD and co-production practices: Self-reliance and self-efficiency of the population; Democratic Participation; Cultural adaptation; Interdependence; Equitability; Goal of sustainable future; Interdisciplinary approaches; Communities' engagement; Mutual benefits; Collaborative approach and partnership; Technology and media usage; and a Leadership and contingency approach (Nuamcharoen, 2017). It is interesting to identify the key success factors that enabled the self-reliant Water Management School to handle the complex water crisis in the area in a sustainable way.

3. Research Questions

The researchers mainly investigated the key success factors for water management allied to the self-reliant Water Management School in Phrae province. The research questions are as follows:

- 3.1. What are the key success factors for water management in the Phrae Provincial Administrative Organization (PAO)?**
- 3.2. How has the co-production approach proven to be an innovative tool in water management to support sustainable development?**

These research questions were developed to define the purpose of the study.

4. Purpose of the Study

This section will set out the main focus of the study, which will be described in the following sections of the paper. The study had two key purposes, which will be discussed below.

4.1. To study the key success factors in water management in the Phrae Provincial Administrative Organization (PAO).

4.2. To investigate whether co-production proves to be an innovative tool in water management to support sustainable development.

5. Research Methods

The researchers applied a qualitative research methodology, comprising in-depth interviews, group interviews, and non-participatory observation. The key informants were the Local Executive Administrator team, public officers, community leaders and citizens of the Phrae province. There were forty key informants in total. Triangulation was applied to validate the reliability of the data. The conversations were recorded and then transcribed into text form and reorganized using Microsoft office before being analysed using content analysis. All interviewees were anonymous and their data were coded by the researchers.

5.1. In-depth interviews

The researchers conducted individual semi-structured in-depth interviews with the PAO's administrative team: that is, the Chief Executive, the Deputy Chief Executive, the Secretary to the Chief Executive, and the Chief Administrator of the PAO. The interviews took place at the PAO office.

5.2. Group Interviews

The group interviews aimed to encourage the interviewees to share their experiences. Two different groups of villagers who were involved in the school projects participated in the group interviews. The members of both groups were selected using the snowballing technique. Another group of interviewees comprised officers at the PAO who implemented the project. The interviews were arranged at the PAO office and in the area where a self-reliant Water Management School and a check dam are located.

5.3. Non-participatory Observation

The researchers also used non-participatory observation throughout the data collection process to gather information regarding the environmental and social contexts of the case study, as well as interviewees' action and reaction to the questions asked. All data were then analysed using content analysis.

6. Findings

In order to demonstrate the findings, the researchers have arranged the significant issues and will set them out in sequence based on the purposes of the study.

6.1. The Key Success Factors for Water Management in the Phrae Provincial Administrative Organization (PAO)

The key success factor that enabled the Water Management School to reach sustainability is how the PAO applies the co-production approach to support its service provision. However, some key attributes of the approach in the case study are more outstanding than others. These are self-reliance and self-

efficiency of the population, democratic participation, community engagement, the collaborative approach and partnership, and the leadership and contingency approach.

▪ **Self-reliance and self-efficiency of population**

The PAO has a responsibility to take care of the sanitary and security needs of the province. It has the equipment, machinery, and know-how; however, the budget and workforce needed to take control over the entire area of the province are limited. Especially in the case of natural disasters, the PAO confronts these difficulties to handle the crisis efficiently. Preventive programs are always better than rehabilitation plans. The PAO encourages people to participate with them in efforts to prevent water crises. As the facilitator, the local government works with the citizens and stimulates cooperation from stakeholders. To co-produce the water management system, it depends on self-reliance and self-efficiency of the population. The local government plays an important role in providing know-how – for instance, the use of GIS technology and the study of water itinerary maps – but people work together in the construction of the water management system. The local government supports civic participation to achieve suitable water solutions in neighbourhoods, as one participant in the group interview mentioned:

The PAO established the self-reliant water management school: they taught us how to use the equipment and machinery, and to understand the geography and water maps. They asked us to build check dams to manage the water retention. After that, the construction was successful. We have sufficient water for consumption. That has made us very happy and motivated us to continue our collaboration with them. They also keep on teaching us things, such as budgeting for dam construction etc.

The role of the PAO not only enhances the water management in the province but also changes the role of traditional service providers and service users, who become service co-producers. Furthermore, they shape attitudes toward the common responsibility of communities to solve water problems. It is thus clear that the population in Phrae province has become self-reliant and appears efficient in problem-solving.

▪ **Democratic participation**

Democratic participation appears during the process of the empowerment of citizens through democracy. Community-based management urges citizens in the area to know their rights and responsibilities to society. People participate in brainstorming, discussing problems and finding solutions. Such democratic participation has been evident since the early phases of the project: from learning about the problems to knowledge management and the actual construction of the water retention system. The researchers observed clear encouragement of cooperation among stakeholders. The sustainability discourse emphasizes that democracy and involvement in decision-making are necessary to improve the effectiveness of many activities. The main emphasis in the community-based activities is on listening to the voices of the majority, especially in the self-reliant school management system. Democratic participation may reflect how communities engage in water management in the province, which will be discussed below.

▪ **Community engagement**

The school can be considered as an innovative tool of the local government. It has highlighted the issue of the water crisis and citizens' social responsibility. People are directly affected by water problems, whether in the form of flooding or drought. It is thus essential to empower citizens to manage and solve these problems. The case study demonstrates the importance of community engagement in water solutions. The concept of the school focuses on self-reliant management by the communities themselves and collaboration from the villagers. One interviewee said:

We have joined the school and this allows us to understand our area in terms of problems and geography. We can analyse the causes of the problems and manage to find solutions for specific issues in the area.

From the data, we imply that community-centric management is a key factor to drive the learning organization and the sustainable development of the area. Moreover, the school drives self-reliant management by supporting the continuous process of learning throughout the project.

▪ **Collaborative approach and partnership**

Besides the major support from the PAO, the project also involved collaboration from many parties: private organizations, public institutes, and civil societies. Such collaboration and partnership contributed to the success of the school and the water management project. The local government seeks further collaboration to sustainably run the project in the long term as the excerpt mentioned in the group interview:

Besides the PAO, a lot of other parties, such as PTT, PEA, etc., had a hand in this project.

Co-production fosters an equal partnership between providers and users; moreover, it enables people to develop, grow and maximize their capacities (Boyle & Harris, 2009). Partnership and collaboration among many bodies in the province enhance the capacities of all parties. For example, the communities cannot build their check dams effectively without the help of the PAO in supporting their machines and tools. In the same way, the PAO cannot provide efficient water management services without the know-how and knowledge from other government agencies, such as the PTT or PTT Public Company Limited, and the Provincial Electricity Authority. This emphasizes that the collaborative approach and partnership are important to the success of the school and to the PAO's water management.

▪ **Leadership and contingency approach**

Leadership is a vital factor that supports the success of the school and the achievement of the PAO's goal. This is evident in the innovation of the service provision, namely the Water Management School, on many levels. At the first level, the Chief Executive of the PAO has a vision toward community-based sustainable development. The good relationship between the government agency and the people in the area helps with collaboration and work on every project, not only the school project. Leaders who always provide support to staff and citizens until they succeed drive the courage to finish difficult tasks. The people in the province agree that leadership is essential to working on the water management project.

The Chief Executive of the PAO is very down-to-earth. That's why he can understand the grass root problems in the province and find a suitable solution. The way he reduces bureaucracy is helpful.

At the second level, project operators such as public officers, community heads and even people in the area, show a developer style of leadership that drives more successful collaboration. This statement was supported by the idea that leadership represents good quality; meanwhile, the contingency approach is a means to manage and deal with the situation depending on the nature of the environment to which the organization relates. The PAO stands for the significance of leadership and contingency at every level. This is due to its enthusiasm to combat natural disasters in the area.

To discuss this aspect further, the key success factors of water management derive primarily from the initiatives to develop a system that can be sustainable and achievable in the long run. The key indicators of success should be how the Water Management Schools encourage people to collaborate with them. The case study highlights the importance of self-reliant management and urges people to co-produce with the local government. In addition, self-reliance and self-efficiency of the population, democratic participation, community engagement, the collaborative approach and partnership, and the leadership and contingency approach are supportive factors underlying the success of this project.

Moreover, the PAO focuses on management in a sustainable way: that is, holistic water management. It attempts to apply many methods and fields of knowledge to deal with the crisis. For example, the late Thai King Bhumibol Adulyadej's "sufficiency economy philosophy" and Integrated Farming are suggested to be applied to farming to help the economy. This approach involves not only knowledge about how to manage the water but also know-how about choosing the right products to produce: agricultural products that are suitable for the quantity of water available and the quality of soil, which are also favourable to the whole system. The collaboration and partnership from the Phrae Provincial Agriculture Office, for instance, is a factor that supports the operation and promotes water management to achieve sustainability. Throughout the interviews, respondents mentioned that collaboration from several parties has been vital to the success of the project. Efforts to foster equal partnerships between the service providers and service users are also necessary for success. Co-production helps to encourage people to participate on equal terms, thus implying the ability to develop and expand people's capacities (Boyle & Harris, 2013). Democratic participation is thus a process that enhances collaborative working.

It is undeniable that self-reliance and self-efficiency of the population is the main quality that supports the previous aspect. This quality is expected in a society that needs co-production. People's development of their capacities is another key success factor in the project. The researchers observed that the concept of the project is underpinned by self-reliance in micro-management in the villages. This means that people in the communities all have a role in making water management in their villages achievable and in dealing efficiently with any problems that arise. This aspect focuses on people as individuals; however, a collective perspective is also important. Community engagement refers to the process of working collaboratively in groups of people that are related by geographic proximity, special interest, or similar situations. The term 'community engagement' broadens the parameters by shifting the focus from the individual to the collective. Community engagement is important to solve local problems and voice the community's needs to the service providers. Many outstanding excerpts from the interviews showed that people in Phrae province, especially in the areas affected by the water crisis, appreciate the importance of team working as communities.

6.2. The Paper Also Set out to Investigate Whether Co-Production Proves to Be an Innovative Tool in Water Management to Support Sustainable Development

As discussed above, it is evident that the Water Management School has led to sustainable development. This is due to the links that connect co-production and sustainability. Five indicators are particularly outstanding, namely self-reliance and self-efficiency of the population; democratic participation; community engagement; the collaborative approach and partnership; and the leadership and contingency approach. However, the other seven indicators are also allied with the practices in other aspects. For example, technology usage is underlined by the PAO offices; in the same way, the mutual benefits are usually mentioned by the group interviewees. Nonetheless, the main credit should go to the PAO for their creativity and initiative. They have created a new mechanism as an innovative tool for their service provision. The water management schools do not function in the same way as a normal school does; rather, they serve as a catalyst to empower the community to co-produce the service. In this way, water management in the province will achieve its goal of sustainability.

The co-production approach supports sustainable development and sustainable economic activities. As evidenced in the case study, we can see that the school, which stands for the co-production approach as an innovative tool for local government, can stimulate sustainability. According to Strokosch and Osborne (2016), the case study shows that the school has achieved consumer co-production and participative co-production and is at the early stage of enhanced co-production, allowing citizens to co-design and co-create service innovation that develops new forms of public service in the form of building the community water management system. In summary, co-production is one of several mechanisms that can be used to increase citizens' influence on the services that are delivered to them. It is the administration team that plans and implements the policy. The equality of users and professional roles in designing and delivering services are points that are not outstanding in this case as the theory suggests. The case study may not show equal terms within the partnership between the providers and users (Wyborn et al., 2019). However, it encourages civic participation in service provision and makes the project much more sustainable.

7. Conclusion

In summary, the research has highlighted the importance of self-reliant management to handle the water crisis, which will enable the project to reach the concept of sustainable development goals. This development is derived from community empowerment in terms of co-delivering public services. The public services that the PAO provides are vital to people's everyday lives from economic, social and environmental aspects. The key success factors underpinning the Self-Reliant Water Management School are self-reliance and self-efficiency of the population, democratic participation, community engagement, the collaborative approach and partnership, and the leadership and contingency approach. The findings regarding these key success factors emphasize that the co-production approach underlining the project witnesses itself as an innovative tool for public service provision in community water management. The research focused on one case study in a specific area: this may impose some limitations to the application of the key success factors to other cases. Moreover, the case study portrayed specific attributes because it is a large-size local administrative organization which has greater potential in terms of budget, workforce and utilities than other types of local administrative organization. In order to enhance these results, it is

suggested that the multiple-case study method should be chosen to investigate discrepancies between the projects being implemented by large and small local administrative organizations to enhance water management.

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