In Search of Best Practices for Improving the Operational Efficiency of the Primary Healthcare Hospitals in Thailand through Benchmarking

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KEYWORDS

sub-district or tambon health promoting hospitals (THPHs); primary healthcare; data envelopment analysis (DEA); benchmarking; best practices.

ABSTRACT

Background: Thailand's public health policy emphasizes equitable access to healthcare services, leading to a rapid increase in primary healthcare demands. Enhancing efficiency has become a crucial solution to address this challenge, especially amidst the constraints of limited resources.

Aims: To measure the operational efficiency of sub-district or tambon health-promoting hospitals (THPHs) in the Eastern Economic Corridor (EEC) by applying the mathematical technique of Data Envelopment Analysis (DEA) and to identify best practices from efficient THPHs that can be applied to improve the operational efficiency of other THPHs.

Methods: First, the operational efficiency of 104 THPHs in Chachoengsao, a province in EEC, was measured using the DEA method. Second, 13 efficient THPHs were selected as benchmarks for operational best practices. In-depth interviews were conducted with five individuals from each selected THPH, including the director and four key stakeholders. The interview data were analyzed and synthesized using directed content analysis to formulate a list of best practices. Finally, the identified best practices were evaluated using the Delphi technique to produce a final list of best practices to improve the operational efficiency of THPHs.

Results: 76 best practices were initially generated from the content analysis of the benchmark interviews. However, after the Delphi experts' evaluation, 66 best practices met the required criteria (Mdn > 3.50 and IQR < 1.50) and were ultimately accepted as potential general strategies for improving the efficiency of THPHs. Of these, 35 best practices were related to input management, and 31 were related to output management.

1. Introduction

Currently, the demand for public health services has continuously increased in quantity and quality (Santana et al., 2023), increasing the need for resources, while public health agencies have limited resources. This imbalance between demand and supply has put pressure on health systems worldwide to focus on efficient organizations by using limited resources efficiently (Mbau et al., 2023) to expand services to meet demand. Therefore, many countries have continuously emphasized research to improve public health operations' efficiency.

In Thailand, the importance of the operational efficiency of public health agencies is the intention of the 2017 Constitution of the Kingdom of Thailand, which states in Section 55 that “The state shall ensure that the public receives efficient and comprehensive public health services, enhance the public’s basic knowledge of health promotion and disease prevention, and promote and support the development of Thai traditional medicine wisdom for maximum benefit” (Vichan, 2017). The policy drive to increase the efficiency of the Thai public health system was evident when the fee-for-service system was changed to the managed care system in 2001 (Strategy and Planning Division of the Office of the Permanent Secretary, Ministry of Public Health, 2002), which allowed people of all income levels to access public health services more equally, and public health agencies must improve their operations to be more efficient.

The Ministry of Public Health has a policy to upgrade the original health centers or primary care units under the Ministry of Public Health to Sub-District (or Tambon) Health Promoting Hospitals or THPHs, totaling 9,770 nationwide in 2011, divided into 3 sizes: small, medium and large, with 4 essential roles: health promotion, disease prevention, medical treatment and health rehabilitation for people at the village and sub-district levels, which are considered crucial primary care units and are close to people in the community. THPH receives most of its budget from a per capita lump sum payment from the universal healthcare system. This system has resulted in a change in the management concept of public health services from being reactive to being proactive. Therefore, to achieve this goal, public health units must be in a situation where they must use limited resources

(Managed care system) to provide services to cover target people as completely as possible or as much as the demand arises. Moreover, the per capita lump sum payment system has resulted in a more transparent view that primary care services play a vital role in the Thai public health system. Using the limited national public health resources will be economical and worthwhile if we can prevent and care for people from the grassroots or community level to keep them away from illness. By emphasizing the use of health promotion measures and disease prevention in various forms or reducing the number of severe patients by accessing care from the initial stages of various illnesses, the efficient operation of primary health care units reduces the workload and the use of public health resources for units at higher levels. In summary, it can be said that the per capita lump sum payment system has instilled the idea of public health unit management to consider the efficient use of limited resources or to determine that public health units at all levels are units that focus on efficiency.

Benchmarking, which involves comparing performance with superior organizations, is an organizational improvement concept that entails studying best practices from leading organizations or benchmarks. In this study, the search for a benchmark organization involved evaluating organizational efficiency using Data Envelopment Analysis (DEA), a widely popular technique for measuring efficiency. A key outcome of this method is the efficiency index, which categorizes THPHs into two groups: those that are efficient and those that are not yet efficient. This study will use the efficient THPH group as the benchmark organization and conduct a lesson-learned analysis and synthesis to formulate best practices. These best practices will serve as guidelines for THPHs that are not yet efficient, as well as for other similar organizations, to apply in enhancing and improving their operational efficiency in the future.

2. Research Objectives

1. To measure the operational efficiency of THPHs in the Eastern Economic Corridor

(EEC) by applying the mathematical technique of Data Envelopment Analysis (DEA).

2. To identify best practices for improving the operational efficiency of THPHs.

3. Conceptual Framework

The first concept, benchmarking, is an idea of organizational improvement achieved by studying best practices from better organizations or benchmarking organizations to apply excellent practices to one's work. Learning from organizations with high experience and success is a shortcut to excellence that reduces trial and error (Camp & Tweet, 1994). This study will extract lessons from efficient THPHs as a guideline for inefficient THPHs and other THPHs, in general, to apply in developing and improving operational efficiency.

The second concept, the evaluation of operational efficiency by DEA, is a method to measure the technical efficiency (TE) of a unit or organization where the production process does not require specifying the form of the production function (no specified form of production function) or is a nonparametric technique for calculating efficiency. DEA uses the theories of linear programming to determine the efficiency index. The DEA method is a good alternative in cases where an organization or production unit, which in the DEA method is called a Decision Making Unit (DMU), produces multiple products using multiple production factors (multiple inputs, multiple outputs). Those products do not have a market price or cannot be readily determined by market prices, making it challenging to easily combine the values of production factors and products. Therefore, basic methods for measuring efficiency are limited, such as ratio analysis, regression analysis, or Stochastic Frontier Analysis (SFA) (Charnes et al., 1978; Bowlin, 1998).

The working principle of DEA can be summarized as follows: DEA uses the input and output data from all the DMUs studied to create a production frontier or efficiency frontier by connecting the various DMUs to form a linear combination. Any DMU located on the frontier is evaluated by DEA as having 100 percent efficiency (efficiency index of 1.00) in using the existing production factors to produce the current output. Conversely, any DMU not located on the frontier is evaluated by DEA as being inefficient or having an efficiency lower than 100 percent (efficiency index < 1.00). The efficiency index derived from this method is a relative efficiency measure, meaning the inefficiency of any DMU is determined by comparing its input and output quantities with those of efficient DMUs on the efficiency frontier (McMillan & Datta, 1998), known as the reference set. This study will use the efficient group as benchmarks to analyze lessons learned and identify best practices.

Based on the above concepts, the researcher has formulated a research framework for developing best practices to improve the operational efficiency of THPHs in the EEC, as shown in Figure 1.

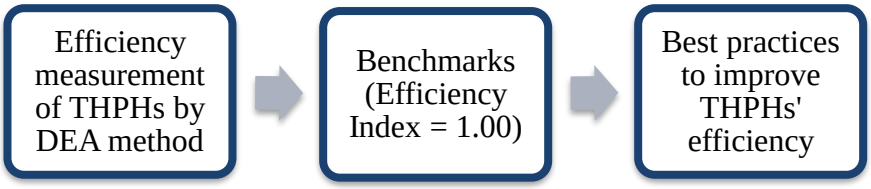

Figure 1: Conceptual Framework

4. Materials and Methods

The process consists of five key steps.

Step 1: Measurement of operational efficiency of THPHs by applying mathematical techniques of data embedding analysisThis quantitative research aims to measure the performance of each THPH by applying the DEA method, consisting of the following sub-steps:

1.1 Selection of the DEA model

The DEA model used in this study is the variable returns to scale model and focuses on output expansion (VRS, output-oriented model). The application of DEA to the THPH context was evaluated for performance evaluation standards using Wattanaburanon's (2018) method. Five qualified persons conducted the evaluation. The average total score was 3.81, which is considered a high standard level. The model is shown as follows:

$$\text{Max } Z_k = \theta_k + \varepsilon\left(\sum_{r=1}^{s} S_{rk}^{+} + \sum_{i=1}^{m} S_{ik}^{-}\right)$$

$$\text{Subject to } X_{ik} - S_{ik}^{-} - \sum_{j=1}^{n} \lambda_j X_{ij} = 0 \quad ; i = 1,2,3,...,m \; ; j = 1,2,3,...,k,...,n$$

$$\sum_{j=1}^{n} \lambda_j Y_{rj} - \theta_k Y_{rk} - S_{rk}^{+} = 0 \quad ; r = 1,2,3,\ldots,s$$

$$\sum_{j=1}^{n} \lambda_j = 1$$

$$\lambda_j, S_{rk}^{+}, S_{ik}^{-} \geq 0 \; ; \; \theta_k \text{ (unrestricted)}$$

ε is an infinitesimally small number,

where

θ_k = The output augmentation index of the k^{th} DMU

Y_{rj} = The value of r^{th} output for the j^{th} DMU

X_{ij} = The value of i^{th} input for the j^{th} DMU

S_{rk}^{+} = The slack variable of the r^{th} output for the k^{th} DMU

S_{ik}^{-} = The slack variable of the i^{th} input for the k^{th} DMU

1.2 Selection of input and output variables

The selection of variables for evaluating operational efficiency is a crucial step. It is essential to choose variables that can best reflect the overall performance of THPH in terms of inputs and outputs. The results will guide the development and improvement of operational efficiency, directly addressing the problem and fitting the context of the study unit. The researcher reviewed the literature and related research to determine the initial set of

variables. Then, content validity was checked by 7 experts using the Index of Item-Objective Congruence (IOC) to select the correct and appropriate variables for evaluating operational efficiency. The criteria for selecting variables in this study were those with an IOC value of 0.7 or higher. The selected variables consisted of 5 inputs: 1) the total number of public health personnel working full-time; 2) overtime budget (OT); 3) budget for medical supplies and drugs; 4) other expenses, including utilities, fuel, maintenance, and contract wages; and 5) the number of village volunteers (VHVs). The 7 output variables were: 1) visits and consultations at THPH; 2) health screening; 3) quality prenatal care; 4) postpartum care; 5) vaccinations; 6) community healthcare projects; and 7) patient referrals.

1.3 Sample Selection

The EEC consists of three provinces: Chachoengsao, Chonburi, and Rayong, which are similar in terms of economy, society, and demographics. There are a total of 330 THPHs in these provinces. This study used cluster random sampling to select one province in the EEC as the study area, resulting in the selection of Chachoengsao. Initially, the efficiency of all 117 THPHs in the province was intended to be examined (Strategy and Planning Division of the Office of the Permanent Secretary, Ministry of Public Health, 2022). An online survey was conducted to collect data on production factors and output variables between September 18 and November 15, 2023. The data collected from all THPHs in the province pertained to the fiscal year 2022. The researcher coordinated with the Provincial Public Health Office (PPHO), District Public Health Offices (DPHOs) in each district, and all THPH directors to request assistance in data collection and to follow up in cases where THPHs submitted data late or provided incomplete data. Ultimately, data from 104 sub-district hospitals with complete information were used as the sample for this DEA study, which exceeds the minimum number of DMUs required for the DEA method as specified by the formula. According to the formula proposed by Banker et al. (1989), the sample size should be $n \geq 3 \times$ (the number of input variables + the number of output variables); therefore, for this research, which includes 5 input variables and 7 output variables, the minimum sample size should be $n \geq 36$.

1.4 The efficiency index calculation.

The efficiency index was calculated using DEAP Version 2.1 software (Coelli, 1996).

Step 2: Selection of THPH Benchmarks

The results from the evaluation of THPH efficiency in Step 1 categorized the THPHs into two groups: the first group consisted of THPHs with full efficiency (efficiency index equal to 1.00), and the second group comprised THPHs that were not yet efficient (efficiency index < 1.00). The researchers selected 13 efficient THPHs from a total of 62 fully efficient THPHs (see Table 1), accounting for 20.97% of the total. This group included 2 large-scale, 6 medium-scale, and 5 small-scale THPHs, which were chosen as the study sample for extracting lessons learned to identify best practices. The sample selection used was the purposive sampling method, which was based on the following criteria: 1) The THPHs are efficient and frequently act as a reference set in the calculation process of the efficiency index using the DEA method; 2) The THPH directors are willing to cooperate and coordinate with key stakeholders to serve as study units through in-depth interviews.

Step 3: Best Practices Search

This part of the study is qualitative research, conducted through in-depth interviews with THPH directors or their representatives, as well as key stakeholders of the THPHs, including local leaders and representatives of service recipients, totaling 5 persons per THPH benchmark. The research instrument is an in-depth interview questionnaire consisting of two parts: Part 1 covers best practices in input management according to the 4Ms management framework—personnel (man), budget (money), materials, and management. Part 2 covers best practices in output management, which consists of 7 approaches aimed at creating products or results in alignment with the 4 missions of THPH (health promotion, disease prevention, disease treatment, and health rehabilitation) in both quantitative and qualitative terms. These approaches include community participation approach to working, proactive services, providing knowledge to the public, applying indigenous knowledge to work, applying technology in work, networking, and working in a research and development format. The research instrument was examined for content validity by 7 experts, and only items with an IOC score of 0.7 or higher were selected.

Step 4 Synthesis of best practices

The process involves analyzing all data obtained from the in-depth interviews using directed content analysis

and synthesizing the results into items that represent best practices in each dimension of input and output management.

Step 5: Examination of the appropriateness and generalizability of best practices

5.1 Five experts assessed the quality of items of the best practices. Content validity and language use were evaluated using an IOC value of 0.7 or higher.

5.2 Assessment of the appropriateness and generalizability of the best practices. The assessment was conducted using the Delphi technique by 17 experts (Macmillan, 1971) over two rounds. The criteria for considering the experts' opinions to select appropriate and generalizable best practices were a Median (Mdn) > 3.50 and an Interquartile Range (IQR) < 1.50.

5. Results

1. THPH efficiency index

The efficiency index of all 104 THPHs, classified by THPH size, is shown in Table 2. It was found that the overall performance of THPHs in Chachoengsao Province was approximately 90%, which can be considered high. The average efficiency index of all THPHs was 0.8951. Most THPHs, 62 (59.62%), have an efficiency index of 1.00, indicating 100% efficiency in utilizing existing resources to produce outputs at the current level. However, 42 THPHs (40.38%) still need improvement in efficiency. It was also observed that operational efficiency of THPHs increased with size. The average efficiency index for small, medium, and large THPHs was 0.8642, 0.9140, and 0.9437, respectively. Similarly, the proportion of efficient THPHs also increased with size, at 58.14% (25) for small, 60.00% (33) for medium, and 66.67% (4) for large THPHs. According to the concept of organizational development through benchmarking, these efficient THPHs serve as benchmarks for studying lessons to identify best practices that other THPHs can adopt to enhance their operational efficiency.

Table 1: Efficiency index, classified by size of THPHs

Size of THPH	Number of THPH	Number of Efficient THPHs (%)	Number of Inefficient THPHs (%)	Efficiency Index			
				Max	Min	Average	S.D.
Small	43	25 (58.14)	18 (41.86)	1.00	0.4608	0.8642	0.1824
Medium	55	33 (60.00)	22 (40.00)	1.00	0.6005	0.9140	0.1316
Large	6	4 (66.67)	2 (33.33)	1.00	0.6620	0.9437	0.1380
Total	104	62 (59.62)	42 (40.38)	1.00	0.4608	0.8951	0.1506

2. Best Practices

Best practices were identified through content analysis of the in-depth interviews with THPH directors and key stakeholders from 13 benchmark THPHs, comprising 2 large, 6 medium, and 5 small THPHs, resulting in a total of 76 items. Of these, 40 items were best practices for input management, categorized into 4 dimensions: 7 items for personnel, 8 items for budget, 12 items for materials and equipment, and 13 items for management. Additionally, 36 items were best practices for output management, organized into 7 dimensions: 5 items for community participation, 4 items for proactive work, 8 items for providing knowledge to the public, 4 items for applying indigenous knowledge to work, 5 items for applying technology in work, 4 items for networking, and 6 items for working in a research and development format. After being reviewed by 17 experts for appropriateness and feasibility for widespread practice (generalization) using the Delphi technique over two rounds, 66 items (86.84%) met the expert criteria (Mdn > 3.50 and IQR < 1.5). Of these, 35 best practices were related to input management, and 31 were related to output management, as shown in Tables 2 and 3.

Table 2: Best Practices in Input Variables

Management Dimension	Best Practices	statistics		Judgment
		Mdn	IQR	
1. Man (I1)	I1.1 Recruiting personnel to be complete according to the workforce framework, both professional and support personnel	3	2	Not Passed
	I1.2 Assigning people to the right jobs	4	1	Passed
	I1.3 Planning workforce to replace each other or rotate duties	4	2	Not Passed
	I1.4 Working as a team that supports each other	4	1	Passed
	I1.5 Organizing a working team to consist of personnel who combine different professions and skills	4	1	Passed

Management Dimension	Best Practices	statistics		Judgment
		Mdn	IQR	
	I1.6 Clearly defining the primary and secondary missions of each personnel	5	1	Passed
	I1.7 Providing personnel with training and seminars to increase their competency	4	1	Passed
2. Money (I2)	I2.1 Operation to obtain a government budget sufficient for the work	4	1.5	Not Passed
	I2.2 Appropriate budget use that is in line with the objectives	4	1	Passed
	I2.3 Budget management with a clear plan and usage through the PDCA process	4	1	Passed
	I2.4 Good disbursement management	4	1	Passed
	I2.5 Preparing staff to be proficient in using the authentication program to reduce the problem of delayed budget receipt	4	1.5	Not Passed
	I2.6 Having a plan and guidelines for generating income for THPH in addition to the annual budget from the government	3	1	Not Passed
	2.7 Organizing activities that are in line with community needs to benefit widely, resulting in lower unit cost	4	1	Passed
	I2.8 Having guidelines for personnel to use resources economically and efficiently, resulting in the slightest loss, such as saving electricity, saving water, installing solar cells in areas where they can be used	4	1	Passed
3. Materials (I3)	I3.1 Planning for procurement by specifying the need for medical materials and equipment in line with the needs of service recipients	4	1	Passed
	I3.2 Having a plan for ordering medical materials and equipment by making purchase orders according to the specifications, comparing prices, controlling quality, and delivering	4	0.5	Passed
	I3.3 Searching for sources of medical materials and equipment with quality and reasonable prices	4	0.5	Passed
	I3.4 Receiving medical materials and equipment always with a standard inspection according to the criteria:	5	1	Passed
	I3.5 Proper storage of medical materials and equipment for easy access and use	4	1	Passed
	I3.6 Disbursement of medicines, materials, and equipment clean and sterile according to the First-In-First-Out principle	5	1	Passed
	I3.7 Having a system for controlling the stock of medicines, materials, and medical equipment	5	1	Passed
	I3.8 supervision the use of medicines, materials, and medical equipment to be cost-effective and minimize loss	5	1	Passed
	I3.9 Systematic collection of statistics on the use of medicines, materials, and medical equipment	4	1	Passed
	I3.10 maintenance and repair of equipment to be ready for use at all times	4	1	Passed
	I3.11 Procurement of additional materials, equipment, and equipment from sources outside the budget, such as local or regional health insurance funds	4	1	Passed
	I3.12 Inspection and evaluation of the process, procurement of materials, equipment and equipment and use, when problems and obstacles are found, use them to plan for further improvement of operations	4	1	Passed
4. Management (I4)	THPH Internal Management	4	1	Passed
	I4.1 Systematic work, planning, implementation, monitoring, and evaluation in both the short and long-term	5	1	Passed
	I4.2 Using the principles of good governance in management	4	1	Passed
	I4.3 Using the principles of lean management to reduce losses, waste, and waste in work	4	1	Passed
	I4.4 Finding a work approach that is suitable for the community under responsibility by applying the indicators set by the central office to the community's way of life	4	1	Passed
	I4.5 Having organizational management skills, such as good communication, creating motivation in work	4	1	Passed
	I4.6 Creating an atmosphere and friendliness in work (rapport)	4	1	Passed
	I4.7 Using technology to assist in work	4	0.5	Passed
	Community Management	4	1	Passed
	I4.8 Officers are "good role models" for the public, such as being good leaders and followers, being good speakers and listeners, and listening to different opinions	4	1	Passed
	I4.9 Being good facilitators to allow the public in the community to show their full potential	4	1	Passed
	I4.10 Using both art and science in working in the community	4	1	Passed
	I4.11 Being democratic	5	1	Passed

Table 3 Best Practices in Outputs

Management Dimension	Best Practices	Statistics		Judgment
		Mdn	IQR	
1. Community participation approach to working (O1)	O1.1 Creating a belief in the community that the community has the knowledge and ability to solve community problems (can-do attitude towards community)	4	1	Passed
	O1.2 Creating inclusive participation to draw on the power of the community to support the work	4	2	Not Passed
	O1.3 Providing opportunities for people to participate, such as organizing village communities, to make people feel a sense of belonging and share responsibility for the activities/projects that are organized	4	1	Passed
	O1.4 Being open-minded, listening to opinions and suggestions from the community seriously, without bias	4	1	Passed
	O1.5 Transforming indicators from the central government into questions that are consistent with the problems and public health needs of the community	4	1	Passed
2. Proactive services (O2)	O2.1 Preparing a health service plan that adheres to the principle of proactive services "near home, near the heart."	4	1	Passed
	O2.2 Surveying and studying health needs and problems in the community to determine appropriate proactive activities and guidelines	4	1	Passed
	O2.3 Selecting a location for activities should focus on places that are community centers	5	1	Passed
	O2.4 Training and developing skills for personnel to work proactively in the community to have the knowledge and ability to carry out proactive work	4	1	Passed
3. Providing knowledge (O3)	O3.1 Gaining knowledge and understanding of the community in terms of population characteristics, culture, beliefs, problems, and knowledge needs of the community	4	1	Passed
	O3.2 Setting clear goals for providing knowledge to the community that can be measured	4	1	Passed
	O3.3 Planning for providing knowledge with the allocation of resources and budget	4	1	Passed
	O3.4 Selecting methods for providing knowledge and tools that are appropriate for the context and needs of the community, such as training, demonstrations, focus group meetings, using local media social media, and having VHVs as a medium	5	1	Passed
	O3.5 Selecting media that are easily accessible and popular in the community, such as community radio, pamphlets and posters, and social media such as LINE, Facebook, and TikTok	4	1	Passed
	O3.6 Using language to provide knowledge that is easy to understand and appropriate for the community's knowledge level	4	1	Passed
	O3.7 Preparing knowledge content that is comprehensive and to the point and provides accurate and up-to-date information	4	1	Passed
	O3.8 Using interesting educational techniques, such as applying local media such as folk songs, games, and local entertainment.	4	0.5	Passed
4. Applying indigenous knowledge to work (O4)	O4.1 Identifying and collecting local knowledge from various sources, such as local scholars, community leaders, community members	4	1	Passed
	O4.2 Inviting community members to participate in the planning and decision-making process to develop and apply local knowledge to modern healthcare	4	1.5	Not Passed
	O4.3 Creating innovations that combine local knowledge and modern technology, such as applying clay and coconut shells to exercise equipment and Thai herbs	4	1	Passed
	O4.4 Disseminating local knowledge and experiences in applying local knowledge to public health through various channels to create a collaborative network	4	1.5	Not Passed
5. Applying technology in work (O5)	O5.1 Planning to apply modern technology to community public health, specifying objectives, goals, methods of operation, and budget	4	1	Passed
	O5.2 Applying the SMART VHV application to work in the community	4	1	Passed
	O5.3 Using social media applications to communicate and send information, such as LINE, Facebook, and TikTok, will help increase the efficiency and effectiveness of public health officials.	4	1	Passed
	O5.4 Using telemedicine technology in work will increase the efficiency and effectiveness of public health services even more.	4	1	Passed
	O5.5 Applying the Google Maps application to work can help guide staff to patients' homes in home visit missions conveniently and quickly.	4	1	Passed
6. Networking (O6)	O6.1 Creating a quality network to work in the community to help solve the problem of THPH's insufficient personnel.	4	1	Passed
	O6.2 Developing and promoting network members' leadership (Leadership development and promotion).	4	0.5	Passed
	O6.3 The role of staff in network work is to be a coordinator and a facilitator so that the network can work to achieve its goals.	4	1	Passed
	O6.4 Expanding and connecting networks both in and outside the community.	4	1	Passed
7. Working in a research and development format (O7)	O7.1 Using research and development methods to solve community public health problems that are specific to each area (local specific)	4	1	Passed
	O7.2 Studying and surveying to identify community public health problems that are appropriate to solve by research and development methods.	4	1	Passed

Management Dimension	Best Practices	Statistics		Judgment
		Mdn	IQR	
	O7.3 Creating a research action plan with clear steps that can be tracked.	4	1	Passed
	O7.4 Monitoring the progress and evaluating research results with the community, adjusting the plan according to the evaluation results and community suggestions.	4	2	Not Passed
	O7.5 Communicating and disseminating research results, communicating research results to the community regularly.	4	1.5	Not Passed
	O7.6 Using research results conducted in the community to solve public health problems.	4	1	Passed

From Tables 2 and 3, when considering the Mdn and IQR values of each of the 66 items that passed the criteria, the researcher believes they can be categorized into two significant groups (considering the meaning of the Mdn and IQR values together and for the convenience of analyzing and discussing the results of the study). Group 1 consists of best practices with Mdn = 4 and IQR = 1 (indicating very broad appropriateness and feasibility and a high level of agreement), referred to as "best practices with a high level of broad feasibility," which includes 52 items (78.79%). Group 2 consists of best practices with Mdn = 4 and IQR = 0.5 (indicating very broad appropriateness and feasibility and a very high level of agreement) or Mdn = 5 and IQR = 1 (indicating very high broad appropriateness and feasibility and a high level of agreement), referred to as "best practices with a very high level of broad feasibility," which includes 14 items (21.21%).

The classification of these best practices into the two groups mentioned above can be used as a framework for planning and prioritizing policies, plans, and strategies to develop and enhance the efficiency of THPH operations both at the level of a single organization and overall within an area (province or district).

6. Discussion

Each best practice obtained through the lessons learned from the benchmarks in this study and that passed the expert opinion assessment criteria is essential and has a direct or indirect impact on the development and improvement of the operational efficiency of THPHs in the study area. The extent of this impact depends on the importance of the expected outcomes of each best practice to the desired performance of the organization, both in terms of input management and output management. Examples of the roles and importance of best practices to operational efficiency, especially those in the group with a very high level of broad feasibility, are briefly detailed below:

I1.6 Clearly define the primary and secondary missions of each personnel. This practice is recognized as a strategy to enhance organizational efficiency. Bryson (2018) noted that having a clear mission framework reduces confusion and overlapping tasks, allowing personnel to focus on their most important responsibilities. It also minimizes time wasted on unrelated tasks. Johnson & Williams (2019) and Brown et al. (2021) found that when personnel understand their primary missions, it leads to the development of specialized expertise and increased responsibility for their work. Having a clear role also facilitates practical performance evaluation, resulting in continuous work improvement and increased overall organizational productivity, as each person can fully concentrate on one's tasks without concern for unrelated or overlapping duties.

I4.2 Using good governance in management:

Good governance is vital to increasing efficiency. This principle encompasses transparency, fairness, responsibility, and accountability. This aligns with the literature review on the role of governance by Nunes et al. (2023), which found that good governance led to hospital personnel taking more responsibility for their duties due to supervision and inspection of work performance, stimulating continuous improvement in service quality. It also reduced conflicts between personnel and executives because everyone received clear information and clarification at every step of the operation. Additionally, transparent communication enables executives to address and resolve problems accurately and quickly. Greenhill & Khalil (2023) emphasized the role of governance in building the capacity of the health system to cope with crises such as the COVID-19 pandemic, showing that good governance increases resilience and the ability to respond effectively to crises while supporting sustainable development, leading to increased productivity.

I4.13 Adherence to work principle: “Working in communities to help communities take care of each other.”

Working with communities in this way allows those interested in healthcare tasks to be

trained and develops their potential for various healthcare practices. Implementing this practice can significantly increase efficiency. When communities support, ease the burden on the health system, and take care of each

other, THPHs or hospitals at higher levels of the health system can focus on treating and caring for patients with more complex conditions. A study by De Weger et al. (2018) found that community participation in health management can reduce the burden on hospitals by preventing diseases. It also helps reduce waiting times and healthcare costs, allowing existing resources to be used more urgently in cases of need.

I3 Overall Materials Management:

Material and equipment management are essential elements that affect efficiency

through cost reduction in the healthcare system. Comparative ordering from multiple sources and quality control during delivery (I3.2) allow THPHs to reduce material procurement costs and increase confidence in product quality. This is consistent with Diaconu et al. (2017), who stated that using an effective price comparison and order management strategy can reduce hospital costs compared to hospitals that do not manage this way. Finding sources of quality and affordable materials and equipment (I3.3) directly impacts the reduction of risks associated with using substandard materials. Additionally, receiving materials inspected according to standards (I3.4) increases confidence in the safety and quality of materials used in the treatment process, which reduces risks to patients and lowers the costs of correcting problems that may arise from using substandard materials. Dispensing drugs, materials, and sterile equipment according to the First-In-First-Out (FIFO) principle (I3.6) is a method that reduces waste due to expiration, a significant problem in many hospitals. Rezeki et al. (2022) found that using the FIFO method significantly reduces waste from drug expiration. A sound stock control system (I3.7) and a strict control system for drugs, materials, and equipment to maximize benefits (I3.8) are essential to reduce storage costs and unnecessary ordering. Lumnpi (2015) studied the development of a drug procurement system and inventory management in the pharmacy department of Nawamintharachini Camp Hospital and found that it reduced costs by 28.13% and increased efficiency in inventory management. This system is convenient and fast, reduces drug shortages, and indicates that systematic control of drug and material use can significantly reduce operating costs. Therefore, good management of medical materials and equipment is vital to reducing costs and increasing efficiency in THPH operations, leading to the sustainable development of public health service quality.

I4.8 Officers as "good role models" for the public:

Government officers are expected by the public to be good role models, which include being good leaders and followers, effective communicators, and good listeners who consider diverse opinions. This is crucial for building trust and fostering good relationships within the community. Bourke (2020) emphasized that a good leader must communicate effectively and listen to diverse opinions. These qualities are essential for creating a highly collaborative work environment and motivating the team to achieve goals.

O2.3 Selecting a location that is a community center for proactive public health activities:

One objective of proactive operations is to provide public health services within the community to address issues such as people's inability to access healthcare due to inconvenient travel, lack of transportation, or insufficient funds (Kankhwao et al., 2023). Therefore, when organizing proactive services in the community, it is necessary to select a location near most people's homes, such as village halls, schools, and temples. These places often have the necessary facilities for hosting activities for many people, such as electricity, water, tables, chairs, and amplifiers.

O3.5 and O3.9 Methods and techniques for providing knowledge are appropriate for the community's context and needs:

People in the community have different capacities and learning preferences. Therefore, providing knowledge to villagers is more successful when using various methods, such as training, demonstrations, focus group meetings, local media, and social media, which help access and promote learning within the community effectively. Additionally, using engaging knowledge-sharing techniques, such as applying local media like folk songs, games, and folk entertainment, helps increase public interest and participation. This is consistent with Hongthong (2022), who studied the role of Kantrum songs during the COVID-19 pandemic in the Thai-Khmer community. The study found that Kantrum songs played an essential role in effectively communicating information about disease prevention and healthcare to the community, using easy-to-understand lyrics and emphasizing local culture. It also helped build unity and encouraged the community during difficult times. Moreover, Chamnian et al. (2020) found that traditional performing arts, such as folk dramas and singing, play a vital role in promoting the mental and physical health of the elderly by helping them feel valued and engaged in social activities.

O6.2 Leadership development and promotion of network members:

Leadership development and promotion are essential for increasing motivation at work. When members are encouraged to demonstrate leadership in various activities, they feel valued and play an important role in the team, resulting in increased enthusiasm and commitment to their work. Day et al. (2014) supported this idea, emphasizing the importance of developing and supporting leadership within the team by fostering leadership in all members, not just those with official positions. Leadership development strengthens teamwork, promotes a culture of knowledge sharing and cooperation, and enables the team to handle challenges more effectively.

The appropriate and feasible best practices identified in this study resulted from collecting best practices from benchmarks or fully efficient THPHs (efficiency index equal to 1.00). Some benchmarks may have already implemented all aspects of these best practices (if any, likely very few), while others may have implemented only some. The findings of this study then suggest that the identified best practices can promote the operational efficiency of all THPHs, whether they are not yet efficient (efficiency index < 1.00) or fully efficient (efficiency index equal to 1.00) in the study area. Additionally, the classification of best practices that passed expert opinion criteria into two groups can serve as a framework for developing plans and strategies to enhance efficiency. Organizing the best practices with a very high level of broad feasibility may be considered for short-term promotion, while the remaining best practices can be prepared as long-term development plans, gradually implemented to align with the potential and operational context of each THPH size and driven forward continuously.

7. Conclusion

This study focuses on measuring the efficiency of THPHs in Thailand's EEC by applying the DEA method. The evaluation results helped identify both efficient THPHs and those that still need improvement. Lessons were then extracted from the benchmarks or efficient THPHs to identify best practices that can be used to help inefficient THPHs reach higher performance standards. This research highlights the benefits of applying best practices from successful organizations and emphasizes the importance of effectively managing limited resources to enhance the potential for providing comprehensive and high-quality public health services in communities, thereby supporting the Thai public health system in achieving sustainable healthcare development.

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