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The Measurement of Efficiency in Educational Opportunity Expansion Schools in Chonburi Province

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ABSTRACT

The purposes of the research were 1) to measure the technical efficiency of educational opportunity expansion schools in Chonburi province and 2) to compare the technical efficiency levels according to the characteristics of educational opportunity expansion schools in Chonburi province. This study employed secondary data from the O-NET, the Ordinary National Educational Test by Chonburi Primary Education Service Area Offices I, II and III, the Office of Basic Education Commission, and the Ministry of Education, in Chonburi Province. The decision making unit consisted of 74 educational opportunity expansion schools in Chonburi Province. Data was analyzed by using frequency, percentage, mean, standard deviation and data envelopment analysis.

The research results were found as follows;

1. The result of technical efficiency of educational opportunity expansion schools based on data envelopment analysis, revealed that the schools associated with the highest efficiency score of 0.81-1.00, accounted for 20.27 percent, the schools associated with a high efficiency score of 0.61-0.80 accounted for 43.24 percent and the schools associated with a moderate efficiency score of 0.41-0.60 accounted for 36.49 percent.

2. The comparison of technical efficiency levels among educational opportunity expansion schools in Chonburi province is classified by technical efficiency levels as follows: the highest efficiency, the high efficiency and the moderate efficiency; the ratio of male students to female students ($\overline{X}$=1.28, $\overline{X}$=1.34, $\overline{X}$=1.20), the ratio of foreign to Thai students ($\overline{X}$=0.06, $\overline{X}$=0.03, $\overline{X}$=0.02), the ratio of public school to temporary teachers ($\overline{X}$=6.75, $\overline{X}$=9.87, $\overline{X}$=6.37), the ratio of teachers who graduated with a master's degree or higher to teachers who graduated with qualifications lower than a master's degree ($\overline{X}$=0.16, $\overline{X}$=0.18, $\overline{X}$=0.16), the ratio of teachers with a professional level or higher to teachers with qualifications lower than professional level ($\overline{X}$=0.33, $\overline{X}$=0.50, $\overline{X}$=0.36), the standard deviation of the average O-NET score in Thai language ($\overline{X}$=10.61, $\overline{X}$=12.28, $\overline{X}$=13.30), class size ($\overline{X}$=17.20, $\overline{X}$=29.23, $\overline{X}$=29.99), students without special needs (34.40 percent, 46.90 percent,18.80 percent), students with special needs (38.10 percent, 40.50 percent, 21.40 percent), medium-sized schools (22.90 percent, 47.90 percent, 29.20 percent), large-sized schools (61.50 percent, 34.60 percent, 3.80 percent), schools located in the municipality (48.50 percent, 39.40 percent, 12.10 percent) and schools located outside the municipality (26.80 percent, 46.30 percent, 26.80 percent).

Keywords: Technical efficiency, Educational Opportunity expansion schools, Data envelopment analysis

1. Introduction

Education is a crucial tool for enhancing human capabilities and fostering knowledge and critical thinking. It plays an indispensable role for human resource development. Education serves as a pivotal mechanism in nation-building, individual development, and job creation, enabling citizens to become lifelong learners (Batool & Chaudry, 2019). Schools, as educational institutions, play a vital role in providing quality education to youth, community members, and society as a whole. Therefore, the quality of education is a result of school management practices (Hoy & Miskel, 2008). Consequently, school management cannot overlook the importance of school efficiency.

According to the budget report for 2022, it was found that the education budget of the Ministry of Education amounted to 332,398.6 billion baht, making it the top expenditure category. This reflects the highpriority that the government places on education (Budget Bureau, 2022). However, it is concerning to note that despite the substantial budget allocation, there has been a decline in the quality of education. This is evident from the results of the Ordinary National Educational Test (O-NET) conducted by the National Institute of Educational Testing Service, which indicate that the average scores have not met the targets set by the National Education Plan indicators (The Secretariat of the Educational Council, 2021). This raises questions about why the quality of education has not achieved the desired goals despite the significant financial support allocated to education.

Educational Opportunity Expansion Schools are educational institutions that provide educational services to the public in order to promote development and higher education attainment. Moreover, they aim to enhance the quality of the population and mitigate societal issues resulting from educational disparities (National Board of Education, 1992). This is also the context of educational opportunity expansion schools in Chonburi province. Upon completing primary education, students can proceed to lower secondary education without incurring fees. The management of Educational Opportunity Expansion Schools in Chonburi Province strives to equip students with academic and vocational knowledge tailored to their age, interests, and abilities. They aim to cultivate fundamental skills and potential in students to become quality personnel in the future. Additionally, they prepare students for higher levels of education (Chonburi Primary Education Service Area Offices I, 2023; Chonburi Primary Education Service Area Offices II, 2023; Chonburi Primary Education Service Area Offices III, 2023).

From the literature review conducted, it has been observed that research on measuring the technical efficiency of opportunity expansion schools in the context of Thailand remains relatively limited (Wiwat Thaoraktrakul, 2008). Particularly, there is a scarcity of studies focusing on schools situated within the Special Development Zone of the Eastern Region. Therefore, investigating the technical efficiency of educational opportunity expansion schools in Chonburi province becomes particularly intriguing for further study.

Due to the aforementioned reasons, educational opportunity expansion schools mostly face challenges related to limited educational resources and low performance in the Ordinary National Educational Test (O-NET) (The Secretariat of the Educational Council, 2021). Therefore, measuring the efficiency of schools becomes crucial. Researchers are interested in studying the technical efficiency levels of educational opportunity expansion schools in Chonburi province and comparing their technical efficiency levels based on school characteristics. This study aims to provide guidance for future educational management practices in educational opportunity expansion schools in Chonburi province.

2. Purposes

1) to measure the technical efficiency of Educational Opportunity Expansion schools in Chonburi province.

2) to compare the technical efficiency levels according to the characteristics of Educational Opportunity Expansion schools in Chonburi province.

3. Research Methodology

This research used a quantitative research methodology.

Population

The population in this study consisted of 74 educational opportunity expansion schools in Chonburi province.

Data Sources

This study utilized secondary data from Chonburi Primary Education Service Area Offices I, II and III, the Office of Basic Education Commission, the Ministry of Education, Chonburi Province.

The study variables

1. The variables were used to measure the technical efficiency of educational opportunity expansion schools in Chonburi province.

1) Input variables for measuring school technical efficiency consisted of 5 variables:

- the ratio of students to school administrators,
- the ratio of students to teachers,
- the ratio of students to classroom, and
- the ratio of computers to students.

2) Output variables used for the average O-NET scores included 4 subjects: Thai language, English language, Mathematics and Science for grade 9 students in 2022.

2. The variables were used to compare the technical efficiency levels based on the characteristics of educational opportunity expansion schools in Chonburi province, which consisted of the following 10 variables:

- the ratio of male students to female students,
- the ratio of foreign students to Thai students,
- the ratio of public school teachers to temporary teachers,
- the ratio of teachers who graduated with a master's degree or higher to teachers who graduated with qualifications lower than a master's degree,
- the ratio of teachers with a professional level or higher to teachers with qualifications lower than professional level,
- the standard deviation of the average O-NET score in Thai language,
- class size,
- special needs student; students without special needs in class and students with special needs in class**,**
- school size; medium-sized schools and large-sized schools, and
- school location; schools located in the municipality and schools located outside the municipality.

Research Instrument

Instruments used in this research were data recording forms.

Data collection

1. Submit a Request letter to use data from the Graduate School to the Director of the Chonburi Primary Education Service Area Offices I, II, and III for research purposes.

2. Upon obtaining permission, the researcher will coordinate with the staff to copy of the data onto the data recording forms created specifically for research purposes.

3. The researcher will then verify and record the data on the data recording forms in preparation for further analysis.

Data Analysis and statistics

1. Descriptive Statistics: Descriptive statistics are used to describe the general characteristics of the variables used in the research and to perform preliminary analysis regarding the technical efficiency scores of educational opportunity expansion schools in Chonburi province. Statistical methods used for data analysis include frequency, percentage, mean, and standard deviation.

2. Technical Efficiency Analysis: To assess the technical efficiency of educational opportunity expansion schools in Chonburi province employs a data envelopment analysis (DEA) framework. Specifically, the model used is the constant returns to scale (CRS) DEA model, which focuses on output orientation. The analysis is conducted using the DEAP 2.1 software.

3. Comparison of Technical Efficiency Levels: The analysis comparing technical efficiency levels based on the characteristics of educational opportunity expansion schools in Chonburi province utilizes cross-tabulation analysis. This analysis is conducted using the SPSS (Statistical Package for the Social Sciences) software.

The efficiency scores

The efficiency scores in this research were divided into 5 levels based on the measured technical efficiency of Opportunity Expansion Schools in Chonburi Province using the Data Envelopment Analysis (DEA) model with constant return to scale (CRS) and an output-oriented approach. The scores range from 0 to 1 and were categorized into 5 levels as follows:

The efficiency scores	The efficiency level
0.81-1.00	The highest efficiency
0.61-0.80	The high efficiency
0.41-0.60	The moderate efficiency
0.21-0.40	The low efficiency
0.00-0.20	The lower efficiency

4. Results

1. Technical Efficiency Levels of Educational Opportunity Expansion Schools in Chonburi Province.

The analysis of technical efficiency for educational opportunity expansion schools in Chonburi province, using data envelopment analysis with the constant returns to score (CRS) production-oriented model,

revealed that the technical efficiency scores of the schools ranged from 0.45 to 1. These scores were classified into the following efficiency levels:

- Highest Efficiency: 15 schools achieved a score between 0.81 and 1.00, accounting for 20.27 percent;
- High Efficiency: 32 schools achieved a score between 0.61 and 0.80, accounting for 43.24 percent;
- Moderate Efficiency: 27 schools achieved a score between 0.41 and 0.60, accounting for 36.49 percent.

Notably, there were no schools with technical efficiency levels classified as low or lowest.

The technical efficiency levels of educational opportunity expansion schools in Chonburi province are summarized in Table 1 below:

Table 1 The technical efficiency levels of educational opportunity expansion schools in Chonburi province, classified by technical efficiency levels.

The efficiency levels	**The efficiency scores**	**Schools** (n=74)	**percentage**
Highest	0.81-1.00	15	20.27
High	0.61-0.80	32	43.24
Moderate	0.41-0.60	27	36.49

2. Comparison of Technical Efficiency Levels based on the characteristics of Educational Opportunity Expansion Schools in Chonburi Province. Table 2 below:

Table 2 The comparison of technical efficiency levels based on the characteristics of educational opportunity expansion schools in Chonburi province.

Variables	**The efficiency level**	**Schools (n)**	**Mean**	**Standard deviation**	**Min.**	**Max.**
the ratio of male students to female students	highest	15	1.28	1.37	0.17	6.00
	high	32	1.34	0.63	0.57	3.75
	moderate	27	1.20	0.45	0.56	2.50
the ratio of foreign students to Thai students	highest	15	0.06	0.09	0.00	0.29
	high	32	0.03	0.07	0.00	0.35
	moderate	27	0.02	0.02	0.00	0.08
the ratio of public school teachers to temporary teachers	highest	15	6.75	6.60	0.00	15.00
	high	32	9.87	14.00	0.00	47.00
	moderate	27	6.37	12.23	0.00	49.00
the ratio of teachers who graduated with a master's degree or higher to teachers who graduated with qualifications lower than a master's degree	highest	15	0.16	0.19	0.00	0.78
	high	32	0.18	0.13	0.00	0.56
	moderate	27	0.16	0.11	0.00	0.44
the ratio of teachers with a professional level or higher to teachers with qualifications lower than professional level	highest	15	0.33	0.28	0.00	0.78
	high	32	0.50	0.57	0.00	3.00
	moderate	27	0.36	0.23	0.03	0.89
standard deviation of the average O-NET score in Thai language	highest	15	10.61	3.74	4.46	18.58
	high	32	12.28	2.69	5.38	18.28
	moderate	27	13.30	1.01	7.20	15.92
class size	highest	15	17.20	9.30	6.00	32.00
	high	32	29.23	10.13	11.00	50.00
	moderate	27	29.99	7.05	14.00	45.50

2.1 When considering the ratio of male students to female students, categorized by the technical efficiency levels of educational opportunity expansion schools in Chonburi province, it was found that the ratio of male students to female students in schools with the high efficiency had the highest average value ($\overline{X}$=1.34, SD=0.63). Following that, the schools with the highest efficiency ($\overline{X}$=1.28, SD=1.37) and the schools with the moderate efficiency ($\overline{X}$=1.20, SD=0.45).

2.2 The ratio of foreign students to Thai students, categorized by the technical efficiency levels of educational opportunity expansion schools in Chonburi Province, was found that the ratio of foreign students to Thai students in schools with the highest efficiency had the highest average value ($\overline{X}$=0.06, SD=0.09). Following that, the schools with the high efficiency ($\overline{X}$=0.03, SD=0.07) and schools with the moderate efficiency ($\overline{X}$=0.02, SD=0.02).

2.3 The ratio of public school teachers to temporary teachers, categorized by the technical efficiency levels of educational opportunity expansion schools in Chonburi province, was found that the ratio of public school teachers to temporary teachers in schools with the high efficiency had the highest average value ($\overline{X}$=9.87, SD=14.00). Following that, the schools with the highest efficiency ($\overline{X}$=6.75, SD=6.60) and the schools with the moderate efficiency ($\overline{X}$=6.37, SD=12.23).

2.4 The ratio of teachers who graduated with a master's degree or higher to teachers who graduated with qualifications lower than a master's degree, categorized by the technical efficiency levels of educational opportunity expansion schools in Chonburi province, was found that the ratio of teachers who graduated with a master's degree or higher to teachers who graduated with qualifications lower than a master's degree in schools with the high efficiency had the highest average value ($\overline{X}$=0.18, SD=0.13). Following that, the schools with the highest efficiency ($\overline{X}$=0.16, SD=0.19) and the schools with the moderate efficiency ($\overline{X}$=0.16, SD=0.11).

2.5 The ratio of teachers with a professional level or higher to teachers with qualifications lower than professional level, categorized by the technical efficiency level of educational opportunity expansion schools in Chonburi province, was found that the ratio of teachers with a professional level or higher to teachers with qualifications lower than professional level in schools with the high efficiency had the highest average value ($\overline{X}$=0.50, SD=0.57). Following this, the schools with the moderate efficiency ($\overline{X}$=0.36, SD=0.23) and the schools with the highest efficiency ($\overline{X}$=0.33, SD=0.28).

2.6 The standard deviation of the average O-NET score in Thai language, categorized by the technical efficiency level of educational opportunity expansion schools in Chonburi province, was found that the standard deviation of the average O-NET score in Thai language in schools with the moderate efficiency had the highest average value ($\overline{X}$=13.30, SD=1.01). Following this, the schools with the high efficiency ($\overline{X}$=1.28, SD=2.69) and the schools with the highest efficiency ($\overline{X}$=10.61, SD=3.74).

2.7 Class size, categorized by the technical efficiency levels of educational opportunity expansion schools in Chonburi province, was found that the class size in schools with the moderate efficiency had the highest average value ($\overline{X}$=29.99, SD=7.05). Following this, the schools with high efficiency ($\overline{X}$=29.23, SD=10.13) and the schools with the highest efficiency ($\overline{X}$=17.20, SD=9.30).

Based on the analysis comparing technical efficiency levels across categorical variables for educational opportunity expansion schools in Chonburi province, the following findings are presented in Table 3 below:

Table 3 The comparison of technical efficiency levels based on categorical variables for Educational Opportunity Expansion Schools in Chonburi Province.

Variables	The efficiency levels			Schools
	highest	High	Moderate	(n)
special needs student				
students without special needs in class	11 (34.40%)	15 (46.90%)	6 (18.80%)	32
students with special needs in class	16 (38.10%)	1 (40.50%)	9 (21.40%)	42
School size				
medium-sized schools	11 (22.90%)	23 (47.90%)	14 (29.20%)	48
large-sized schools	16 (61.50%)	9 (34.60%)	1 (3.80%)	26
School location				
schools located in the municipality	16 (48.50%)	13 (39.40%)	4 (12.10%)	33
schools located outside the municipality	11 (26.80%)	19 (46.30%)	11 (26.80%)	41

2.8 Group variables of special needs student, divided into 2 groups, as follows:

1) Students without special needs in grade 9 a total of 32 educational opportunity expansion schools in Chonburi province reported having students without special needs. When classified by the technical efficiency level of these schools, the following distribution was observed:

- High Efficiency Group: 15 schools (46.90%) fell into this category.
- Highest Efficiency Group: 11 schools (34.40%) achieved the highest efficiency.
- Moderate Efficiency Group: 6 schools (18.80%) demonstrated moderate efficiency.

2) Students with special needs in grade 9, total of 42 educational opportunity expansion schools in Chonburi province reported having students with special needs. When classified by the technical efficiency level of these schools, the following distribution was observed:

- Highest Efficiency Group: 16 schools (38.10%) fell into this category.
- Moderate Efficiency Group: 9 schools (21.40%) demonstrated moderate efficiency.
- High Efficiency Group: 1 school (40.50%) achieved high efficiency.

2.9 Group variables of school size, divided into 2 groups, as follows:

1) Medium-sized schools total 48 schools. Classified by the technical efficiency level of educational opportunity expansion schools in Chonburi province, it was found that the group of medium-sized schools had the high efficiency. Specifically, there were 23 schools (47.90%) in this group, followed by 14 schools (29.20%) with the moderate efficiency and 11 schools (22.90%) with the highest efficiency.

2) Large-sized schools totaled 26. Classified by the technical efficiency level of educational opportunity expansion schools in Chonburi province, it was found that the group of large-sized schools had the highest efficiency. Specifically, there were 16 schools (61.50%) in this group, followed by 9 schools (34.60%) with the high efficiency and 1 school (3.80%) with the moderate efficiency.

2.10 Group variables of school location, divided into 2 groups, as follows:

1) Schools located in the municipality totaled 33. Classified by the technical efficiency level of educational opportunity expansion schools in Chonburi province, it was found that the group of schools located in the municipality had the highest efficiency. Specifically, there were 16 schools (48.50%) in this group, followed by 13 schools (39.40%) with the high efficiency and 4 schools (12.10%) with the moderate efficiency.

2) Schools located outside the municipality, totaled 41. Classified by the technical efficiency level of educational opportunity expansion schools in Chonburi province, it was found that the group of schools located outside the municipality had the high efficiency. Specifically, there were 19 schools (46.30%) in this group, followed by 11 schools (26.80%) with the highest efficiency and 11 schools (26.80%) with moderate efficiency.

5. Discussion

1. Technical efficiency of educational opportunity expansion schools in Chonburi province

The technical efficiency of the educational opportunity expansion schools in Chonburi province based on data envelopment analysis, revealed that the technical efficiency scores of the schools ranged from 0.45 to 1. The majority of schools demonstrated high efficiency (score 0.61-0.80) with 32 schools (43.24%) falling into this category. Additionally, 27 schools (36.49%) exhibited moderate efficiency (score 0.41-0.60) while, 15 schools (20.27%) achieved the highest efficiency (score 0.81-1.00)

2. Comparing the technical efficiency levels according to the characteristics of educational opportunity expansion schools in Chonburi province

The comparing of technical efficiency levels according to the characteristics of educational opportunity expansion schools in Chonburi province classified by technical efficiency level as the highest efficiency, the high efficiency and the moderate efficiency respectively as follows; the ratio of male students to female students ($\overline{X}$ =1.28, $\overline{X}$=1.34, $\overline{X}$=1.20), the ratio of foreign students to Thai students ($\overline{X}$=0.06, $\overline{X}$=0.03, $\overline{X}$=0.02), the ratio of public school to temporary teachers ($\overline{X}$=6.75, $\overline{X}$=9.87, $\overline{X}$=6.37), the ratio of teachers who graduated with a master's degree or higher to teachers who graduated with qualifications lower than a master's degree ($\overline{X}$=0.16, $\overline{X}$=0.18, $\overline{X}$=0.16), the ratio of teachers with a professional level or higher to teachers with qualifications lower than professional level ($\overline{X}$=0.33, $\overline{X}$=0.50, $\overline{X}$=0.36), the standard deviation of the average O-NET score in Thai language ($\overline{X}$=10.61, $\overline{X}$=12.28, $\overline{X}$=13.30), class size ($\overline{X}$=17.20, $\overline{X}$=29.23, $\overline{X}$=29.99), students without special needs in class (34.40 percent, 46.90 percent,18.80 percent), students with special needs in class (38.10 percent, 40.50 percent, 21.40 percent), medium-sized schools (22.90 percent, 47.90 percent, 29.20 percent), large-sized schools (61.50 percent, 34.60 percent, 3.80 percent), schools located in the municipality (48.50 percent, 39.40 percent, 12.10 percent) and schools located outside the municipality (26.80 percent, 46.30 percent, 26.80 percent).

6. Recommendations

1. Recommendations from the study

For schools within Chonburi Province's educational opportunity expansion program that currently operate at a moderate technical efficiency level, it is imperative to enhance efficiency across various management aspects. This includes academic, budgetary, personnel, and general administrative dimensions. Such improvements are pivotal responsibilities of school administrators to ensure quality education. Moreover, developing teachers to have knowledge and understanding of instructional management, as well as fostering student motivation for learning, significantly contributes to elevating school effectiveness. For schools already operating at a high technical efficiency level, maintaining quality is essential for sustained effectiveness.

2. Recommendations for further study

2.1 Due to the research focusing on basic national-level educational performance indicators, which primarily assess academic proficiency, the study on the technical efficiency level of schools in the educational opportunity expansion program in Chonburi Province does not cover psychological and behavioral aspects. Therefore, future research should gather data on psychological and behavioral dimensions related to educational outcomes to ensure comprehensive assessment of technical efficiency in schools.

2.2 The current assessment of technical efficiency in schools primarily focuses on those within the educational opportunity expansion program in Chonburi Province. Consequently, future studies may explore technical efficiency in schools under different jurisdictions but at the same grade level to compare operational methodologies across various school affiliations beyond government-operated institutions.

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