The Development of an Effective Private School Management Model in the Northeastern Region of Thailand

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Abstract

The aim of this mixed-methods research is to create a model for developing effective private schools in the northeast of Thailand. Seven experts examine and affirm the key components for school effectiveness as suitable with priorities of needs for development as follows: 1) school curriculum management comprising instructional leadership, teaching and learning management, academic planning system, and information and technology; 2) learning community building consisting of learning network, collaboration, and learning climate and environment; 3) management of the school administrators comprising principal leadership, expertise in academic management, expertise in school personnel management, expertise in management of general affairs, and expertise in budget management. The research team creates the model; 15 experts determine and affirm it as suitable, feasible, and useful at the highest level; and the results of the experimentation for 3 months at one purposively selected school in Bookeo District, Chaiyaphum Province are found effective at the highest level. The model can be used as a framework in both elementary and secondary schools to go to quality schools.

Keywords: development model, school effectiveness, school management, private schools in the Northeastern region, Thailand schools

1. Introduction

Today's global society has changed. Economic competition and technological development are intensely, more closely connected quickly and affecting the lives of the society and activities greatly. The Office of the National Economic and Social Development Board (2016, p. 5) mentioned that Thailand has limitations on almost all strategic fundamentals, which are all evidently barriers to the country's development. Most importantly, Thailand must develop the Thai population as a whole to be complete and whole people of all ages. In particular, human capital development must be enhanced by upgrading the quality of education, learning, skill development, and public health services in all areas, along with the need to promote the role of social institutions to cultivate good people with discipline, good values, and social responsibility. The Thai education system needs to adapt to keep up with the changes, economically, socially, politically, and culturally. In establishing the 12th National Education Plan, the Secretariat of the Council of Education (2017), concluded that the Thai education system has problems with the quality and standard of education at all levels, especially the former. Development results are unsatisfactory, due to the basic education level having an achievement score of much lower than the average for many countries in Asia. Therefore, it is necessary for Thailand to reform its education system to make it a great mechanism in driving the country to be attuned to the new constitution of the Kingdom of Thailand and the 20-year National Strategic Framework (2017–2036) and the 12th National Economic and Social Development Plan (2017–2021), which can lead the country toward stability, prosperity, and sustainability.

School administration's effectiveness is characterized by the ability of schools to work together to achieve established goals, especially in the era of globalization that is constantly changing in terms of economic, social, political, and cultural facets. Schools can only survive if they can adapt and respond to new situations. The school must have the ability to integrate: that is, to combine its strength for unity in executing the school mission. School effectiveness is a result of teaching and learning, school climate, and systematic implementation based on the concept of the Office of Nation Education Standards and Quality Assessment (Public Organization), which states that the quality assessment must be in line with the intent of the National Education Act, mainly focusing on the quality of the learners, to ensure that students receive an education of similar quality regardless of locality, with a quality

assurance system as a tool for promotion and support for continuous and sustainable quality improvement of education (Office for Educational Standards and Quality Assessment, 2011).

For this reason, educational organizations, especially private schools, must adapt and adjust to keep up and cope with the changes that are important in allowing the organizations to operate efficiently and effectively, especially private schools, under the office of the Private Education Promotion Board, with their own social characteristics that influence the way of life of the local people.

School administrators need to have a deep understanding of the context (Ekarin Sungthong, 2009) and development of private schools for sustainable growth. School administrators and teachers working in schools must have clear concepts and good working principles in line with the needs and changes in society, thus making the schools successful. As Peerasak Wilairat (2012, p. 12) stated, if any organization has executives and personnel with the knowledge, ability, and motivation for achievement in performance, that organization will yield successful results in operations. Developing an organization to be effective, personnel development, or the development of human resources in the organization are key ways that the organization should focus on due to personnel being a factor determining the success of the organization, especially if personnel are motivated and dedicated physically and mentally to work. These are important internal values that drive individuals to desire to complete their work with standards of excellence (Walaiphan Pornpraisarn, 2014).

From the aforementioned points, it can be said that the effectiveness of school administration lies in its ability to achieve the targets that have been set. To achieve the greatest efficiency and effectiveness, there must be several factors according to the structure of the organization that are interrelated, and there are different levels of hierarchy. Therefore, the researcher, as an owner of a private school in the education service area, is keenly interested in studying the effective private school management model in the northeast based on the aforementioned concept of academic educators. The researcher will investigate what components the model should contain and use the results of the study as a concept for the development of the school administration process to be successful in the management of educational institutions in a sustainable manner.

2. Research Objectives

(1) To study the components of effective private school administration in Thailand.

(2) To study current conditions, the desirable conditions, and needs for the development of effective private school administration model in the northeastern region of Thailand.

(3) To develop an effective private school administration model in the northeastern region of Thailand.

(4) To study the results of implementing the effective private school administration development model in Thailand.

3. Research Methodology

The study was carried out in the form of research and development.

To be consistent with the objectives of the study, the researcher identified the sample group and the informant group according to the objectives, which were divided into four groups in four phases as follows.

Phase 1: Study of components of effective private school administration. The informant group consisted of seven experts purposively selected according to the criteria specified by the researcher, to help in deliberating, determining, and checking the suitability of components.

Phase 2: Study of current conditions, desirable conditions, and needs for the development of the effective private school administration model in the northeastern region of Thailand. The sample group consisted of 367 schools in the northeastern region. In this stage, the researcher collected data from three groups: administrators, teachers, and school committees with a total population of 1,101 people, with the sample of 291 administrators, teachers, and school committees obtained from the opening of Krejci and Morgan tables.

Phase 3: Development of an effective private school administration model in the northeastern region of Thailand. The informant group consisted of 15 experts in educational administration, purposively selected according to the criteria specified by the researcher.

Phase 4: Study of the results of implementation of an effective private school administration development model. The informant group consisted of seven experts in the field of education, purposively selected according to the criteria specified by the researcher, including teachers and related personnel in the school.

4. Research Tools

(1) Evaluation of the effective private school management components using the 5-level rating scale according to the Likert method.

(2) Opinion questionnaire on current and desirable conditions of effective private school administration in the northeastern region, divided into two parts as follows.

Part 1 – A checklist canvassing basic information of the respondents.

Past 2 – Current condition opinion questions and the desirable condition according to the effective private school administration using a 5-level rating scale according to the Likert method.

(3) Semi-structured interview form with open-ended questions to inquire about comments and suggestions.

(4) Validity, suitability, and feasibility and usefulness assessment form to evaluate development of the effective private school administration model using the 5-level rating scale according to the Likert method.

4.1 Creating and Testing Tools

The researcher used previous research, concepts, and theories related to the development of an effective private school administration model as the foundation for creating and developing questionnaires. They studied the method of constructing a rating scales questionnaire with 5 levels according to the Likert method. They created a questionnaire by defining the questions in line with the objectives and definitions of the research variables. They presented the questionnaire to the dissertation advisors for validation and suggestions for improvement. They then presented the questionnaire to five experts to verify the content validity by finding the index of Item-Objective Congruence (IOC) with an IOC value of 0.06 or higher, which can be considered accurate with content consistency index at 0.80–1.00. They tested the revised questionnaire (try-out) with a non-sample population of 30 people and used the result to find the confidence value (reliability) of the questionnaire by using Cronbach's alpha coefficient.

4.2 Data Collection Method

For collection of this information, the researcher took four steps to comply with the objectives, divided into four phases, with data collection methods as follows:

Phase 1: Study of components of effective private school administration

The researcher requested a letter from the Faculty of Education, North Eastern University, Thailand, for assistance from experts in assessing the suitability of effective private school management components. They coordinated with the informant groups to request information and collect data. They recorded and collected documents and took pictures of activities.

Phase 2: Study of the current and desirable conditions and needs for the development of an effective private school administration model

Data collection: The researcher requested cooperation from the Faculty of Education, North Eastern University, Thailand, by sending a letter to the school administrators asking permission to collect information. The researcher sent the questionnaire to the sample group by post and prepared an empty envelope inside the questionnaire envelope with a stamp addressed to the researcher for respondents to return the questionnaire by post and document online (Google drive) for faster information delivery.

Phase 3: Development of an effective private school administration model

The researcher requested an official letter from the Faculty of Education, Northeastern University, Thailand, for assistance in organizing activities and collecting information and coordinating by telephone, scheduling appointments, managing dates and times for an interview, and study management guidelines. They analyzed data obtained from the study visit to find guidelines for developing an effective private school administration model. They collected data through an official letter from the Faculty of Education, Northeastern University, Thailand, and then invited experts for focus group discussions, coordinated by phone. They scheduled appointments with specific dates and times for focus group discussions. They facilitated focus group discussion activities on the appointed dates and times. They collected data according to research and analysis tools and presented the report to the focus group participants. They edited and refined data according to the advice of experts from focus group discussions and then submitted to the dissertation advisors for review and refinement.

Phase 4: Study of an effective private school administration development model

The researcher requested assistance from the Faculty of Education, North Eastern University, Thailand, in assessing the suitability of effective private school management components. They coordinated with informant groups to request information and to travel to collect the information independently using the tools provided and then recorded and collected documents and took pictures of activities.

4.3 Data Analysis

The researcher conducted data analysis of the respondents' preliminary information, including gender, occupation, and education level, by enumerating the frequency (Frequency) and finding the percentage (Percentage), then presenting them in the form of a table and interpreting the results by narration.

The researcher analyzed the data obtained from the effective private school administration development tool via a 5-level rating scale using the following scoring criteria.

5 means the highest level of suitability

4 means a very suitable level of suitability

3 means a moderate level of suitability

2 means a low degree of suitability

1 means the lowest level of suitability

Criteria for interpreting data from effective private school administration development tools are as follows (Srisaard, 2010, p. 102).

Average 4.51–5.00 means appropriate at the highest level

Mean 3.51–4.50 means appropriate at a high level

Mean 2.51–3.50 means appropriate at a moderate level

Mean 1.51–2.50 means appropriate at a low level

Average 1.00–1.50 means appropriate at the lowest level

The researcher analyzed open-ended questions via content analysis.

4.4 Statistics Used to Analyze Data

This researcher used statistical data analysis consisting of the following:

Statistics for the quality of tools, including content validity by finding the index of consistency (IOC) and confidence of the questionnaire (reliability) by using Cronbach's alpha coefficient.

The statistics used were frequency distribution, percent (Percentage: P), average (Mean: " μ "), standard deviation (Standard Deviation: " σ "), and PNI modified.

5. Research Results

(1) Results of the components of an effective private school administration revealed that the effective private school management components consisted of three main components and 12 sub-components, which are the first at management of school administrators with 5 sub-components: 1.1) Executive Leadership, 1.2) Management Expertise in Academic Administration, 1.3) Management Expertise in Personnel Management, 1.4) Management Expertise in General Affairs Administration, 1.5) Management Expertise in Budget. The second main component is the school management and curriculum development with 4 sub-components: 2.1) Academic Leadership, 2.2) Instructional Management, 2.3) Academic Planning System, 2.4) Information Technology. The third main component is building a learning community with 3 sub-components: 3.1) Learning Network, 3.2) Participation, 3.3) Learning Environment.

(2) Results of the study of the current and desirable conditions and the needs for the development of effective private school administration in the northeastern region are shown in the following table.

	Current Condition			Desirable Condition		
Item	$\overline{\mathbf{X}}$	S.D.	Operational Level	$\overline{\mathbf{X}}$	S.D.	Operation al Level
1) Management of school administrators	3.36	0.63	Medium	4.65	0.47	Highest
2) Management of curriculum development of school	3.24	0.53	Medium	4.85	0.26	Highest
3) Building a learning community	3.80	0.88	High	4.74	0.88	Highest
Total	3.69	0.79	High	4.74	0.62	Highest

Table 1. Mean, Standard Deviation, and Level of Current and Desirable Conditions of Effective Private School Administration in the Northeastern Region

From the table, the researcher found that the present and desirable conditions of effective private school administration in the northeastern region revealed that the current state of the overall private school administration was at a high level (= 3.69, S.D. = 0.79). When considering each item in descending order, the researcher found that building a learning community had the highest mean level (= 3.80, S.D. = 0.88), followed by the management of school administrators (= 3.36, S.D. = 0.63) and school management and curriculum development (= 3.24, S.D. = 0.53), respectively.

The overall desirable condition of private school administration was at the highest level (= 4.74, S.D. = 0.62). When considering each item in descending order, the researcher found that the development of the school management and curriculum development had the highest mean value (= 4.85, S.D. = 0.26), followed by the creation of learning communities (= 4.74, S.D. = 0.88) and management of school administrators (= 4.65, S.D. = 0.47) according to number.

Table 2. PNI Modified Values for the Development of Effective Private School Administration in the Northeastern Region Overall and Individual Aspect

Administrative Elements	Ι	D	PNI Modified	Modified Prioritized
1) Management of school administrators	3.57	4.70	0.318	3
2) School management and curriculum development	3.51	4.72	0.343	1
3) Building a learning community	3.56	4.74	0.330	2

From the table, the researcher found that the needs priorities (PNI modified) for the development of effective private school administration in the northeastern region in descending order are: 1) school management and curriculum development, 2) learning community building, and 3) management of school administrators, respectively.

(3) With regard to the results of the development of an effective private school administration model, the researcher analyzed the data on the components, the current and desirable conditions, and needs and then created and developed an effective private school management model as shown in the following figure.



Figure 1.

6. Discussion

To look into the research results more deeply and to gain more insightfulness, the results need to be clarified, compared, and modified further. Because no one study can ever be a panacea or recipe for every solution to the problem, this study needs critical roundup and modification to make the model best fitted and of great benefit to the situation or condition of the context specified.

Regarding the intended effectiveness of the school in this study, it was in tune with the two Alberta studies on the overall effectiveness of primary school. Emphasis was placed on climate, high expectations for students, leadership, the morale and satisfaction of staff and students, effective teaching, and student attitude (Johnson & Holdaway, 1990).

Authorities on school effectiveness such as Sammons et al. (1995) and Reynolds (1996) identified 11 factors for an effective school. Many factors have elements found as key attributes, which this researcher also considered key components of school effectiveness. Those factors are learning organization, shared leadership, shared vision and goals, focus on teaching and learning, purposeful teaching, positive reinforcement, clear and fair discipline, and positive feedback. This is in line with Mondal (2020), who emphasized strong organizational framework, strong and professional principal, and strong and professional teachers.

Perhaps the best known summary of the characteristics of an effective school is provided by Ronald Edmonds (1979) as cited in Ajit Mondal (2020). He identified five distinct characteristics in high-achieving schools with the top priority being "strong administrative leadership, particularly in the area of curriculum and instruction" (p.). Other

key characteristics that are in congruence with this study are: a strong and professional principal, and strong professional teachers. This researcher places high importance on expertise of the school administrators in management of general affairs, budget, personnel, and academic affairs.

There are seven key common elements of an effective school: clear school mission, high expectation for success, instructional leadership, opportunity to learn and time on task, safe and orderly environment, positive home–school relations, and frequent monitoring of student progress (Kirk & Jones, 2004).

A strong organizational framework and structure with autonomy, flexibility, and adaptability are key factors that this researcher found to be a highly important foundation for school effectiveness. Three elements that affect school effectiveness are school culture, climate, and time on the task of learning and teaching.

It is to be noted that this study is concerned directly with a private and not public school. The nature of private school administrators can be somewhat different because the owner of the private school has more power and authority to direct and supervise as desired with more freedom. The administration can be more authoritative and efficient, which makes effectiveness far more attainable. That is why this researcher places greater emphasis on the administrator's authority and expertise in managing key missions, rather than leadership roles. However, if the administration can appropriately balance both authority and great leadership, the effectiveness of the private school administration will be better and offer the highest benefit and success with sustainability.

With regard to the administrator's leadership, it is in congruence with a recent study by type out fully first, then use acronym (EQAO), cited by Calman and published by D'Addario (2017), where she asserted that a strong and effective principal leadership is the key element of school effectiveness. Leaders are highly visible, actively supervising instruction, protecting instructional time, and supportive of the work environment. They also monitor staff performance and promote professional development in schools.

The research findings confirm Leithwood et al.'s (2006) findings, who stated that school leaders improve teaching and learning indirectly, and are most powerful through their influence on staff motivation, commitment, and working conditions. The leadership of the school principal is second only to classroom teaching as an influence on pupil learning, as highlighted by the National College of School leadership. As such, this researcher places leadership among the highest needs priorities for development of effective schools.

One of the most important components in school effectiveness is instructional leadership, listed as a sub-element of curriculum management and instruction in this study. Schools need effective leaders to communicate their mission and vision. This is in line with Lezotte (2001), who stated that "in the effective school, the principal acts as an instructional leader, effectively and continually communicat[ing] the mission of the school to staff, parents, and students" (p.).

The opportunity to learn and student time on task are considered crucial elements. In the effective school, teachers allocate a significant amount of classroom time to instruction in the essential content and skills. For a high percentage of this time, students are engaged in whole class or large group, teacher-directed, planned learning activities.

A safe and orderly environment is also a valuable element. In the effective school, there is an orderly, purposeful, business-like atmosphere free from the threat of physical harm. The school climate is not oppressive and is conducive to teaching and learning.

Positive home–school relations are a highly important element in school administration for effectiveness: parental, family, and community involvement is also crucial in making a school effective. Much of the school literature has been focused on the need for school to serve and educate not only the child, but the entire family. This includes parents as valued members of the school family. Schools develop programs for parents in the evenings and on the weekends. The idea is that if children see their parents valuing education, they will also value it. This is in line with Goodman's (1997) statement that when this happens, "the kids settle down and get serious about learning and then they achieve positive results" (p.). Parents should be treated as respected partners who bring important perspectives and often the untapped potential to grow in this capacity to support their children's education.

High expectations of students as well as teachers have repeatedly been found to have a positive impact on the performance of both parties. Students are always dependent on the expectations placed on them. Teachers who are expected to teach at high levels of effectiveness always reach that level of expectation, particularly when teacher evaluation and professional development are geared toward improving instructional quality (Lynch, 2016).

Other essential characteristics of effective schools are the integration of technology with management, teaching, learning, and all other facets of school affairs (Davies, 2014). Adequate facilities with regard to space, classroom dimensions, and technology support and service must be sufficiently provided.

The frequent monitoring of student progress Lezotte (1991) was not evidently included as a key characteristic in this study because the monitoring and assessment process is integrated with all facets of the development model with special emphasis on teaching and learning. This researcher recognized the importance of the monitoring and assessing component of the model for development of effective school management. It is the inevitable part of the entire development process.

With regard to the significance of the community building component, the researcher concurs with Darling-Hammond (1997), who claimed that prosperous professional development, which leads to student achievement and success in the organization itself, is reliant on authentic collaboration practices in an active professional learning community. They went on to conclude that as a result of school communities providing teachers with opportunities and time to develop strong working relationships, more sharing and consistency among educators and problem-solving efforts will be observed.

Schools can be transformed into a communal living space where ethical values such as tolerance, fairness, respect, collaboration, democracy, and social responsibilities can be promoted. This shared learning atmosphere may be produced by ethical leaders who set a good example and listen to their colleagues' opinions.

The size of the school seems to be another factor in the school's effectiveness (Lynch, 2016, p. 3). Researchers report that the smaller the school, the better the students perform, especially in the case of younger students. This is the rationale behind the concept of schools-within-schools.

A key finding regarding the implementation of an effective school model is that positive support from the school principal is fundamental to success. Further, teacher support for, belief in, and commitment to this particular model's implementation tend to follow months or years of successful practice and lead to sustainable development as the ultimate goal.

It should be remembered that being successful and effective is not enough; it must be ongoing and sustainable. Sustainability and aiming for excellence should be realized and actualized to make the school development truly and authentically effective.

7. Suggestions and Recommendations

Overall, it seems that there is a growing awareness of the importance of an effective school management and administration in Thailand, particularly in the private school sector. This study suggest that there is a need for ongoing research and development in this area to ensure that schools are able to provide high-quality education.

Based on the findings of the study, here are some suggestions for use and further research:

7.1 Suggestions for more Improvement

Strong instructional leadership at all levels must be encouraged and developed; moreover, teaching and learning should be prioritized to support high academic expectations for students and teachers. School-based professional development, a culture of professional collaboration, and a cultivation of learning communities should be considered crucial and put into serious actual practices.

Integration of technology into teaching and learning and all other facets of management and services should be sufficiently provided.

Crucially, evaluative potential, meaningful assessment, and frequent monitoring of student progress and all other processes must be integrated. Most importantly, a clear school mission, vision, and goals must be articulated effectively and communicated throughout the school community and related agencies, parents, and families.

7.2 Suggestions for further Research

There should be study and research of ineffective school management to compare and gain more insight. There should also be a study about how to create the best management model accompanied by the best manual for effective implementation. In addition, there should be more studies on measuring an effective school framework to ensure the quality of intended results, rather than simply determining the development model. Moreover, the Thai education system should take into account the serious concern of the effectiveness of private schools, encouraging and supporting more funds to study how to improve the effectiveness of the private school sector. By following these

suggestions, educational institutions can continue to develop and improve their management models, leading to more successful and effective schools.

References

- Calman, Ruth C. (Sep 2010). "*Exploring the Underlying Traits of High-Performing Schools*" (PDF). Education Quality and Accountability Office. Archived from the original (PDF) on 2014-07-04.
- D'Addario, Joseph. (2017). 8 key Factors of School Effectiveness. (https://edureach101.com/8-key-factors-of-school-effectiveness/)
- Darling-Hammond, L. (1997, September). Quality Teaching: The critical key to learning. Principal, 77(1), 5-11.
- Edmonds, R. R. (1979). Effective Schools for the Urban Poor. *Educational Leadership*, 37(1), 15-27. Effective Schools.

(https://www.ontariodirectors.ca/CODE_Advisories/Downloads/CODE%20Advisory%20No%209%20WEB.pd f) (PDF). Council of Ontario Directors of Education. June 30, 2011.

- Ekarin, Sungthong. (2009). Strategic Leadership in a Multicultural Society: A Review of Theory. and practice, *Journal* of Education Prince of Songkla University, Pattani, 20(1), 1-16.
- Goodman, C. L. (1997, June–July). Principal of National Blue Ribbon Schools Says High Poverty Schools Can Excel. *IDRA Newsletter*, 24(6). Retrieved January 28, 2004, from http://www.idra.org/Newslttr/1997/Jun/Zarate.htm
- Johnson, N.A., & Holdaway, E.A. (1990). "Effectiveness of Primary Schools". *International Journal of Educational Management*, 4(3). https://doi.org/10.1108/09513549010144923
- Kirk, D. J., & Jones, T. L. (2004). *Effective schools*. Pearson Assessment Report. Avalable at: http://images.pearsonassessments.com/images/tmrs/tmrs_rg/EffectiveSchools.pdf?WT.mc_id=TMRS_Effective _Schools. Accessed: September 11, 2015.
- Lezotte, L. (1991). Correlates of Effective Schools: The first and second generation, Okemos, MI. : Effective Schools Products, Ltd; D.J., Jones, T. L. (2004). Effective Schools. Pearson Assessment Report.
- Lynch, M. (2016, June 29). *The Five Attributes of Successful Schools*. (https://www.fmucenterofexcellence.org/bestpractice/lynch-m-2016-june-29-the-five-attributes-of-successful-sc hools-retrieved-march-3-2017-from-education-week/)
- Mondal, Ajit. (2020). School Effectiveness An Area of Research in Teacher Education, Teacher Education, Scenester IV 2020.
- Office for National Education Standards and Quality Assessment. (2011). *Indicator Education Standards*. and criteria for consideration for external quality assessment: basic education level Bangkok: Office for National Education Standards and Quality Assessment (Public Organization)
- Office of the National Economic and Social Development Board. (2016). *Summary of the national economic and social development plan.* Twelfth Edition 2017-2021. Bangkok: Office of the National Economic and Social Development Board, Office of the Prime Minister.
- Pornpraisarn, Walaipan. (2014). The Relationship between Achievement Motivation and Efficiency and Work of Employees in the Auto Parts Industry, Nakhon Ratchasima Province.
- Wilairat, Peerasak. (2012). *Executive Success*. [Online]. Accessed from: http://www.pantown.com/group.php?display=content&id=36749&name=content32&area=3. 3 November 2022.

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