

School Management for Sustainable Development in Energy and Environmental Excellence

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ABSTRACT

Thailand emphasises encouraging all sectors to achieve their commitments to improving the quality of human life following the United Nations' sustainable development goals (SDGs) by 2030. Therefore, educational institutions across the country must develop school management approaches to enhance the quality of education and prepare Thai society to meet global challenges. This research aims to contribute to global action by developing school strategies and leadership practices to help achieve the SDGs. The mixed method of SWOT and the Analytic Hierarchy Process (AHP) was used to determine a suitable strategy for school accomplishment. In-depth interviews with school administrators were conducted to identify the leadership practices of school management. The results indicated an urgent need to equip human resources with knowledge and expertise in the energy field and the environment to teach students effectively. The five keys to leadership success in human resource development include goal setting, strategic budgeting, activity planning, achievement striving, and collaborative building. The school administrative strategies and leadership practices towards energy and environmental excellence developed in this study would be beneficial guidelines for school leaders in policy implementation for attaining SDGs. Contribution to SDGs would create a more sustainable world for all.

Keywords: Energy and environment, human resource development, leadership, school management, strategies, sustainable development

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INTRODUCTION

Education is important in national and international socio-economic and environmental development (Yaaman et al., 2019). Educational management must align

with national policies, global trends, and philosophies or beliefs to meet the needs and respond to such challenges (Amanchukwu et al., 2015). As the world population is expected to reach 10 billion by 2050 (Lutz & Samir, 2010), the negative consequences of overpopulation require the participation of all sectors to play a role in achieving sustainable development goals (SDGs, Franco & Derbyshire, 2020). Therefore, the challenges for the education sector related to providing quality education as the foundation of sustainable development.

The current national education plan (2017–2036) in Thailand is aligned with the United Nations' SDGs, which in turn are following the global social development goal of eliminating poverty, with simultaneous development of quality of life and environmental conservation. The main vision of the national education plan is to provide all Thai people with quality education and lifelong learning, focusing on learners with 21st-century characteristics and learning skills to keep pace with ever-changing global situations and social contexts. In the process, the national education plan has included six educational development strategies: (1) educational management for social and national stability, (2) human, research and innovation development and production to increase the nation's competitiveness, (3) development of people's potential and creation of a lifelong learning society, (4) provision of educational opportunity and equality, (5) educational management for environment friendliness and quality of

life, and (6) improvement of educational management efficiency (Office of the Education Council, 2017).

With environmental problems emphasised in the fifth strategy of the national education plan to fulfil the UN's SDGs by 2030, educational institutions nationwide have been obliged to adapt their policies to make the country a low-carbon society. These institutions must improve and develop various aspects following the national education plan to achieve sustainable development (Suriyankietkaew & Hallinger, 2018). For instance, educational institutions should encourage the development of teachers for innovative and environment-friendly technology to maximise the learning potential of all students. Furthermore, they must develop new curricula following 21st-century skills and enable learners to lead environment-friendly lives. In doing so, it is crucial to receive collaboration from all educational personnel to support quality improvement in education and propel their respective institutions toward sustainable future changes.

Planning educational development strategies concerning national policy and global trends is an essential mission of school administration and its priority as per the principle of the management process. If the planning is well organised with clear, practical steps, the school administration will be successful and achieve its goals (Jasti et al., 2019). As Thailand strives for sustainability, environmental issues must also be considered for effective

school planning and the development of appropriate solutions. The present environmental issues in schools are energy and water usage, food waste, and general waste management (Wachirawongsakorn & Sudnum, 2016). The school must therefore handle these issues appropriately to promote sustainable development and green practices. Nonetheless, the assessment of the preparedness of Thai schools in 2009–2014 to become green schools under the standard criteria of the Department of Environmental Quality Promotion revealed that only 112 schools across the country were well-prepared. Additionally, more than half of the small and medium-sized schools in Phitsanulok province were unprepared due to the lack of environmental planning and budget and the unpreparedness of teachers for environmental science (Wachirawongsakorn & Sudnum, 2016).

The main objective of this research is to develop school administrative strategies and leadership practices towards energy and environmental excellence, to promote education management for sustainable development. Maewinsamakkee School, Chiang Mai, Thailand, was selected as a purposive sample due to the school-specific characteristics, the vision of school administrators and administrative effectiveness. This medium-sized public school offers educational services from kindergarten to high school levels. It has continuously received multiple national awards, including the school management award, the education quality award, and the award in biological agriculture learning

management for sustainable development, for more than 10 years, by adopting the philosophy of sufficiency economy. To tackle global environmental issues, the school administrators have allocated some budget to develop various energy and environmental activities. They have also recognised the need for clear energy and environmental strategies to optimise the budget allocation and achieve the school's sustainability vision. As the school is looking to move toward sustainable development, the invented school administrative strategies and practices would serve the national and international policies of developing citizens with an awareness of sustainable energy and natural resource conservation for a better future for humanity.

LITERATURE REVIEW

At the global level, there is a strong correlation between population growth, economic growth, and energy demand (Sorrell, 2015). Although energy is regarded as one of the most important aspects of improving the economic and social quality of life in all nations, improper energy usage could result in various environmental problems, including air pollution, water pollution, and global warming (Osuntuyi & Lean, 2022). The importance of education to cope with these challenges and help create a more sustainable world is well recognised. In 2015, the SDGs developed by the United Nations was accepted by world leaders, who are working towards achieving them by 2030. Among the 17 SDGs, the improvement of the quality of education

is articulated in Goal 4 and is linked to the other goals in one way or another. Thus, education is an effective means for implementing sustainable development, as it increases knowledge and awareness of the importance of energy and environmental conservation and prepares future citizens to engage in sustainable living practices (Ma et al., 2020; Mahat et al., 2019b; Shulla et al., 2020).

Numerous researchers have presented substantial linkages between environmental and energy education and sustainability from diverse perspectives and countries. The impact of education on sustainable development was studied in Pakistan by Nousheen et al. (2020). The authors found that education on sustainable development in various programs could effectively assist teachers in recognising diverse economic, social, and environmental challenges from the sustainability perspective and imparting this knowledge to students. The key elements for the determinants of Malaysian students' knowledge of sustainable energy saving were verified by Mahat et al. (2019a). Their findings revealed four major aspects of students' awareness of sustainable energy conservation practices: electricity conservation, water conservation, power maintenance, and the 3Rs of reduce, reuse, and recycle. The authors concluded using a confirmatory factor analysis that the developed model could effectively identify the critical aspects to verify knowledge about energy-saving practices in the primary school surveyed, which could be transferred to the parents. Wojuola and Alant (2019) also studied

various aspects of the Nigerian public's beliefs, perceptions, and attitudes towards renewable energy technologies to derive implications for science and technology policy and education. The results indicated an insufficient understanding of renewable energy technology and no association between the participants' educational level and knowledge of renewable energy sources. In addition, the participants' lack of awareness regarding sustainable development was evident. Consequently, it was proposed that a national renewable energy and sustainability curriculum might help facilitate a sustainable way of life.

Providing a good quality education could effectively propel policy goals towards the sustainable development of nations. Educational management must, therefore, adapt according to the policies and changing contexts to address the need for societal transformation. Education for sustainable development requires school leaders to manage the resultant changes. The role of school leaders as change agents is to formulate policies and strategic plans in line with the goals of education for sustainable development (Mogaji & Newton, 2020). According to Chukwumah (2015) and Faiz et al. (2019), strategic planning could be an effective management tool for policy direction, implementation strategies, action planning, monitoring, and evaluating results. Strategic planning has been widely adopted in the education sector as the process of setting the direction and approaches for achieving the goals of the schools. Many schools worldwide, especially in Western countries, have begun

adopting the practice of strategic planning since the 1980s (Mbugua & Rarieya, 2014). Through strategic planning, administrators and teachers can set a clear goal and vision and carefully plan school policy formulation and evaluation.

The success of reshaping education to address sustainable development goals depends greatly on the school leaders (Mogaji & Newton, 2020; Muller et al., 2020). The study conducted by Iqbal et al. (2020) revealed the significance of effective leadership for sustainable development, as they could foster collaboration, motivation, and assistance for the transformational process. School leaders should develop an action plan, provide practical guidelines, and support essential elements, such as providing sufficient budget and personnel, for achieving operational excellence by following the established goals (Muller et al., 2020). Furthermore, school leaders should evaluate the outcomes of programs and activities to ascertain whether their goals are being achieved (Slimane, 2012). Various evaluation models can be applied to evaluate the success of school programs and activities. Nevertheless, the most popular method for evaluating programs, particularly those aimed at sustainable improvements, is the context, input, process, and product (CIPP) evaluation model (Warju, 2016).

METHODS

The mixed-method approach was adopted in this study to determine the best strategy and obtain a comprehensive understanding

of leadership practices for sustainable development in energy and the environment. A focus group discussion and a questionnaire were utilised to construct, verify, and select the school administrative strategies. An in-depth interview was used to explore effective practices in leading the school towards sustainable development. The research methods were as follows:

(1) Conducting a focus group discussion with twenty participants to assess and analyse the school contexts using a SWOT analysis and Internal and External matrix. Thereafter, the TOWS matrix was applied to develop the strategies and plans for green school administrative strategies. The focus group participants include five school administrators (a school principal and four vice principals) and fifteen teachers with experience in strategic planning, science teaching, and agriculture teaching. The participants were divided into two discussion groups with a diverse representation in each group for multiple viewpoints and appropriate group size, as Lazar et al. (2017) suggested.

(2) Verifying the propriety and feasibility of strategies from the six experts. The data collected were then analysed using statistical mean and standard deviation. Results were interpreted by multiplying 0.5 with the average score of the propriety and feasibility of each strategy. The final score was obtained by summarising the total scores of the propriety and feasibility together to prioritise the strategies.

(3) Defining the goals, strategy selection criteria of the CIPP model evaluation, and alternative strategies. Subsequently, an Analytic Hierarchy Process (AHP) model was constructed to aid in the decision-making and improve the reliability of the SWOT analysis.

(4) Conducting an enquiry with a population of five school administrators using an AHP-based pair-wise comparative questionnaire and thereafter examining the consistency ratio (C.R.) to analyse the weights of the alternative strategies to select a suitable strategy for the school. The questionnaire was divided into four sections. The first section comprised the basic information of the respondents. The next section dealt with the comparison of criteria in making the decision. The third section focused on the comparison of alternatives based on those criteria. The last section provided an open-ended question for school management suggestions and energy and environmental excellence recommendations.

(5) Conduct in-depth interviews with five school administrators to explore the roles of successful leaders in energy and environmental excellence. The main theme of the questions was (1) school policy on energy and environment and the implementation for effective results, (2) factors influencing the success of school energy and environmental development, (3) roles and responsibilities of a school

leader in energy and environmental excellence, (4) approach for promoting the collaboration of teachers and staff members for ensuring the implementation of sustainable practices, (5) problems and recommendations for addressing operational challenges, and (6) other suggestions for the development of the school towards energy and environment sustainability.

The research instruments were verified for their content reliability by applying the index of item-objective congruence (IOC). The data analysis was divided into three parts: (1) content analysis was used to analyse the qualitative data from the focus group discussion and in-depth interviews, (2) the IE matrix was applied to determine the school contexts by plotting the internal and external factor evaluation scores onto the X and Y axes. The scores were then classified into three categories: poor (1.00–1.99), medium (2.00–2.99), strong (3.00–4.00), and (3) the AHP was used to analyse the questionnaire. The Eigenvector values were calculated using Equation 1.

$$\lambda_{max} = \frac{1}{n} \sum_{i=1}^n \left\{ \frac{\sum_{j=1}^n a_{ij} \times w_j}{w_i} \right\} \quad [1]$$

Given

λ_{max} = Eigenvector main axis

n = Matrix size

a_{ij} = Pair-wise comparison components

w_i = Eigenvector value of the i component

w_j = Eigenvector value of the j component

The consistency index (C.I.) was calculated using Equation 2

$$C.I. = \frac{\lambda_{max} - n}{n-1} \quad [2]$$

The consistency ratio (C.R.) was calculated using Equation 3

$$C.R. = \frac{C.I.}{R.I.} \quad [3]$$

The random consistency index (R.I.) can be referred to in the sample random index table of Saaty (2008). For the data to be congruent and applicable, the values of the consistency ratio should not exceed 0.5 and 0.8 for n = 3 and 4, respectively, and 0.10 for n ≥ 5.

RESULTS

SWOT Analysis for Energy and Environmental Excellence

An onsite focus group discussion was conducted with twenty school administrators and teachers at Maewinsamakkee School to gather views on the school contexts and conditions in achieving energy and the environment for sustainable development. The key factors from the SWOT analysis of a focus group discussion were used to develop the Internal External (IE) matrix as presented below:

Table 1 shows the IFE analysis results of Maewinsamakkee School. The IFE total weight score of 2.30 out of 4 indicated that the school had a moderate strength in being

Table 1
Internal Factor Evaluation matrix (IFE) of Maewinsamakkee school

No.	Internal factors	Weight	Rate	Score
S1	The administrators have a broad vision and encourage personnel to be aware of the importance of energy and the environment.	0.15	4	0.60
S2	The school has a policy for school development and elevation as a prototype on energy and environment.	0.10	3	0.30
S3	Personnel is aware of and interested in energy conservation, waste management and converting waste into energy.	0.10	4	0.40
S4	The school has learning resources and activities related to energy and the environment.	0.10	3	0.30
S5	The school has a variety of alliances.	0.05	3	0.15
W1	Most personnel lack knowledge and expertise in energy and the environment.	0.15	1	0.15
W2	Lack of collaboration and participation from some teachers, personnel, and students.	0.10	1	0.10
W3	Some students are not aware of waste disposal	0.05	2	0.10
W4	Budgets from internal and external agencies are insufficient.	0.10	1	0.10
W5	Energy-related expenditure is high, e.g., electricity and water bills.	0.10	1	0.10
Total		1.00		2.30

Note. Weight is the importance level of each factor; the more weight it is, the more important it becomes. Rate is a score level of capabilities with 4 as a primary strength, 3 as a secondary strength, 2 as a secondary weakness, and 1 as a primary weakness.

developed toward energy and environmental excellence. The most important internal factor that needed improvement was raising the knowledge and expertise levels of its personnel on energy and environment (W1).

Table 2 shows the EFE analysis results of Maewinsamakkee School. The EFE total weight score of 2.60 out of 4 implied the school’s moderate tendency to develop towards energy and environmental excellence. The external factor that needed to be improved to prevent its negative effects was the implementation of state policies on energy and the environment, with school administrators setting the goals and putting the policies into practice (T1).

The total weighted scores from the IFE and EFE matrices were plotted on an IE matrix to analyse the strategic

position of Maewinsamakkee School. The IE Matrix analysis results indicated that the school was in column 5 (Figure 1), with the IFE and EFE weight scores at moderate levels of 2.30 and 2.60,

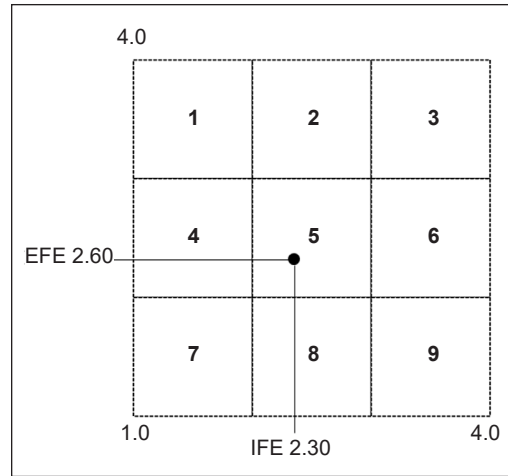


Figure 1. IE matrix of Maewinsamakkee school

Table 2
External Factor Evaluation matrix (EFE) of Maewinsamakkee school

No.	External factors	Weight	Rate	Score
O1	Receiving support from the sub-district administrative organisation and other agencies	0.15	3	0.45
O2	Receiving collaboration from the communities in segregating, relocating, and managing waste	0.15	3	0.45
O3	Neighbouring communities are empowered with quality human resources	0.20	4	0.80
O4	External specialists and speakers organise training and educate school personnel on energy and environment	0.15	3	0.45
T1	Overlap and confusion of the renewable energy policy implementations from many involved government agencies	0.15	1	0.15
T2	State agencies do not have sustainable methods for solving inappropriate waste disposal, resulting in waste segregation programs being unsuccessful.	0.10	1	0.10
T3	There is no suitable waste disposal area, obliging the waste to be relocated to distant areas.	0.05	2	0.10
T4	Certain types of waste segregated by the school cannot be sold.	0.05	2	0.10
Total		1.00		2.60

Note. Weight is the importance level of each factor; the more weight it is, the more important it becomes. Rate is a score level of capabilities with 4 as a primary opportunity, 3 as a secondary opportunity, 2 as a secondary threat, and 1 as a primary threat.

respectively. This phenomenon illustrated a holding and maintaining the situation. The strategies that should be applied are the improvement of the efficiency of the energy and environmental management system based on the marketing penetration strategy and the developing of environmental and energy instructional quality based on the product development strategy (Khajezadeh et al., 2019).

TOWS Matrix Analysis for Energy and Environmental Excellence

After the SWOT analysis, the TOWS analysis was applied to generate alternative strategies by brainstorming ideas from school administrators and teachers. Paring major factors to construct appropriate strategies by applying the TOWS matrix of the school yielded four types of alternative strategies that could be adopted for environment and energy excellence, including:

(1) Proactive strategy (SO), using strengths in conjunction with opportunities: creating a curriculum and promoting learning activities incorporating energy and environment. It is intended to enhance educational quality by incorporating multi-disciplinary sciences to enable students to apply their knowledge in their daily lives and future careers. The activities focus on promoting diverse energy innovation. Such innovative activities include drying with a solar dryer, smart farming, production of compost from food waste, production of biomass from agricultural residues, production of

biomass pellets, production of biogas for school consumption, production of roadblocks from recyclable plastic waste, and dust-free room preparation.

(2) Corrective strategy (WO), overcoming weaknesses with opportunities: Equipping human resources with expertise in energy and environment is to develop awareness and capability of teachers and educational personnel for implementing and applying energy innovation and technology to enhance the learning achievements of students.

(3). Preventive strategy (ST), using strengths to avoid threats: Developing green school learning resources will help to develop learning media and resources for learner-centred instructional management by installing energy innovations and demonstration systems within the green school. They may include a solar power generation system, a solar dryer, a solar water pumping system for smart farming, a learning centre about organic agriculture and composts, a biomass production system, a biogas production system, a learning centre for one-stop waste management, a DIY air filter, or a smart dust monitoring system.

(4) Defensive strategy (WT), reducing weaknesses and avoiding threats: Revising the energy management system will help reduce energy costs and increase income using renewable energy. It is a plan for the school's energy management with clear, practical

guidelines, indicators, and operation assessment by applying the ISO 50001 energy management systems standard to limit and reduce energy costs and increase sustainable energy production efficiency.

School Administrative Strategies for Energy and Environmental Excellence

The school context assessment using the TOWS matrix analysis led to the construction of strategic plans consisting of primary and secondary strategies and operation projects. The strategies and operation projects are shown in Figure 2. Six experts validated these strategic plans to verify the propriety and feasibility of the strategies in ensuring the accuracy of the information prior to their actual implementation in the school. The average scores for the primary strategies were high, with average scores of 4.42 and 4.38 out of 5.00, respectively. Average scores for the secondary strategies were also high for the propriety strategies (4.43) and feasibility strategies (4.29). Lastly, average scores for the operation projects, too, were at a high level at 4.29 for the propriety strategies and 4.25 for the feasibility strategies. However, when interpreting results regarding the sum scores of proprieties and feasibility for the primary strategies, it was found that SO and WO strategies were equally important for the experts, with a total score of 4.58. The ST and WT strategies were next important, with scores of 4.25 and 4.16, respectively. Thereafter, the AHP analysis was applied to select and rank a strategy for

the administrators of the Maewinsamakkee School to follow.

Analytic Hierarchy Process (AHP) Analysis for Strategy Selection

After the strategy verification by the experts, five school administrators were asked to select the most necessary and urgent strategy to drive the education management policies for promoting an environment-friendly quality of life. The AHP was applied as an analysis of complex decisions. The AHP model for decision-making in defining alternative strategies is shown in Figure 3.

Figure 3 illustrates the AHP Model for assisting the decision-making in specifying alternative strategies for the school. The CIPP model was applied as the selection criteria for implementation decisions. Context evaluation (C) is to consider the operation goals. Input evaluation (I) is to consider the operational budget. Process evaluation (P1) is to consider operational activities. Product evaluation (P2) is to consider operational achievements. After the pair-wise comparison was applied to prioritise the criteria, each pair of alternative strategies was analysed to prioritise the best choice among the four alternative strategies. These alternative strategies consisted of (1) SO strategy: creating a curriculum and promoting learning activities incorporating energy and environment, (2) WO strategy: equipping human resources with expertise in energy and environment, (3) ST strategy: developing green school learning resources, and (4) WT strategy: revising the energy management system to reduce energy costs

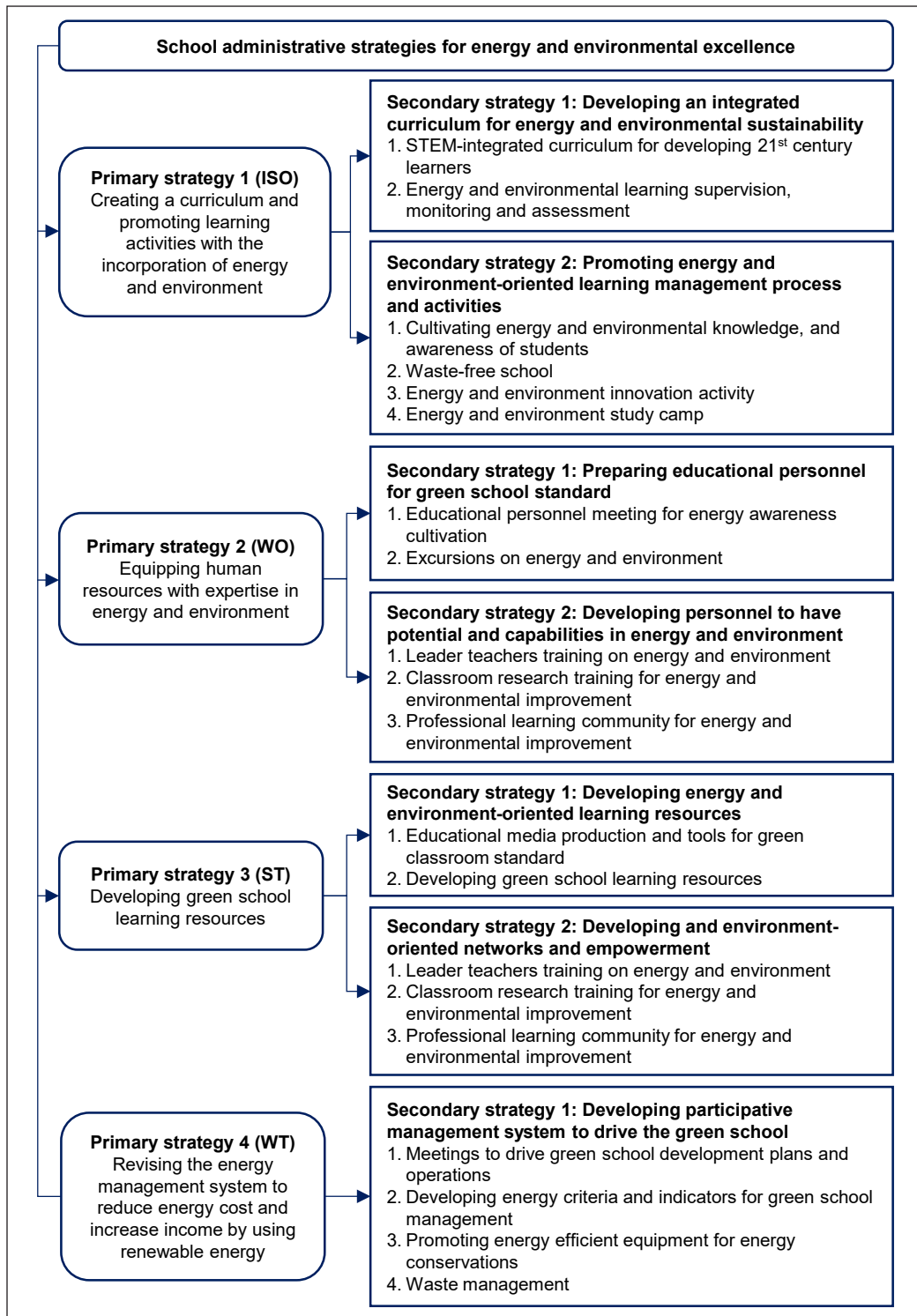


Figure 2. School administrative strategies for energy and environmental excellence

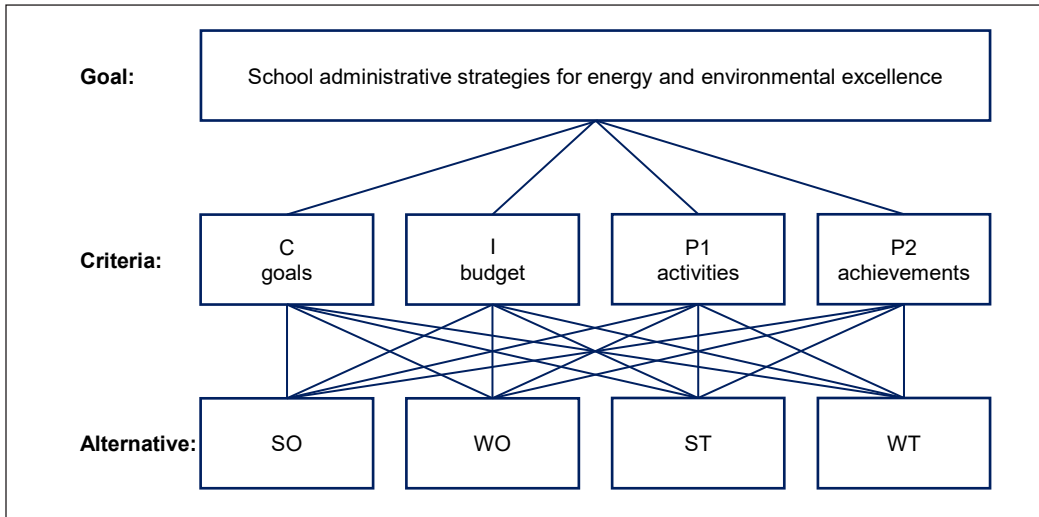


Figure 3. AHP model for decision-making in defining alternative strategies

and increase income by using renewable energy. The AHP analysis results are shown in Tables 3 and 4.

Table 3 shows the assessment results in the selection of alternative strategies by five school administrators. The data was derived from analysing the questionnaire and the matrix record to compare the paired criteria from each administrator. Thereafter, the consistency ratio (C.R.) was examined. The results illustrated that the C.R. value was less than 0.08, which was acceptable.

The finding from this research indicated that the decision on the criteria weights was logical and corresponding. The results from the administrators were then calculated for the Eigenvector mean.

The AHP analysis results to select the most suitable strategy for the school to achieve environmental and energy excellence showed that the importance weights of the strategy selection criteria were operational goals (C), achievements (P2), operation activities (P1), and

Table 3
Alternative strategy selection results

Criteria	Weight of importance					Total	Eigenvector mean	Priority
	1 st person	2 nd person	3 rd person	4 th person	5 th person			
C	0.4092	0.4658	0.4168	0.3487	0.4118	2.0523	0.4105	1
I	0.1104	0.2771	0.1209	0.1145	0.1080	0.7309	0.1462	4
P1	0.2150	0.1611	0.2695	0.2160	0.1872	1.0488	0.2098	3
P2	0.2654	0.0960	0.1928	0.3209	0.2930	1.1680	0.2336	2
C.R.	0.0534	0.0115	0.0264	0.0441	0.0263	-	-	-

Note. C.R. mean = 0.0323

operational budget (I), with the weights of 0.4105, 0.2336, 0.2098 and 0.1462 or with the percentages of 41.05, 23.36, 20.98 and 14.62, respectively. It could be concluded that Maewinsamakkee School focused on the operation goals the most to develop energy and environmental excellence.

Table 4 shows the five school administrators' priority results of the alternative strategies. When this priority was assessed, the alternative strategies with the highest weights of importance were ranked from high to low in the following order: the WO strategy, "equipping human resources to have expertise in energy and environment," the WT strategy, "revising the energy management system to reduce energy cost and increase income by using renewable energy," the SO strategy, "creating a curriculum and promoting learning activities with the incorporation of energy and environment," and the ST strategy, "developing green school learning resources." The total weights were 0.3091, 0.2649, 0.2470, and 0.1781, or 30.91, 26.49, 24.79, and 17.81, respectively. The results indicated that the school prioritised human resource development to strengthen its academic potential and to raise the quality

levels of learning management on energy and environment for students.

The WO alternative was a corrective strategy exploiting opportunities to propel the school towards energy and environmental excellence. The school received external support in organising training and educating personnel to raise their energy and environment expertise. This strategy comprised five projects, including convening meetings for school personnel to cultivate their understanding and awareness of energy, organising excursions on energy and environment, training leaders of teachers on energy and environment, conducting classroom research training to improve learning and teaching on energy and environment, and enhancing professional learning community on energy and environment. In addition, the analysis of the open-ended questions in the questionnaire for the school administrators revealed that the administrators desired school personnel to be trained and developed regularly to keep abreast with technological changes and to have potential in instructional management, emphasising the learning achievements of learners.

Table 4
Priority results of the alternative strategies

Alternative strategies	Criteria Weight				Total (I)	Priority
	C (0.4105)	I (0.1462)	P1 (0.2098)	P2 (0.2336)		
SO	0.2600	0.2257	0.2610	0.2287	0.2479	3
WO	0.3170	0.3099	0.3021	0.3011	0.3091	1
ST	0.1845	0.2040	0.1655	0.1622	0.1781	4
WT	0.2386	0.2604	0.2715	0.3080	0.2649	2

Leadership Practices for Sustainable Energy and Environmental Excellence

After the AHP strategy selection, school administrators were interviewed to ascertain leadership practices for achieving sustainable development in energy and the environment through education. As school administrators prioritise teachers as the most important factor influencing student achievement, the interviews revealed five keys to leadership success in human resource development. The first four keys for school leadership were following the CIPP model, while the other key involved effective followers. These key practices were:

- (1) **Goal-setting:** Setting goals for staff training in energy and environment is a crucial leadership practice that substantially impacts the quality of education and students' academic success. The goals need to be clear and attainable with guidance and direction from school leaders for successful implementation.
- (2) **Strategic budgeting:** Adequate budget and resources are essential for sustainable investments in staff training and professional development concerning energy and the environment. The budget needs to be prioritised according to areas requiring the most attention and appropriately spent to achieve the school's needs. For leaders with a restricted budget, plans for sustainable cost optimisation are needed.
- (3) **Activity planning:** Professional development activities must be set up

to align with the school's objectives and budgets in improving energy and environmental skills and staff members' knowledge. The training activities must also be relevant to the needs of staff members; therefore, it is important to ensure that staff is involved in the training design process.

(4) **Achievement striving:** School leaders who strive to achieve their goals can lead a team towards attaining sustainability and excellence in energy and environment. Striving for goal achievement requires practical leadership skills to plan, manage, monitor, and evaluate the effectiveness of staff training activities and their impact on student learning outcomes.

(5) **Collaborative building:** Collaborative work environments would assist in increasing the productivity and efficiency of the organisation. Collaboration must be encouraged by the school leaders to provide staff members with a sense of community and encourage them to participate in teams for high-performance results actively.

School administrators reported an important requisite of leadership and followership for the success of policy implementation. The interviews indicated the importance of school leaders as the main factor in ensuring achievement. However, the leaders alone cannot accomplish the mission without the contribution of effective subordinate staff. Therefore, school leaders must inspire staff commitment to fulfil the

goals, achieve high-performance results, and improve student outcomes.

DISCUSSION

Education plays a key role in creating a productive workforce for an advanced industrial society. It also enhances public awareness and concerns for energy and the environment due to economic growth and technological innovation (Kioupi & Voulvoulis, 2019). Wittayasin (2017) found that an important requirement for Thailand to achieve economic success and sustainable development outcomes is to equip people with knowledge and skills to thrive in the future through education. Improvement in the quality of education will transform society and empower people to strive together for a sustainable future (Shulla et al., 2020).

The importance of energy and environmental education for sustainable development has been recognised globally. Many past studies have suggested integrating the topics of renewable energy and the environment into the classrooms at all levels to equip students with knowledge and skills to address the 21st century's environmental challenges (Kandpal & Broman, 2014). Additionally, as indicated by Mahat et al. (2020) and Zsóka et al. (2013), environmental education and education for sustainability significantly influence students' environmental awareness, knowledge, attitude, and action. This research supports the arguments of past studies by promoting the green school concept to drive the achievement of SDGs

and sustainably enhance the quality of life. In the face of global competition, schools must equip their students with 21st-century skills and build students' knowledge to address environmental issues and adopt a life in harmony with nature (Wojuola & Alant, 2019).

Education policies should be adopted about the needs of society. The challenges for schools, therefore, concern their ability to embed national policies into school policy development and practices (Wangmo, 2018). This study developed energy and environmental excellence strategies and leadership practices for Maewinsamakkee School to contribute to global action. The results indicated four primary strategies for Maewinsamakkee School, including (1) SO: Creating a curriculum and promoting learning activities incorporating energy and environment, (2) WO: Equipping human resources with expertise in energy and environment, (3) ST: Developing green school learning resources, and (4) WT: Revising the energy management system to reduce energy cost and increase income by using renewable energy. An AHP was then applied to select strategic options for Maewinsamakkee School. AHP has been used extensively by many decision-makers and researchers to make complex decisions (Russo & Camanho, 2015). As Barcelona (2020) suggested using AHP to ensure the research quality in education, this research also advocated using AHP as a suitable method to apply in the decision-making process for educational administration. For any school to be successful, executive

decisions require an effective decision-making process to improve educational practices to meet the needs of and be consistent with the school contexts (Ayeni, 2018).

Concerning AHP priorities, the criteria applied in this study for the AHP to evaluate alternative strategies were the CIPP evaluation model as C (goals), I (budget), P1 (activities), and P2 (achievement). The decision-making process was conducted by comparing the four mentioned alternative strategies among SO, WO, ST, and WT, following the pre-defined criteria of the CIPP evaluation model proposed by Stufflebeam. This model is considered one of the most effective models for evaluating programs, projects, products, institutions and systems (Mohebbi et al., 2011). Over the years, the model has been adapted and employed in various fields at the end of the project, at the beginning and during the implementation process (Aziz et al., 2018; Sopha & Nanni, 2019). Of these four alternative strategies, it was concluded that equipping human resources with expertise in energy and the environment was the most important. Increasing teacher effectiveness through training and development would improve teacher capacity and student outcomes. This finding is consistent with that of Alton-Lee (2011), Ghazzoul (2018), and Huang et al. (2019), emphasising the importance of teacher professional development to enhance student achievement. Liu et al. (2015) and Camasso and Jagannathan (2018) also confirmed the importance of teachers in providing quality environmental education.

As a result, teachers need to update their professional skills and knowledge in environmental education pedagogy to raise the quality of teaching and learning to achieve SDGs (Murphy et al., 2021).

Incorporating national and international policies into school policy formulation transforms the connection from the abstract to the concrete. School leaders are crucial to implementing policy, as they control the school's direction and lead and manage school members to achieve the set goals (Day et al., 2016; Klar & Brewer, 2013; Mingaine, 2013; Mthethwa, 2012; Syomwene, 2013). Five key successes for school leaders to operate following the SDGs policies were found in this study for effective management. These keys include goal setting, strategic budgeting, activity planning, achievement striving, and collaborative building. The discovered keys to leadership success are related to the CIPP components, as they can be conducted for continuous improvement and successful goal attainment (Bukit et al., 2019). The first task of school leaders is to set clear goals and provide direction for achieving goals. The finding of this study is consistent with the suggestions made by Kiprop and Kanyiri (2012) and Van Wyk and Moeng (2014) that the school's goals must be clear, measurable, and possible to implement. Additionally, the budget is essential for the implementation of the SDGs. This finding agrees with Willy and Osadi (2019), which indicates a strong correlation between the implementation of the school budget and the efficient development of education.

Consequently, a sufficient budget should be allocated, prioritised, and spent properly for optimum results. Akpan (2016), the author indicated the need for school leaders to plan and facilitate activities to improve the quality of the teaching and learning process. The viewpoint of Akpan (2016) aligns with the result of this study that school leaders must plan activities following the school's objectives and budget to improve the quality of education.

Another finding of this study demonstrates the need for school leaders to strive for excellence to achieve the SDGs. Striving for excellence requires school leaders to plan, manage, monitor, and evaluate their performances to ensure their goals and objectives are achieved. This finding is supported by the work of Mthethwa (2012) and Syomwene (2013), that school leaders need to supervise, monitor, and evaluate their actions to obtain effective results. This management process would enable school leaders to understand the problems better and adjust the methods used to achieve progress in the right direction. Finally, the result of this study also reveals the importance of school leaders in promoting team collaboration. As reported by previous researchers, staff members need to have a shared vision and a sense of ownership and participate actively in policy implementation, monitoring, and evaluation to achieve the desired results (Ansell et al., 2017; Bridwell-Mitchell & Sherer, 2017; Moosa et al., 2020). Suppose the school encourages staff members to share a vision and perform as per previous

study recommendations. In that case, the school could succeed in the implementation of policy on education for sustainable development.

CONCLUSION

The SDGs are a global vision to address the challenges of achieving a better and more sustainable future. Most goals in the 2030 agenda for sustainable development require education to equip people with the knowledge and skills needed to survive and thrive. As people around the world adhere to the sustainable development agenda for the provision of education, sustainable strategies and leadership practices were developed and explained to balance the continual growth of society among human, social, economic, and environmental needs. Other schools seeking development according to the SDGs could also adopt the results found in this research in practice. However, they should apply appropriate strategies and most beneficial practices according to the school contexts, situations, and environment conducive to student development.

A significant aspect highlighted in this research is the need to raise teacher quality through human resource development to accomplish sustainable development. In many countries, most teachers are poorly prepared to teach topics related to the integration of energy and the environment for sustainability. Therefore, continuing professional development related to energy and the environment should be promoted to update the knowledge and skills of the school members. In doing so, school leaders

have a key role to play in the success of the human resource development of teachers. School leaders are responsible for setting clear goals, allocating budget, planning activities, and evaluating teacher training and development results in energy and environment. They also need to foster staff collaboration for active professional learning communities (PLCs) to enhance their teaching practice and improve student outcomes. Achieving SDGs requires effective leadership to design strategic plans and implement activities for successful implementation.

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