

An Exploratory Factor Analysis (EFA) on Components and Indicators of Area-based Social Innovation for Small-sized Secondary Schools in Thailand

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Abstract

This study was designed to investigate the components and indicators of area-based social innovation for small-sized secondary schools in Thailand. A total of 400 school administrators and teachers from 200 small-sized secondary schools at northeastern region of Thailand participated in this study as respondents. The researchers employed a survey design using a questionnaire as a research instrument. They conceptualized social innovation for small-sized school's components and indicators by analyzing documents and past studies to develop a social innovation model using exploratory factor analysis. The findings showed that a total of seven components and 14 indicators were identified from the measurement model. The seven components and 14 indicators were (i) community engagement and participation with two indicators namely stakeholder involvement and community needs assessment; (ii) inclusive and equitable education with two indicators, namely access and inclusion and support systems; (iii) collaborative partnerships with two indicators, namely local collaborations and inter-school networks; (iv) curriculum and pedagogical innovation with two indicators, namely relevant curriculum and innovative teaching methods; (v) capacity building and professional development with two indicators, namely teacher training and leadership development; (vi) sustainable practices with two indicators, namely environmental education and resource management, and (vii) monitoring and evaluation with two indicators, namely impact assessment and feedback mechanisms.

Keywords: Area-Based Social Innovation, Component, Exploratory Factor Analysis, Indicators.

INTRODUCTION

Social innovation is a topic that has rapidly gained visibility during the last decades where public organizations, private companies, and community groups are interested in developing more efficient and effective solutions to important societal challenges, such as poverty, demographic change, climate change, and unemployment (Ferreira et al., 2022). Kamnongphai and Chusorn (2016) defined social innovation as an innovative paradigm of socially transformative process in some new small-sized schools constructed by invention and development based on moral and ethics in order to solve problems, meet the needs of society, support social participation, and effectively transform society into better way.

Area-based innovation for small-sized secondary schools in Thailand involves tailored strategies and practices that cater to the specific needs and contexts of these schools (Kamnongphai & Chusorn 2016). According to Lu (2024), community engagement and participation is one of the key components to foster social innovation in small-sized schools. Some indicators that are derived from this component such as building strong relationship leverage local resources, and active participation. Therefore, school administrators need to establish trust between the school and community that can lead to effective collaboration. This involves regular communication, transparency and mutual respect. Besides, school administrators should encourage parents and community members to participate in school activities and decision-making processes that can lead to innovative solutions tailored to the community's needs.

The essential component of the social innovation model is inclusive and equitable education. Inclusive and equitable education refers to a comprehensive approach to education that ensures all students, regardless of their background, abilities, or circumstances, have access to quality education and the opportunity to succeed. It is grounded in the principles of fairness, justice, and respect for diversity (Toonchaiyaphum, 2019). Lu (2024)

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indicated that there are three indicators of inclusive and equitable education such as accessibility, diverse learning needs, and inclusive curriculum. Therefore, school administrators from small-sized schools must ensure physical, economic, and digital access to education for all students including those with disabilities, from marginalized communities, or in remote areas. On the other hand, underprivileged students in small-sized schools have diverse learning needs. As a result, teachers in small-sized schools should cater to different learning styles and needs of students through differentiated instruction, individualized education plans (IEPs) and various teaching methods (Toonchaiyaphum, 2019). Following this line of reasoning, developing a curriculum that reflects the diverse cultures, languages, experiences of all students, promoting a sense of belonging and relevance.

The other component of social innovation in secondary small-sized schools is collaborative partnerships. Collaborative partnerships are crucial for enhancing educational outcomes, resource sharing, and community development. According to Žičkienė and Tamasauskiene (2021), school administrators should foster partnerships between small-sized secondary schools to share resources, best practices, and extracurricular activities. This can include joint teacher training programs shared libraries, and collaborative student projects. According to Lathapipat and Sondergaard (2016), small-sized schools in Thailand are facing challenges for quality education. The 2012 Programme for International Student Assessment (PISA) revealed that almost one third of Thai 15-year-old students were lacking critical skills needed for employment tasks that require reading skills beyond a basic level (Lathapipat & Sondergaard, 2016). Lathapipat and Sondergaard (2016) concluded that those disadvantaged and poorer performing students are concentrated in small rural village schools in Thailand. Thai small-sized secondary schools are severely hindered by inadequate learning materials and physical infrastructure which limits their capacity to provide quality instruction (Lathapipat & Sondergaard, 2016). Consequently, the researchers intended to find out components and their indicators of area-based social innovation model using Exploratory Factor Analysis (EFA).

MATERIALS AND METHODS

Research Design

A survey research design was employed by researchers as a valuable tool, particularly in the field of education because this research design has several strengths and key advantages. First of all, surveys could be distributed to a large and geographically dispersed population allowing the researchers to collect data from a diverse sample, so-called wide reach to all secondary small-sized schools. Compared to other data collection methods, surveys are relatively cheap, especially when conducted online. Furthermore, surveys can be administered quickly, and responses can be gathered in a short amount of time, making it an efficient method for data collection (Gay et al., 2011).

The rationale to select surveys as a method of data collection because surveys can ensure that each respondent receives the same set of questionnaires, which assists the researchers in maintaining consistency and comparability of data. The researchers used structured questions with predefined response options, which makes it easier to quantify and analyze the data using statistical methods (Gay et al., 2011).

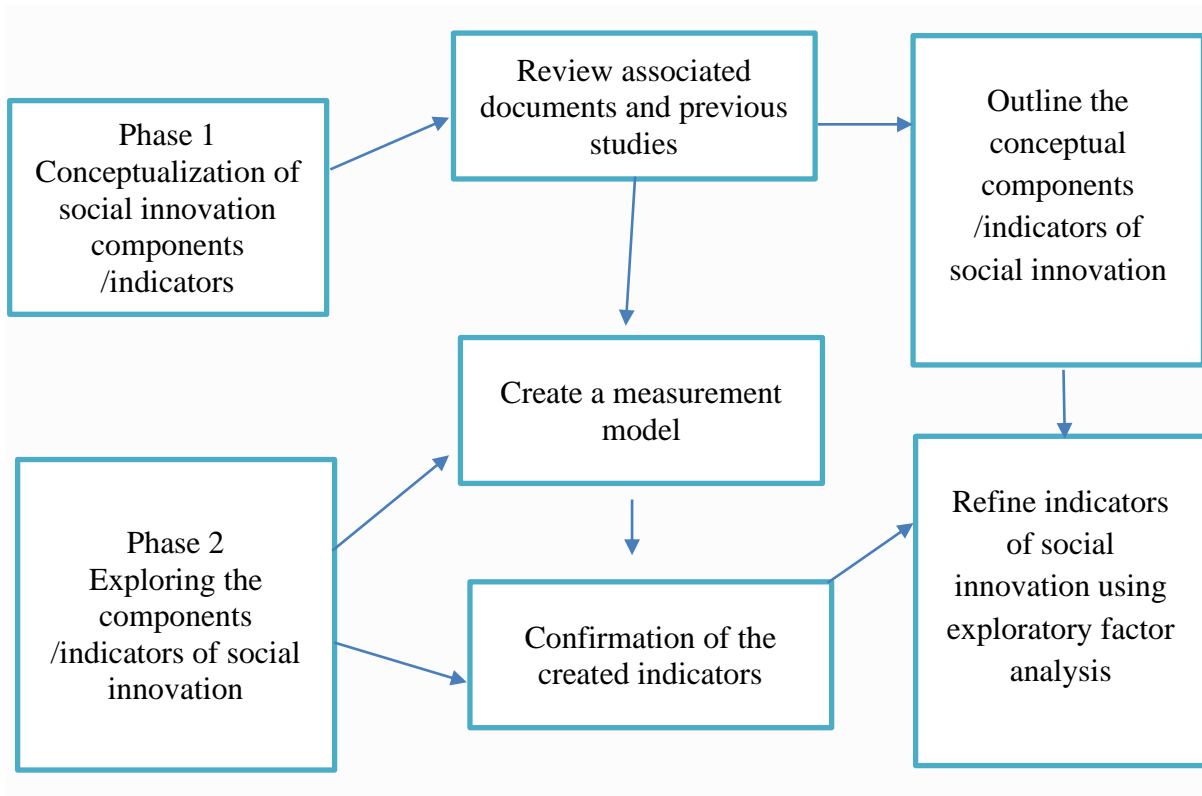


Figure 1. Research Framework

Population and Samples

The population of this study was school administrators and teachers from a total of 540 secondary small-sized schools in northeastern region of Thailand. A multi-stage sampling was conducted to divide the population into clusters and then taking a random sample of these clusters. Within each selected cluster, a further stratified random sample was taken, and this process could be repeated across multiple stages. This approach was useful for this study because a population is too large and dispersed to conduct simple random sampling effectively (Gay et al., 2011).

The researchers employed multi-stage sampling because this sampling method offers several advantages where it is challenging to create an exhaustive list of the population or where direct access to the entire population is not feasible. By using multiple stages to select samples, researchers can improve the representativeness of the sample. Each stage allows for a more refined selection process, potentially leading to a sample that better reflects the overall population. Moreover, this sampling method can increase the accuracy of the sample by reducing the potential for sampling errors at each stage. By carefully selecting sub-groups, namely school administrators and teachers, researchers can control various factors that might introduce bias (Cochran, 1977). A total of 400 respondents consisting of 200 school administrators and 200 teachers. from 200 small-sized secondary schools as required sample size. Table 1 demonstrates the distribution of population and sample groups of this study.

Table 1: Distribution of Population and Sample Groups

Province	Population of schools	Samples of schools	Population		Samples		Total
			Adminis-trator	Teacher	Adminis-trator	Teacher	
Kalasin	38	14	38	732	14	14	28
Khon Kaen	54	20	54	1043	20	20	40
Chaiyaphum	16	6	16	354	6	6	12

Nakhon Phanom	34	13	34	658	13	13	26
Nakhon Ratchasima	18	6	18	366	6	6	12
Bueng Kan	16	6	16	319	6	6	12
Buriram	32	12	32	712	12	12	24
Mukdahan	20	7	20	339	7	7	14
Maha-sarakham	22	8	22	459	8	8	16
Roi Et	38	14	38	834	14	14	28
Loei	29	11	29	589	11	11	22
Sisaket	52	19	52	1142	19	19	38
Sakon Nakhon	18	7	18	408	7	7	14
Surin	58	22	58	1202	22	22	44
Nong Khai	20	7	20	383	7	7	14
Udon Thani	39	15	39	771	15	15	30
Ubon Ratchathani	36	13	36	797	13	13	26
Total	540	200	540	11106	200	200	400

Research Instrument

Online questionnaires were used by the researchers as a research instrument as it has become increasingly popular due to advancements in technology and the widespread availability of the internet. Data collection and processing are faster since responses are recorded and stored electronically in real-time. Online surveys are more environmentally friendly as they reduce the need for paper and physical materials. The strength of using online questionnaires is participants can complete the questionnaire at their convenience, which can lead to higher response rates. Responses are automatically entered into a database, reducing the risk of data entry errors and speeding up the analysis process.

To maximize the effectiveness of online questionnaires, the researchers make sure that all the 31 questions in the online questionnaires are easy to understand and free of jargon to minimize misinterpretation, so-called clear and concise questions. The researchers used google forms as a platform available for creating and distributing online questionnaires. Google forms is a free and easy-to-use option that integrates well with other Google services.

This online survey questionnaire consisting of 31 closed questions as a method to collect quantitative data. The closed question structure was employed by limiting responses that fit into pre-determined sets of components and indicators of social innovation. A continuous five-point Likert scale was used to evaluate the strength of perception. This questionnaire was comprised of eight sections and intended to collect information pertaining to respondents' perceptions of social innovation. Section A collects respondents' demographic backgrounds, namely gender, age, working experience, highest academic degree, and position. Section B to H was specifically designed to gauge data about social innovation (27 items) consisted of seven components, namely (i) community engagement and participation with two indicators namely stakeholder involvement and community needs assessment: (i) community engagement and participation (5 items) with two indicators namely stakeholder involvement (3 items) and community needs assessment (2 items); (ii) inclusive and equitable education (2 items) with two indicators, namely access and inclusion (1 item) and support systems (1 item); (iii) collaborative partnerships (6 items) with two indicators, namely local collaborations (3 items) and inter-school networks (3 items); (iv) curriculum and pedagogical innovation (5 items) with two indicators, namely relevant curriculum (3 items) and innovative teaching methods (2 items); (v) capacity building and professional development (2 items), namely teacher training (1 item) and leadership development (1 item); (vi) sustainable practices (3 items) with two indicators, namely environmental education (1 item) and resource management (1 item), and (vii) monitoring and evaluation (5 items) with two indicators, namely impact assessment (2 items) and feedback mechanisms (3 items), making a total of 27 items. Overall, online questionnaires are a powerful research instrument that, when used appropriately, can yield high-quality data efficiently and effectively

Data Analysis

Element weight value in the context of EFA was used by researchers to measure the factor loading of the variables on the extracted factors. Therefore, factor loadings of EFA in this study represent the correlation coefficients between the variables and the factors. These values indicate how much of variance in a variable is explained by a factor and are crucial for interpreting the results of EFA. In short, factor loadings are coefficients

that represent the relationship between the observed variables and the underlying latent factors. They can be seen as the “weights” of the variables on the factors (Gay et al., 2011).

The range of factor loadings are from -1 to 1. Loadings closer to -1 or 1 indicate a strong relationship between the variable and the factor while loadings near 0 indicate a weak relationship. So, a high absolute value (typically greater than 0.4) is interpreted that the variable strongly relates to the factor. On the other hand, a low absolute value (typically less than 0.4) is interpreted that the variable weakly relates to the factor. If a variable has high loadings on multiple factors, it may indicate that the variable is complex or not uniquely associated with a single factor, so-called cross loadings (Hair et al., 2013).

FINDINGS AND DISCUSSION

The aim of this study was to identify components and indicators of area-based social innovation of area-based social innovation model for small-sized secondary schools in northeastern region of Thailand using EFA. The findings showed that there are seven essential components and 14 indicators based on the conceptualization of area-based social innovation model for small-sized secondary school administrators. Then, the researchers continued to evaluate the validity of the observable variables using EFA.

Demographic Data of Respondents

A total of 400 distributed questionnaires were successfully collected from 200 small-sized secondary schools in northeastern region of Thailand, giving a response rate of 100 percent. The majority of respondents are females (50.75%). Most of the respondents’ age ranged between 31 to 40 years old (38.25%). This was followed by respondents with their age between 41 to 50 years old (28.25%). Only 18.75 percent and 14.75 percent of the respondents are more than 50 years old and less than 30 years old respectively. So, the majority of the respondents are middle age. The demographic data showed that researchers obtained a comprehensive and representative sample in terms of their work experience as a good practice when conducting surveys to gather quantitative data. An equal distribution of respondents in terms of their work experience such as 82 (20.50%) of respondents’ work experience was less than five years; 73 (18.25%) of respondents’ work experience was between six to 10 years; 78 (19.50%) of respondents’ work experience was between 11 to 15 years, and 66 (16.50%) of respondents’ work experience was between 16 to 20 years. However, most of the respondents have more than 20 years’ work experience (101, 25.25%). Owing to researchers decided to select one school administrator and one teacher from each school, therefore the total number of school administrators and teachers are the same, that is 200 samples from each sample group. Finally, a total of 236 (59.00%) respondents obtained a master’s degree, followed by 139 (34.75%) respondents who possessed a bachelor’s degree. Only 25 (6.25%) of respondents were awarded a doctoral degree. This demographic data of respondents assists the researchers to capture diverse perspectives and insights across different demographic groups. Table 2 demonstrates the demographic data of respondents.

Table 2: Profile of Respondents

Background	Frequency (N= 400)	Percentage (%)
Gender:		
-Male	197	49.25
-Female	203	50.75
Total	400	100
Age		
-<30 years old	59	14.75
-31 to 40 years old	153	38.25
-41 to 50 years old	113	28.25
->50 years old	75	18.75
Total	400	100
Work experience		
-<5 years	82	20.50
-6 to 10 years	73	18.25
-11 to 15 years	78	19.50
-16 to 20 years	66	16.50
->20 years	101	25.25
Total	400	100

Position		
-School administrators	200	50.00
-Teachers	200	50.00
Total	400	100
Academic qualification		
-Bachelor's degree	139	34.75
-Master's degree	236	59.00
-Doctoral degree	25	6.25
	400	100

Identification of Components and Indicators for Area-based Social Innovation Model

The findings from documental examination of previous studies, theories, and concepts revealed that there are seven essential components and 14 indicators of area-based social innovation model: (i) community engagement and participation with two indicators namely stakeholder involvement and community needs assessment; (ii) inclusive and equitable education with two indicators, namely access and inclusion and support systems; (iii) collaborative partnerships with two indicators, namely local collaborations and inter-school networks; (iv) curriculum and pedagogical innovation with two indicators, namely relevant curriculum and innovative teaching methods; (v) capacity building and professional development with two indicators, namely teacher training and leadership development; (vi) sustainable practices with two indicators, namely environmental education and resource management, and (vii) monitoring and evaluation with two indicators, namely impact assessment and feedback mechanisms. The findings of the components, indicators, and behavioral elements are displayed in Table 3 below.

Table 3: Identification of Components, Indicators, and their Behavioral Elements of Area-based Innovation for Small-sized Schools

Components	Indicators	Behavioral Elements
Community engagement and participation (CEP)	Stakeholder involvement (CEP1)	Actively involving community members such as parents in the planning and implementation of school initiatives. (CEP1.1)
		Actively involving community members such as local businesses in the planning and implementation of school initiatives. (CEP1.2)
		Actively involving community members such as NGO in the planning and implementation of school initiatives. (CEP1.3)
	Community needs assessment (CEP2)	Conducting assessments to identify the specific social needs of the community. (CEP2.1)
Conducting assessments to identify the specific social challenges of the community. (CEP2.2)		
Inclusive and equitable education (IEE)	Access and inclusion (IEE1)	Ensuring that all students regardless of their socio-economic background have access to quality education. (IEE1.1)
	Support systems (IEE2)	Providing support services for marginalized and vulnerable groups, including students with special needs. (IEE2.1)
Collaborative partnerships (CP)	Local collaborations (CP1)	Building partnerships with local organizations to support school programs and initiatives. (CP1.1)
		Building partnerships with local businesses to support school programs and initiatives. (CP1.2)
		Building partnerships with government agencies to support school programs and initiatives. (CP1.3)
	Inter-school networks (CP2)	Establishing networks with other schools to share resources. (CP2.1)
		Establishing networks with other schools to share knowledge. (CP2.2)
		Establishing networks with other schools to share best practices. (CP2.3)
Curriculum and pedagogical innovation (CPI)	Relevant curriculum (CPI1)	Integrating local culture into the curriculum. (CPI1.1)
		Integrating history into the curriculum. (CPI1.2)
		Integrating social issues into the curriculum. (CPI1.3)
	Innovative teaching methods (CPI2)	Employing diverse and inclusive teaching methods such as project-based learning. (CPI2.1)
Employing diverse and inclusive teaching methods such as service learning. (CPI2.2)		

Capacity building and professional development (CBPD)	Teacher training (CBPD1)	Providing ongoing professional development for teachers to equip them with innovative teaching strategies (CBPD1.1)
	Leadership development (CBPD2)	Developing leadership skills among school staff and students to drive social innovation. (CEPD2.1)
Sustainable practices (SP)	Environmental education (SP1)	Promoting sustainability and environmental awareness through curriculum. (SP1.1)
		Promoting sustainability and environmental awareness through school activities. (SP1.2)
	Resource management (SP2)	Implementing effective use of resources and promoting recycling and conservation within the school (SP2.1)
Monitoring and evaluation (ME)	Impact assessment (ME1)	Regularly evaluating the effectiveness of social innovation initiatives. (ME1.1)
		Regularly evaluating the impacts of social innovation initiatives on the community. (ME1.2)
	Feedback mechanisms (ME2)	Establishing channels for continuous feedback from students (ME2.1)
		Establishing channels for continuous feedback from parents (ME2.2)
Establishing channels for continuous feedback from community members (ME2.3)		

Interpretation of Practical Level of Each Component and Its Indicators of Social Innovation for School Administrators of Small-sized Secondary Schools

The researchers interpreted the mean score for understanding the central tendency of a dataset for each component of social innovation was assessed according to Boomchom’s (2014) identification as shown in Table 4.

Table 4: Interpretation of Practical Level of Each Component and Its Indicators of Social Innovation for Administrators of Small-sized Schools

Interval of Mean Value	Interpretation
4.51 to 5.00	Highest
3.51 to 4.50	High
2.51 to 3.50	Moderate
1.51 to 2.50	Low
1.00 to 1.50	Lowest

The findings of the practical level for each component to promote area-based social innovation for secondary small sized schools indicated that support systems (IEE2) indicator (mean score = 3.55, *SD*= 0.50) was the most important indicator of area-based social innovation model. This was followed by resource management (SP2) indicator (mean score = 3.54, *SD* = 0.52), environmental education (SP1) indicator (mean score = 3.49, *SD* = 0.73), impact assessment (ME1) indicator as well as Local collaborations (CP1) indicators, feedback mechanisms (ME2) indicator (mean score = 3.44, *SD* = 0.42), innovative teaching methods (CPI2) indicator (mean score = 3.42, *SD* = 0.60), inter-school networks (CP2) indicator (mean score = 3.41, *SD* = 0.68), teacher training (CBPD1) indicator (mean score = 3.40, *SD* = 0.59), relevant curriculum (CPI1) indicator (mean score = 3.35, *SD* = 0.54), leadership development (CBPD2) indicator (mean score = 3.33, *SD* = 0.70), community needs assessment (CEP2) indicator (mean score = 3.32, *SD* = 0.50), and stakeholder involvement (CEP1) indicator (mean score = 3.31, *SD* = 0.64). However, the least important indicator was found as access and inclusion (IEE1) (mean score = 3.30, *SD* = 0.55). Table 5 depicts the details of each indicator of area-based social innovation ranking in order from the most important to the least important indicator. Moreover, findings also showed that there were 14 indicators which derived from the seven essential components with regards to fit the Thai context, as illustrated in Table 5.

Table 5: The Results of Mean Scores (\bar{x}) and Standard Deviation (SD) for Essential Components and Indicators of Social Innovation Practices in Small-sized Schools

Variables (Component/indicator)	Practical Level			Ranking
	\bar{x}	SD	Inter-pret	
Community engagement and participation (CEP)				
Stakeholder involvement (CEP1)	3.31	0.64	Moderate	13
Community needs assessment (CEP2)	3.32	0.50	Moderate	12
Inclusive and equitable education (IEE)				
Access and inclusion (IEE1)	3.30	0.55	Moderate	14
Support systems (IEE2)	3.55	0.50	High	1
11 Collaborative partnerships (CP)				
Local collaborations (CP1)	3.46	0.62	Moderate	4
Inter-school networks (CP2)	3.41	0.68	Moderate	8
Curriculum and pedagogical innovation (CPI)				
Relevant curriculum (CPI1)	3.35	0.54	Moderate	10
Innovative teaching methods (CPI2)	3.42	0.60	Moderate	7
Capacity building and professional development (CBPD)				
Teacher training (CBPD1)	3.40	0.59	Moderate	9
Leadership development (CBPD2)	3.33	0.70	Moderate	11
Sustainable practices (SP)				
Environmental education (SP1)	3.49	0.73	Moderate	3
Resource management (SP2)	3.54	0.52	High	2
Monitoring and evaluation (ME)				
Impact assessment (ME1)	3.46	0.62	Moderate	4
Feedback mechanisms (ME2)	3.44	0.42	Moderate	6
Total	3.39	0.58	Mode-rate	

The Findings of EFA to Identify Underlying Relationships Between Measured Variables

An EFA was employed as a statistical technique to identify underlying relationships between measured variables. This finding helps in understanding the structure of data by grouping correlated variables into factors. After the researchers conducted an EFA and extracted five factors. The factor loadings as indicated in Table 6, can be interpreted as follows:

Factor 1: A total of five variables, namely Component 2, support systems indicator (IEE2) [$\beta = 0.867$], Component 3, inter-school networks indicator (CP2) [$\beta = 0.823$], Component 6, environmental education indicator (SP1) [$\beta = 0.620$], Component 4, relevant curriculum indicator (CPI1) [$\beta = 0.587$], and Component 5, teacher training indicator (CBPD1) [$\beta = 0.576$], in descending order. The EFA result indicated that these five variables have high loadings, and they are strongly associated with Factor 1.

Factor 2: A total of three variables, namely Component 3, local collaborations indicator (CP1) [$\beta = 0.930$], Component 4, innovative teaching methods indicator (CPI2) [$\beta = 0.905$], and Component 6, resource management indicator (SP2) [$\beta = 0.668$], in descending order. The EFA result indicated that these three variables have high loadings, and they are strongly associated with Factor 2.

Factor 3: A total of three variables, namely Component 7, feedback mechanisms indicator (ME2) [$\beta = 0.867$], Component 1, community needs assessment indicator (CEP2) [$\beta = 0.859$], and Component 2, access and inclusion indicator (IEE1) [$\beta = 0.631$], in descending order. The EFA result indicated that these three variables have high loadings, and they are strongly associated with Factor 3.

Factor 4: There is only one variable, namely Component 7, impact assessment indicator (ME1) [$\beta = 0.923$]. The EFA result indicated that only one variable has high loading and is strongly associated with Factor 4.

Factor 5: There are two variables that have high loadings, namely Component 1, Stakeholder involvement indicator (CEP1) [$\beta = 0.856$] and Component 5, leadership development (CBPD2) [$\beta = 0.667$]. Therefore, the EFA result showed that they are strongly associated with Factor 5.

By interpreting the factor loadings, the researchers could understand the underlying structure of the data and how the variables group together into factors. Table 6 demonstrates the findings of EFA for essential indicators of area-based social innovation for secondary small-sized schools in northeastern region of Thailand.

Table 6: The Results of EFA for Essential Indicators of Area-based Social Innovation for Small-sized Schools

Component	Indicator	Element Weight Value				
		1	2	3	4	5
Community engagement and participation	Stakeholder involvement (CEP1)					0.856
	Community needs assessment (CEP2)			0.859		
Inclusive and equitable education (IEE)	Access and inclusion (IEE1)			0.631		
	Support systems (IEE2)	0.867				
Collaborative partnerships (CP)	Local collaborations (CP1)		0.930			
	Inter-school networks (CP2)	0.823				
Curriculum and pedagogical innovation (CPI)	Relevant curriculum (CPI1)	0.587				
	Innovative teaching methods (CPI2)		0.905			
Capacity building and professional development (CBPD)	Teacher training (CBPD1)	0.576				
	Leadership development (CBPD2)					0.667
Sustainable practices (SP)	Environmental education (SP1)	0.620				
	Resource management (SP2)		0.668			
Monitoring and evaluation (ME)	Impact assessment (ME1)				0.923	
	Feedback mechanisms (ME2)			0.867		

CONCLUSION

The EFA used to examine the components and indicators of area-based social innovation for small-sized secondary schools in Thailand has provided valuable insights into the essential components required for successful social innovation. In conclusion, small sized secondary school administrators can enhance their educational practices and outcomes by focusing on community engagement, collaborative partnerships, resource utilization, and cultural relevance. The identified indicators serve as practical tools for assessing and guiding social innovation initiatives, ultimately contributing to the overall improvement of education in small-sized secondary schools in Thailand.

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