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Development of Early Childhood Education Management Model Based on National Education Standards and Management Information System (MPAUD-SNSI)

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Abstract

The low quality of early childhood education management in Indonesia can be seen from the results of accreditation that refer to national education standards. This study offers a solution that is to streamline management through the application of a management model based on national standards for early childhood education, which is integrated with a management information system. This article describes the process of formulating and testing a model called MPAUD-SNSI. The tests conducted at 45 schools in Bengkulu Province showed that the model and application of the management information system produced in this study were valid and reliable. The spider diagram simulation feature in the application can conduct a self-evaluation before applying for accreditation. This evaluation helps schools to improve the quality of management sustainably. The empirical test results show that if the indicators in the PAUD-SNSI model are applied in schools, the level of effectiveness of school management can reach the very effective criteria.

Keywords: *Early Childhood Education; Education Management; National Education Standards; Management Information Systems*

Introduction

The number of early childhood education (ECE) schools in Indonesia over the last ten years has shown a significant increase as an implication of increasing public awareness about the importance of early childhood education. The implementation of good education requires good management according to a predetermined standard, such as educational goals, government policies, or healthy organizational values (Sasongko & Sahono, 2016). Management of education is related to being integrated consistently in all aspects of management in educational organizations. Latif and Latief (2018) state that education management is needed to balance goals, objectives, and activities to be achieved by parties interested in educational goals within the organization. Therefore, ECE as an educational service needs to be well organized and managed to achieve its goal of helping children grow and develop.

According to Freeman et al. (2014), the principles of good ECE management include the planning stages as outlined in the mission and implementation that includes achievement targets and program evaluation. Efforts to achieve ECE quality start from the program planning stage by developing a vision that supports children's development and learning (Freeman, Decker, & Decker, 2014). Management principles become tools or guidelines for predicting, planning, decision making, coordinating, and controlling all efforts to achieve goals. All components of good ECE management are linked to

procedures and activities carried out consistently, effectively, and efficiently to support learning and meet the needs of students.

ECE quality, according to Magnuson and Shager (2010), Freeman et al. (2014) and Early, et al. (2018), is measured from two aspects, namely structural and process aspects. The structural aspects of the ECE program are easy to measure and manage and affect children's development indirectly by shaping everyday experiences in the classroom. The process aspect is designed to directly evaluate children's daily experiences and interactions by observing children's classroom activities and assessing the achievement of their experiential dimensions. Assessment of this aspect is measured using instruments that describe the process experienced by children to achieve a certain level of growth and development (Early, Sideris, Neitzel, R.LaForett, & G.Nehler, 2018). These two aspects measure ECE services based on the process and results of the school's efforts to facilitate children's growth and development. Generally, Winterbottom and Piasta (2015) stated that process quality is considered more critical than structural quality because it directly affects children. However, the concept of measuring ECE management performance is expected to involve integrating both structural and process quality aspects (Ozmantar & Karatasoglu, 2019). Thus, sustainable ECE quality management needs to be directed at optimizing educational inputs and processes to achieve quality educational outputs concerning the process and structural aspects of ECE.

In Indonesia, the quality of ECE is evaluated using the National Standard for Early Childhood Education (SN-PAUD). SN-PAUD includes eight standards namely: 1) Early Childhood Development Achievement Level (TPPA), 2) Content, 3) Process, 4) Educators and Education Personnel, 5) Facilities and Infrastructure, 6) Management, 7) Financial Management, and 8) Assessment. School quality refers to these national standards for all education management processes: planning, organizing, implementing, monitoring, and evaluating (Septarina & Sasongko, 2019). National standards are used as quality standards that function as guarantees for the quality of educational services according to specific criteria (Machali & Hidayat, 2016). However, to meet the standards, ECE as an educational organization must implement a quality assurance system for each component of educational input, process, and output.

The form of evaluation of SN-PAUD implementation in Indonesia is accreditation, which is carried out regularly at least every five years. Accreditation as an educational policy, according to Frank and Lilian Gilbreth's management theory, is one of the variables in improving educational performance (Latif & Latief, 2018). Accreditation reflects the progress shown by an institution towards quality improvement beyond the minimum standards set by the accreditation association (Ibrahim, 2014). Accreditation is accepted and carried out in many countries to measure the quality of education in an institution, including for ECE schools (Winterbottom & Piasta, 2015).

This study uses the results of ECE accreditation in Indonesia as a preliminary study to identify management problems based on SN-PAUD. The source of the accreditation data is the website https://akreditasi.banpaudpnf.or.id/laporan which contains the 2019 ECE Indonesia accreditation report. The preliminary study results show the distribution of SN-PAUD achievements from 34 provinces in Indonesia in 2019 as follows.

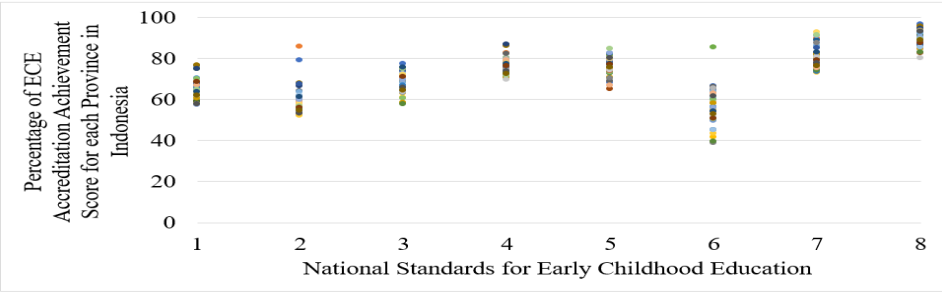

Figure 1. Distribution of Achievements of National Standards for Early Childhood Education at Indonesia in 2019 (source: https://akreditasi.banpaudpnf.or.id/laporan)

The graph in Figure 1 shows that the management standard (standard 6) has the lowest average achievement, 55.96%, with values ranging from 38% to 85%. These results are relevant to the results of research by Siswanto (2014), Basuki (2019), and Muyasaroh (2016), which stated the problem of the low achievement of SN-PAUD related to management standards. Formulating a quality assurance system in ECE that is oriented towards fulfilling the quality standards should be set and internal. Without good planning, careful implementation, and systematic monitoring (Muyasaroh, 2016). It means that the problem of ECE management in Indonesia needs to be resolved immediately by developing an effective ECE management model regarding SN-PAUD.

On the other hand, organizational activities can be appropriately managed and smoothly influenced by managerial activities. Organizational activities are closely related to administration. School administrative innovations need to be carried out so that the data and information presented can be done quickly, thoroughly, correctly, and satisfies the interested parties. Administrative innovation in school management can be done by utilizing technology (Sasongko & Sahono, 2016), for example, in the form of a management information system (MIS). Information and communication technology (ICT) has the potential as a strategic partner supported by the structure, policies, and management vision, not only as a management tool (Setiawan, 2017).

MIS is a computer-based system within the organization to provide various forms of information needed by various levels of management in making decisions for planning, monitoring, and operating an organization effectively (Setyanto, Rasyidah, & Sulhan, 2017). Nurdyansyah and Widodo (2017) noted that the education MIS has become a requirement to increase school competitiveness. Furthermore, Setyanto et al. (2017) stated education MIS as a system that combines human resources and technology to select, store, process, and present data to support educational decision-making processes. MIS education can function as a system that controls school administration, control, and supervision, starting from planning, implementation, and evaluation. It is possible if the quality of information produced by MIS meets the criteria of accuracy, timeliness, relevance, and completeness (Nurdyansyah & Widodo, 2017).

The existence of MIS in the implementation of ECE is one of the indicators of accreditation assessment that directly affects the ECE quality standard. It relates to the existence of information as a resource that is equivalent to the other four types of resources, namely human, equipment, material, and money (Widyastono, 2015). Information in MIS is a resource whose value is increasing because it is needed by management in planning and controlling activities effectively. Therefore, this study integrates MIS in the development of an ECE management model based on SN-PAUD.

Method

The main objective of this research is to produce an effective early childhood education management model according to SNP and SIM for continuous quality improvement. Therefore, the authors chose to use the educational research and development (R&D) approach model according to Borg and Gall (1983). The principles of R&D consist of four aspects (Borg & Gall, 1983). The first aspect is studying research findings to look for research findings related to the developed product. The second principle of R&D is to develop products based on the research findings. The third and fourth principles of R&D are field testing in situations where the product is used and revising the product to correct the weaknesses found in the field test. The design of the R&D stages of this research is presented in the following figure.

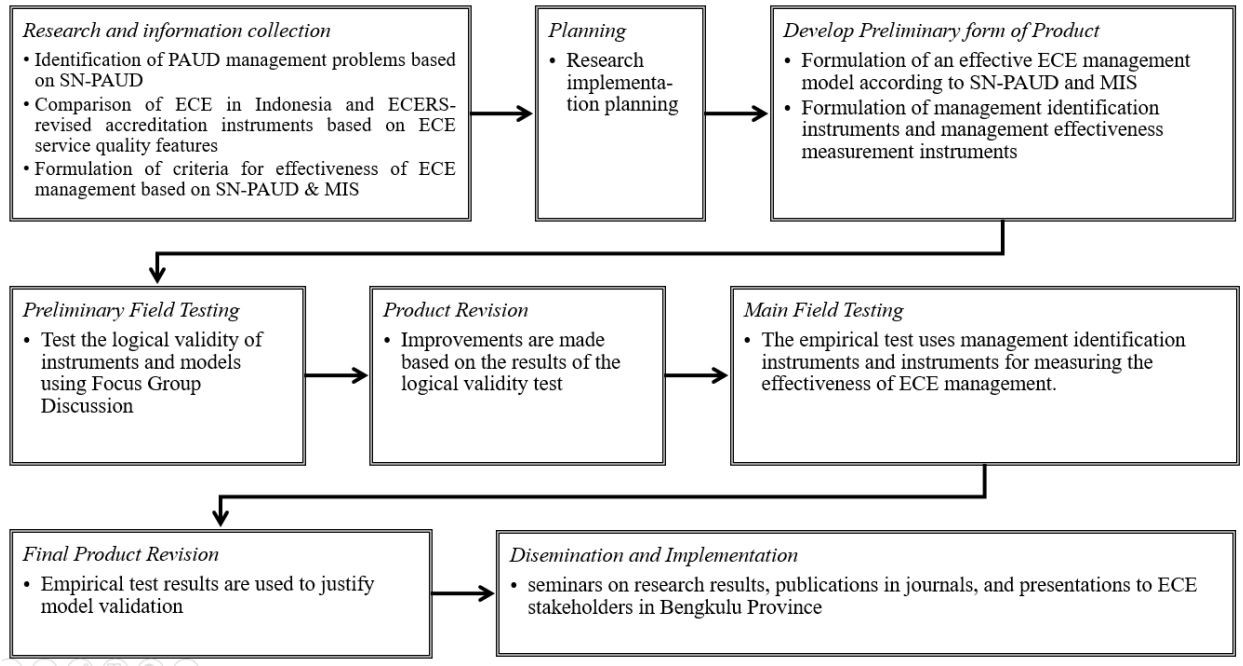

Figure 2. R&D Stage Design

Educational R&D is the development of models that use research results to design new education products or procedures (Gall, Gall, & Borg, 2003). The product of this R&D is the ECE management model that is systematically tested, evaluated, and refined to meet valid and reliable criteria. The research subjects, as respondents, were 45 ECE principals in Bengkulu Province selected to represent each region and accreditation status.

Data were obtained from scientific article documents, documentation on SN-PAUD and ECE accreditation, results of 2016–2019 ECE accreditation, questionnaire data, and focus group discussions. The product was tested for logical validity by ECE's academics and practitioners and empirically tested by 45 respondents. The test data were analyzed using narrative review, descriptive statistics, Miles and Huberman qualitative data analysis for focus group discussion, Pearson correlation coefficient, Aiken index, and Cronbach's Alpha coefficient.

Results and Discussion

The main finding of this study is the SN-PAUD and MIS-based ECE Management Model which is called the PAUD-SNSI Model (MPAUD-SNSI). This section contains a description of the MPAUD-SNSI development process.

The model is created by examining the relationship between the theory of school effectiveness and the SN-PAUD. The analysis begins by comparing the indicators for the ECE accreditation instrument in Indonesia against the system-revised early childhood environment rating (ECERS-Revised) instrument. This comparison was conducted to evaluate the structural and process aspects of ECE services. The ECE accreditation instrument in Indonesia emphasizes the ability of educational institution management to facilitate early childhood learning. Meanwhile, ECERS-Revised does not evaluate school management. However, the measurement of school management achievement in the ECE accreditation instrument in Indonesia is limited to the availability of documents, not including the measurement of the effectiveness of management capabilities.

The government gives schools the authority to make management decisions and develop their own plans in overcoming educational problems by referring to the national education system (Aziz,

2015). This is the basis for considering the application of the school-based management (SBM) model in Indonesia. The essence of SBM is a combination of school autonomy, independence, and participatory decision making to achieve school quality goals (Raharja, 2002). The ideal implementation of SBM according to (Ismail, 2008) is through a management approach as a system consisting of inputs, processes, and outputs. The implementation of SBM at ECE is carried out through strategic stages continuously and involves all elements of education management.

According to Edmond (1979), the concept of MBS refers to the theory of effective school, which focuses on improving the educational process through changing attitudes and behavior of all school components (Rivai & Murni, 2009). Effectiveness is related to achieving the expected results, and efficiency is related to everything issued for achieving goals (Farikhah & Wahyudhiana, 2018). Suppose it is associated with the relationship between school effectiveness and efficiency, the educational input determines the efficiency of education (Burusuc, Babarovic, & Velic, 2016). Burusuc et al. (2016) stated that the effectiveness of education is the result of achieving educational efficiency, namely the quality of performance or achievement or maximum results achieved by using a minimum of educational input.

The effectiveness of education can be seen from the output of education, which describes the efficiency of educational inputs and the implementation of the educational process. Even though the inputs are available very well, if the three essentials of SBM (autonomy, participatory decision making, and school independence) have not been implemented optimally, the education output will not reach the expected target. A study conducted by Siswanto (2014) and Andriani (2018) on ECE in Indonesia shows that schools generally do not have firm control over educational inputs. Therefore, the educational process is carried out in the form of implementing the SBM policy. The output of education is academic and non-academic achievements, including the achievement of accreditation.

The relationship between aspects of measuring school effectiveness and efficiency, the essence of SBM, and SBM as an education management system is described as follows.

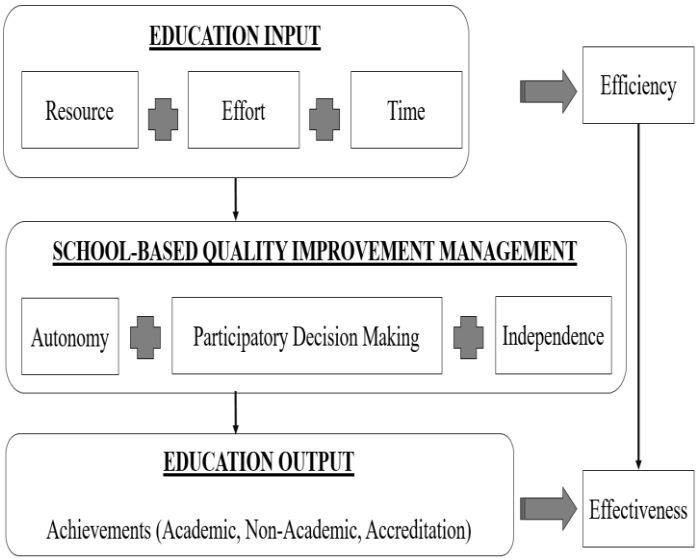

Figure 3. Diagram of the Relationship between School Effectiveness and Efficiency and SBM Approach as the Implementation of an Education System

Figure 3 above shows that the efficiency of education inputs can increase the effectiveness of education outputs if they comprehensively apply the three essences of SBM. The results of the analysis are then used to map the SBM and SN-PAUD indicators.

Mapping of SBM and SN-PAUD indicators in the first stage shows the main focus of SBM indicators, namely on achieving management standards with an accompanying focus covering process standards, educators and education personnel, financing, and education assessment. Therefore, the

indicators of management effectiveness according to SBM are only mapped to the standard management variables. However, the results of the FGD found that it was necessary to do a re-mapping involving eight standards. The results show that the main focus of the SBM indicator is on achieving management standards. Meanwhile, TPPA standards, content, process, educators and education personnel, financing, and educational assessment focus on SBM. Thus, SBM indicators can be used to formulate criteria for school management effectiveness based on the SN-PAUD.

In the first stage of formulation, a table of criteria for the effectiveness of ECE management was obtained from mapping the SBM indicators based on the input-process-output categories to the management standard variables. The table includes three groups of criteria, namely inputs (resources), processes (effort and time), and outputs (achievements), grouped by five management variables and includes 20 items of criteria for the effectiveness of ECE management. Analysis of the table shows that effectiveness criteria have not been included in the SBM and SN-PAUD, including (1) input from the monitoring and assessment stages; and (2) outputs from the planning, organizing, monitoring, and implementation stages. These deficiencies can be made up through the use of MIS. It needs to be done so that schools can be gradually planned and controlled in storing, processing and presenting data related to school accreditation, so it takes an MIS for accreditation preparation as an effort to achieve SN-PAUD.

This study developed an MIS for accreditation preparation called SIAP-PAUD (ECE accreditation preparation information system) as part of the formulated management model. This application was created as a form of school management innovation in education implementation, namely ICT-based administration. The SIAP-PAUD application has a main menu consisting of a dashboard, Re-accreditation Target Set, Accreditation Standards, and User Guide. The dashboard display for the SIAP-PAUD application is as follows.

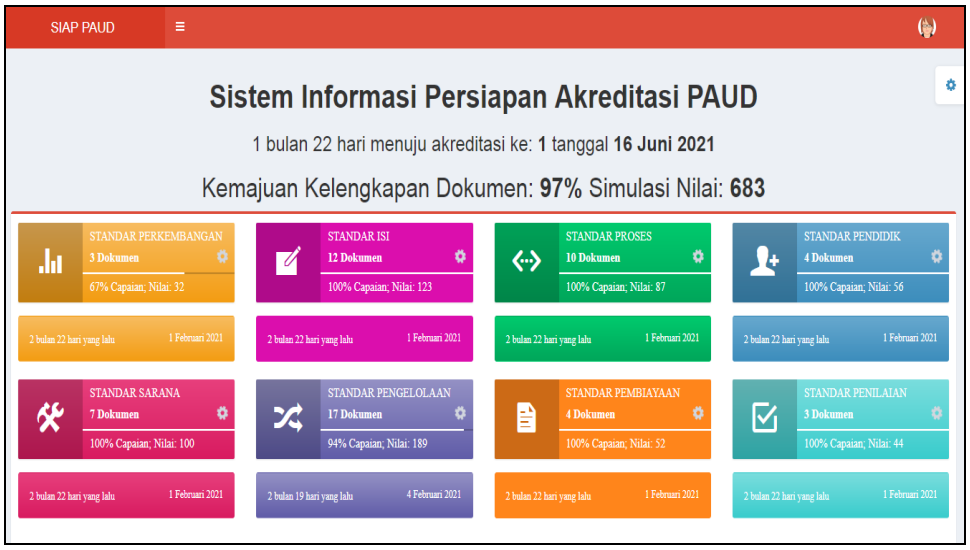

Figure 4. *Dashboard* of SIAP-PAUD

The information displayed on the SIAP-PAUD application dashboard as shown in the image above includes: 1) the last deadline for the preparation of accreditation documents which counts down to the end of the file preparation date, 2) the percentage of accreditation completeness, 3) simulation of file value achievements, 4) the number of required documents, achievements, progress of completion and simulation of the value of eight accreditation standards (SNP), and 5) today's day and date, as well as the latest hour. Viewed from the aspect of the database system, the SIAP PAUD application stores data offline using a flash disk. SIAP PAUD provides information on the completeness of accreditation documents and simulations of accreditation assessment. In this case, SIAP PAUD carries out the function of managing educational activities and resources.

The use of SIM, namely SIAP PAUD, into the management effectiveness criteria becomes the basis for developing a factual model into a school-based quality improvement management model and information system. Setiawan (2017) stated that the change in the stages of integration of ICT into the education system is a process that leads to the achievement of sustainability. The model is then used to develop an instrument for measuring the effectiveness of ECE management and validated through FGD (Focus Group Discussion).

The FGD respondents consisted of three academics and four ECE practitioners. Qualitative data from logical validity in FGD respondents' responses to a list of questions related to the formulated model. Respondents recommended mapping the variables and indicators of each standard based on the input-process-output categories to determine the criteria for the effectiveness of ECE management. In addition, the management effectiveness criteria also include aspects of the use of management information systems for accreditation. The FGD participants also suggested the need for additions to the analysis of the quality of sustainable school management in the form of spider diagram analysis.

A spider diagram is a graphical method that displays multivariate data in a two-dimensional graph of three or more quantitative variables represented by axes from the same point. The radius on the net describes the value of one variable. This charts are used to show outliers and similarities, or when one graph is more remarkable in each variable than the other. The spider diagram is primarily used for ordinal measurements, with each variable somehow corresponding to "better" and all variables on the same scale. The spider diagram simulation displayed in the SIAP PAUD application is as follows.

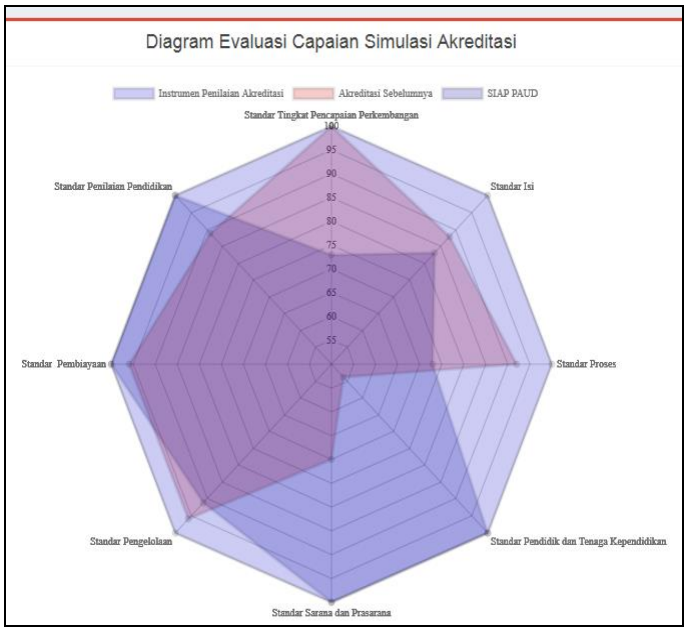

Figure 5. Example of Spider Diagram Simulation in SIAP-PAUD

The simulation uses three data, i.e., previous accreditation data as the initial reference data, the target data to be achieved, and data on the current condition of accreditation preparation. Target data is data on the instrument of measurement of the effectiveness of ECE management. The current condition of accreditation preparation is obtained from completeness data updated in the SIAP-PAUD application. According to documents that have been updated into SIAP-PAUD, the present condition data can change at any time. The simulation results show that the spider diagram feature in SIAP-PAUD can help schools conduct regular evaluations of current conditions to prepare for the next accreditation.

This study provides a questionnaire to the validator to obtain construct validity, content validity, and reliability to obtain quantitative data. Quantitative data on the validity and reliability of the instrument is used to measure the effectiveness of ECE management in the form of a validator response score to the

instrument validation indicators. The validators consisted of four academics and five ECE practitioners. The data from the validation results were then processed using the Pearson Correlation and the Aiken Index to determine validity and Cronbach's α for reliability.

The conclusion from the factor analysis for measuring the effectiveness of ECE management instruments, namely the correlation of aspect 1 (readability) and aspect 2 (achievement of goals), is positive with very high correlation criteria. Thus the items on the aspects of readability and goal achievement are strong constructs. If compared with the value of $r_{table} = 0.71$ for n = 8 and a significance level of 10%, then the r_{count} of the two aspects meets the conditions of $r_{count} \geq r_{table}$ so that the instrument is said to have significant validity.

Item analysis for the construct validity of the model was carried out by correlating the scores of each item from nine validator to the total item scores of all validators. The results of the calculation of the item analysis show that all items are very valid. The same results were also obtained for content validity. Content validity was carried out to obtain agreement from nine validators based on the results of the Aiken index calculation. The calculation of the Aiken index is based on many raters = n = 9, many categories = c = 5, and the lowest value category = low = 1. The results of the Aiken index calculation show that the PAUD-SNSI model has a level of agreement from nine validators who are very valid. The reliability of the model was carried out to obtain the internal consistency of the nine instrument validators. The Cronbach's α coefficient reliability calculation results show $0,6 \leq r_i = 0,96$, which is close to the value 1, which indicates high reliability.

The model was further improved according to the results of the FGD and validation and had implications for adding a large number of management effectiveness indicator items, from 25 items to 161 items, as shown in Table 1. By including the eight standards in the SN-PAUD and elements of the management information system, the PAUD-SNSI model is visualized as follows.

		Variables of ECE Management Effectiveness based on Input category (Resources, Effort and Time) and documented in SIAP-PAUD	Variables of ECE Management Effectiveness based on Process category (Autonomy, Participatory Decision Making, Independence) and documented in SIAP-PAUD	Variables of ECE Management Effectiveness based on the Output category (Academic and Non-Academic Achievements) and documented in SIAP-PAUD
i-th Standard	Variables of i-th Standard	input indicators mapped against i-th standard indicators	process indicators mapped against i-th standard indicators	output indicators mapped against i-th standard indicators
		School efficiency	→	School effectiveness

Figure 6. PAUD-SNSI Model

PAUD-SNSI model was developed using the SN-PAUD, which includes eight Education standards. SN-PAUD is used to standardize education management in Indonesia and is integrated with SBM, school effectiveness theory, and MIS. Each standard in the SN-PAUD serves as a reference for planning, implementation, monitoring, follow-up, and quality assurance of PAUD quality. The components of the PAUD-SNSI Model include the variables of ECE management effectiveness based on the education input, process, and output categories, the eight SNP variables, and the management effectiveness indicators mapped to the NES indicators. The model is visualized into eight sub models for each standard to facilitate the operationalization of implementation in schools. The component of each standard sub model is shown in Table 1.

Table 1. The component of each standard sub model of PAUD-SNSI Model

Standard of SN-PAUD	Variables of Standard	Variables of ECE Management Effectiveness			Total
		Input	Ouput	Process	
Standard 1. Level of Child Development Achievement	Level of Developmental Achievement	Three indicators of services for children based on children's developmental achievements	Three indicators of effective teaching and learning process and child empowerment based on children's developmental achievements	Three indicators of evidence of achievement based on documentation of child development achievements	9
Standard 2. Content	1. Curriculum 2. Scope of Material 3. Competence 4. Education Calendar	1. Five indicators of availability of curriculum resources, educational services and teaching staff 2. Two indicators of service time availability	1. Four indicators of curriculum development and education calendar 2. Three indicators of curriculum implementation and education calendar 3. Two indicators for reviewing and socializing the curriculum and education calendar	Nine indicators of evidence of achievement based on curriculum documentation, materials, competencies and educational calendar	25
Standard 3. Process	1. Learning Process Planning 2. Implementa-tion of the Learning Process 3. Assessment of the Learning Process	1. Six indicators of planned early childhood learning services 2. Three indicators of planned early childhood learning service guidelines	1.Six indicators of planning, implement-ting and evalua-ting the learning process based on time 2. Three indicators of planning, implement-tation and assessment of the learning process based on the program or technique	Ten indicators of evidence of achievement based on documentation of planning, implementation and assessment of learning	28
Standard 4. Educators and Education Personnel	1. Educator 2. Education Personnel	Two indicators of the qualifications of dedicated and capable educators and education personnel	Six indicators for managing the competence of educators and education personnel according to the type of assignment	Four indicators of evidence of achievement based on documentation of the qualifications and competencies of educators and education personnel	12
Standard 5. Facilities and Infrastructure	1. Facilities 2. Infrastructures	Six indicators of the availability of infrastructure	Six indicators of infrastructure management as a comfortable, safe and orderly environment	Seven indicators of proof of achievement based on documentation of legality of ownership, inventory, and physical photos	19
Standard 6. Management	1. Planning 2. Organizing 3. Implementation 4. Supervision 5. Assessment	1.Six policy indicators that are formulated in a clear, systematic and documented manner 2. Nine indicators of adequate management input	1.Nine management indicators according to responsive, anticipatory, independent, participatory, open and accountable principles 2.Six management indicators that prioritize quality culture and teamwork	Seventeen indicators of evidence of achievement based on documentation of planning, organizing, implementing, monitoring, and evaluating	47
Standard 7. Financial Management	1. Planning 2. Implementation	Four indicators of competent staff and procedures for planning and implementing systematic financing	Four indicators of accountable and open financing planning and implementation	Four indicators of evidence of achievement based on documentation of planning and implementation of financing	12
Standard 8. Assessment	1. Planning 2. Implementation	Three indicators of education assessment planning and implementation procedures	Three indicators of planning and implementing education assessment in a systematic and planned manner	Three indicators of evidence of achievement based on documentation of planning and implementation of education assessment	9
Total	**21 Variables**	**49 indicators**	**55 indicators**	**57 indicators**	**161**

As illustration of PAUD-SNSI sub models, the sub-models for standard 1 level of child development achievement are presented in the diagram below.

		Variables of ECE Management Effectiveness based on Input category and documented in SIAP-PAUD	Variables of ECE Management Effectiveness based on Process category and documented in SIAP-PAUD	Variables of ECE Management Effectiveness based on the Output category and documented in SIAP-PAUD
		Services for children based on children's developmental achievements	Effective teaching and learning process and child empowerment based on children's developmental achievements	Evidence of achievement based on documentation of child development achievements
Standard 1. Level of Child Development Achievement	Variable Level of Developmental Achievement	ECE focuses on serving early childhood to achieve 6 aspects of developmental achievement and documented service plan documents in SIAP PAUD	ECE implements the teaching and learning process in accordance with 6 aspects of development and documented service implementation process documents in SIAP PAUD	ECE has a document on the achievement of 6 aspects of child development which is documented in SIAP PAUD on a regular basis
		ECE focuses on serving early childhood to achieve age-appropriate development and service plan documents are documented in SIAP PAUD	ECE implements the teaching and learning process according to age groups and documents the service delivery process is documented in SIAP PAUD	ECE has a document on the achievement of child development based on age group which is regularly documented in SIAP PAUD
		ECE plans services for children based on the database of child development achievements stored in SIAP PAUD	ECE documents the teaching and learning process according to 6 developmental aspects and age groups and is stored in SIAP PAUD	ECE has a document of achievement of the child development program (daily, weekly, monthly, semi-annual) which is regularly documented in SIAP PAUD
		School efficiency	→	School effectiveness

Figure 6. PAUD-SNSI sub-models for standard 1 level of child development achievement

The empirical test measured the effectiveness of the PAUD-SNSI model if the model was applied in schools. Respondents filled out the instrument for measuring the effectiveness of ECE management. The field states the respondent's perception of the level of effectiveness of school management if each indicator of management effectiveness is applied in their schools. The score for each item is grouped into five categories on the Linkert scale, namely 5 = very effective, 4 = effective, 3 = moderately effective, 2 = less effective, and 1 = ineffective. The total score and percentage of achievement for each standard are calculated, then the effectiveness criteria are determined based on the assessment of the effectiveness of each standard. Recapitulation of empirical test data for measuring the effectiveness of ECE management instruments is grouped according to eight SN-PAUDs.

This study determines the empirical validity of the instrument for measuring the effectiveness of ECE management based on the Pearson correlation index between the scores of each standard and the total score of all standards given by each respondent. Reliability is determined using Cronbach's α coefficient. The following table presents the results of the calculation of the Pearson and Cronbach's α correlation for the empirical test of the model.

Table 2. Calculation Results Empirical Test of PAUD-SNSI Model

Components	Standard								Total Varians
	1	2	3	4	5	6	7	8	
Total per item	1899	5296	5948	2608	4008	9914	2567	1891	
Correlation coefficient r	0.63	0.76	0.90	0.73	0.87	0.95	0.87	0.82	
Validity Criteria	valid	valid	very valid	valid	very valid	very valid	very valid	very valid	830.16
The variance of each standard	8.39	35.67	28.74	1.86	10.20	97.13	8.18	5.84	
Cronbach's Alpha Coefficient Reliability = r_i = 0.77									

Data processing uses descriptive statistics for empirical test results, including the distribution of the total score of each standard based on the lowest value (min), the highest value (max), and the average. The study counts the number of schools (frequency of data) that achieve the criteria of being very effective and effective for all standards and overall. Frequency refers to the number of times various subcategories of a given phenomenon occur, so the percentage of occurrences can be easily calculated. The empirical test results show that the average standard score meets the criteria for being effective or very effective. The standard achievement reached the criteria of being effective or very effective. Thus, if

the PAUD-SNSI model is applied in schools, the level of effectiveness of school management can reach the criteria of being effective or very effective. These results can be used to conclude that the PAUD-SNSI model has met the valid criteria. The summary of the results of descriptive statistics is shown in Table 3 belows.

Table 3. Descriptive Statistical Results for Empirical Test of PAUD-SNSI Model

Standard of SN-PAUD	Criteria score range		Distribution of the total score			Number of schools	
	Very effective	Effective	Min	Max	Averages	Very effective	Effective
Standard 1. Level of Child Development Achievement	37.8–45	30.6–37,8	29	45	42.2	43	1
Standard 2. Content	105–125	85–105	97	125	117.7	43	2
Standard 3. Process	132.8–140	92.8–132.8	105	140	132.2	28	17
Standard 4. Educators and Education Personnel	50.4–60	40.8–50.4	53	60	58.0	45	0
Standard 5. Facilities and Infrastructure	79.8–95	64.6–79.8	79	95	89.1	44	1
Standard 6. Management	197.4–235	159.8–197.4	173	235	220.3	44	1
Standard 7. Financial Management	50.4–60	40.8–50.4	45	60	57.0	44	1
Standard 8. Assessment	37.8–45	30.6–37.8	31	45	42.0	43	2
Total 8 standard	**676.2 - 805**	**547.4 – 676.2**	**621**	**805**	**758.5**	**44**	**1**

The procedures to implement the PAUD-SNSI model that can sustainably improve the school's management quality are as follows. First, identify problems in each standard referring to the effectiveness indicators of ECE management in the PAUD-SNSI model. Second, determine the next achievement target by filling out the instrument to measure ECE management's effectiveness according to the PAUD-SNSI model. Next, using the SIAP-PAUD application regularly to assist the function of managing and collecting data on educational activities and resources. Lastly, simulating the spider diagram available on the SIAP-PAUD application to conduct a self-evaluation before applying for accreditation. Thus, optimizing the management model enriched by technology helps schools carry out a planned and systematic management.

Conclusion

The novelty of the PAUD-SNSI model compared to other education management models is that it has detailed indicators for measuring management effectiveness that integrates SN-PAUD, SBM, and MIS variables. The addition of the spider diagram simulation feature in the SIAP-PAUD application can be used to conduct self-evaluation before applying for accreditation because the spider diagram can show which standards need to be streamlined in order to achieve the target. This evaluation helps schools to improve the quality of management sustainably. In that case, it will impact ECE management under the eight SN-PAUD, where the model and application can be used to identify which standards need to be streamlined to get the expected accreditation achievement target.

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