

A Sustainable Web Base Quality Model In Improving of Educational Service: A Structural Equation Modeling-Based Investigation

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ABSTRACT

Current problems in the world of education include the existence of quality gaps between schools, the emergence of resistance to change, and weak improvement in the quality of education services, especially in schools that are considered less superior than favorite schools. This study aims to analyze and develop a web-based student admissions system design as a strategy to improve the quality of education that is more equitable and fair. The study uses a mixed methods approach with an explanatory sequential design, which begins with the collection of quantitative data and continues with qualitative data. The research sample involved 32 people consisting of school principals and teachers in various regions of Indonesia, with cluster, quota, and random side sampling techniques. Data analysis techniques used include t-tests and structural equation modeling (SEM). The results of the study show that the implementation of a web-based student admissions system can improve operational efficiency, reduce discriminatory practices in accepting new students, and increase user satisfaction with the system. The novelty of this study lies in the integration of a digital student admissions model as an educational policy instrument that is not only administrative, but also strategic in encouraging continuous improvement in the quality of education. This model can be used as a reference for the government in formulating more inclusive, adaptive, and data-based education policies.

INTRODUCTION

It is acknowledged that the admission process has been regulated in government regulations with four pathway models, but this model reduces the dichotomy between high-achieving schools and low-achieving schools (Bulkani et al., 2023) and even creates new challenges, especially for schools that are considered 'favorites' and 'non-favorites', which leads to a lack of interest among students to perform academically, because even students with low test scores can be admitted if they live near the school (Mutrofin et al., 2020).

In academia, researchers know that admitting new students (PPDB) is one of the first steps students and parents must take to enroll their children in school (Hamidah et al., 2020). Some research conducted by explains that the development of this New Student Admission Information System is good if implemented; everything will be more practical, efficient, sophisticated, transparent (everyone can know), and can reduce the occurrence of fraud in the enrollment of new students (B et al., 2024). However, this system also has weaknesses because it requires significant costs (for system development), good human resources, and the condition of the Indonesian population in general, which is not tech-savvy. With such a system, the gap between popular schools is widening.

Some countries, namely Malaysia, Japan, Australia, England, and the United States (State of Texas), have implemented zoning systems in schools and agree that zoning policies should contribute to a fair and equitable distribution of students. However, the zoning process should be transparent. This is the basis for ensuring that

schools play an essential role in developing all students' cognitive and non-cognitive potential (Surve & Londhe, 2020).

Schools are essential because they must meet the community's needs for quality education. A quality education provides individuals the necessary skills, such as numeracy and literacy, to compete in the global economy (Rawlings et al., 2024). Therefore, educational institutions need to maintain their existence by improving the overall quality of service (Nordahl et al., 2023). Parent and student satisfaction determine a school's quality (Sharma et al., 2022). The satisfaction of students' parents is determined not only by the students' teaching and learning experiences but by the students' overall experience as school customers, from enrollment to graduation (Chuktu et al., 2024).

Currently, the standard model for schools to follow when implementing PPDB with a web-based information system is limited to regulations and a few procedures for using a web-based information system. The current online admission process is highly dependent on the central authority, which can lead to a lack of transparency in the admission process. With this in mind, the researchers are interested in using the PPDB model as a web-based information system to improve the quality of educational services. The research aims to develop a web-based PPDB model that can improve the quality of educational services, especially in primary and secondary education. The explanation of previous research and trends in PPDB development before and after zoning and the focus on developing a web-based PPDB model is expected to provide a stronger context for the importance of this research in improving the quality of education services in Indonesia.

RESEARCH METHOD

The method used in this research is a mixed-methods research with an explanatory sequential research design (Acquah et al., 2021). This research took three steps: firstly, conducting preliminary research, exploring field conditions, collecting field data, data processing and interpretation, and developing an initial model of performance-based authentic leadership for school improvement. This phase often used surveys, questionnaires, or other quantitative data collection methods (Suharyanto et al., 2019). The second step consisted of developing a performance-based authentic leadership model for school quality improvement, model validation and revision, conducting FGDs to test the model ideas by experts in the field of school leadership, limited field testing, and model revision. The third step consisted of conducting FGDs on the whole model, large-scale implementation in practice, and disseminating the model.

In qualitative research, on the other hand, the researcher was the research instrument. Researchers become human instruments whose tasks are determining the research focus, selecting informants as data sources, collecting data, assessing data quality, analyzing, interpreting, and drawing conclusions.

Research Participants

The research participants were conducted in Indonesia with a total sample of 552 elementary and junior high school teachers. Model validation was performed through FGDs involving principals, teachers, doctoral students, and five experts in school quality, information systems, and education administration. Cluster, quota, and

random sampling were used, while data collection was done through questionnaires, observations, and offline and online interviews. Table 1 shows the details of the respondents.

Table 1. Research participants

No.	Description	Frequency	Percent
Position			
1	Teacher	220	39.9
2	Public Relations	9	1.6
3	Principal	88	15.9
4	Student Affairs Teacher	19	3.4
5	Head of PPDB	31	5.6
6	Financial	1	0.2
7	Curriculum	12	2.2
8	Operator	2	0.4
9	Student Parents	1	0.2
10	PPDB Committee	8	1.4
11	Staff Facilities and Infrastructure	17	3.1
12	Staff Administrative	1	0.2
13	Vice Principal	2	0.4
14	Vice Principal of Public Relations	31	5.6
15	Vice Principal of Student Affairs	39	7.1
16	Vice Principal of Curriculum	45	8.2
17	Vice Principal of Facilities and Infrastructure	26	4.7
Total		552	100
Location of the school			
1	Village	416	75.4
2	Borders	16	2.9
3	Cities	120	21.7
Total		552	100

Data Analysis

Data analysis techniques used descriptive statistics, t-tests, SEM (Structural Equation Modeling), and qualitative data analysis. Descriptive statistics were used to describe the results of the model implementation (Harbison & Simmons, 2024). The authors used the t-test to determine the model's effectiveness by comparing pretest and posttest results (Mishra et al., 2019). SEM was used to examine the factors that influence the improvement of the quality of educational services (Osman et al., 2020), while qualitative analysis describes the results of quantitative data processing (Antunes & Araújo, 2021). The following data analysis techniques are presented using structural equation modeling (SEM).

Each latent variable is identified based on measurable indicators in the model specification stage. Latent variables in this study include PPDB Regulation (X1), Education Administration Principles (X2), Web-based PPDB Model (M), PPDB Service Quality (Y1) (measured through the RATER dimension), Education Service Quality (Y2), and IT Infrastructure Availability (C1) as a control variable. Each latent variable is calculated using several indicators obtained through a questionnaire based on a Likert scale of 1-5. The following shows the coding of this study's variables, indicators, and

questions. Data analysis for qualitative approaches using N-VIVO from the results of interviews, documentation studies, observations by recording conditions in the field (fieldnotes) what was observed by prioritizing the main aspects of the research or determining the focus among the results of the description and reflection of the observation data under the focus of the research question.

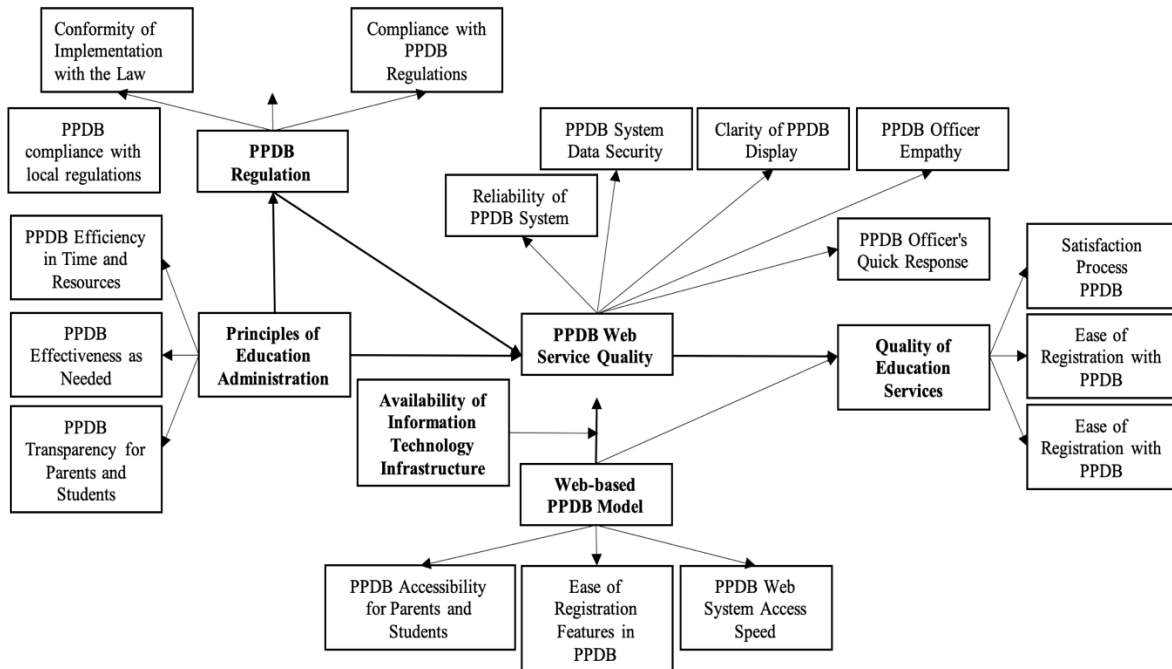


Figure 1. New Learner Admission Model (PPDB) Using Web Base Information System

RESULTS AND DISCUSSION

This is a verification analysis relevant to the research objectives, namely, obtaining an overview of the results of the study of the proposed model in overcoming problems in the form of the effect of Product Completeness (X1), Brand Image (X2), and Service Quality (X3) on Customer Loyalty (Y) by using survey results on web-based information system users.

This research uses verification analysis with the PLS (structural equation modelling) approach, consisting of 2 (two) types of models formed, namely 1) measurement models and 2) structural models. The author uses a variance structure-based Structural Equation Model (SEM) method known as PLS-PM (Least Square Path Modeling) to test the research hypothesis that implies a causal relationship between latent variables. The reason for choosing PLS is because the sample size used is relatively tiny (Petter & Hadavi, 2022) (Kock, 2019). To estimate the model parameters in PLS-PM, the SmartPLS software version 4.0.9.2 was used. Data analysis began by calculating scores for each dimension using the values of each indicator variable associated with each dimension.

The following figure presents the relationship between variables in this study.

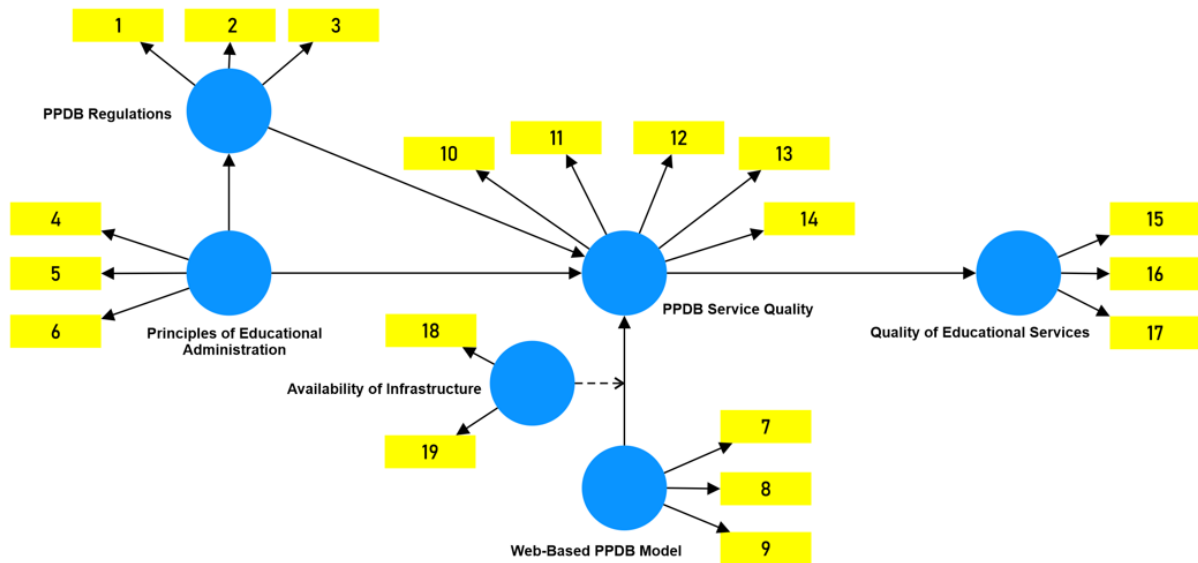
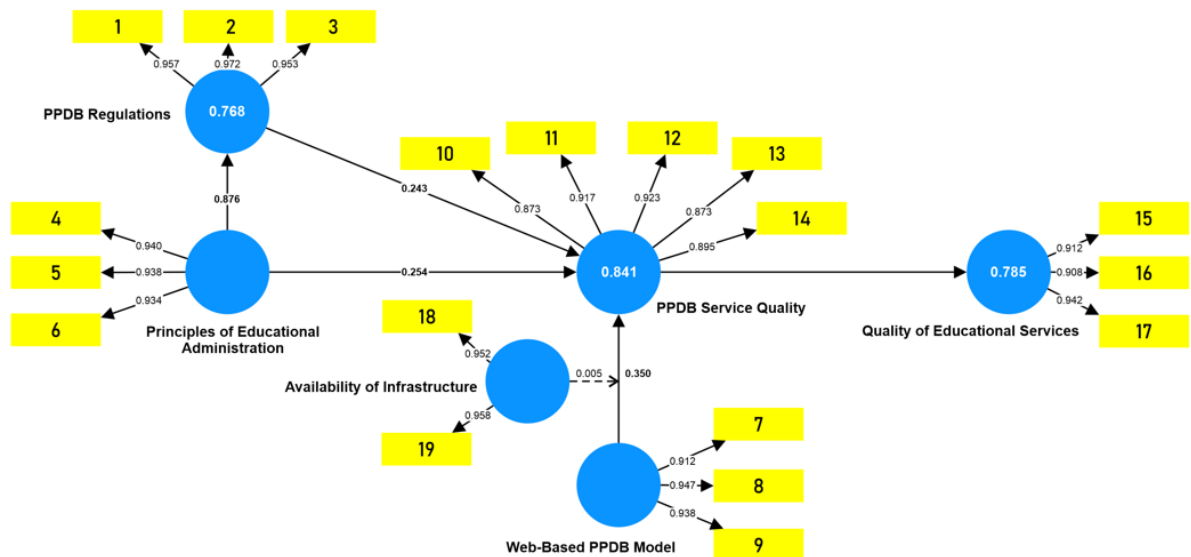


Figure 2. Linkages between Research Variables

The path diagram below shows that, using Smart PLS software, the values of model parameters were estimated using the appendix of data processing results. No indicators were found to be below 0.7 (smaller than 0.7).



Standardized Loading Factor Path Diagram

Figure 3. Path Diagram of Standardized Loading Factor

This study used partial least squares structural equation modeling (PLS-SEM) to analyze the relationship between variables in the developed conceptual model. The following table presents the loading factor results of the indicators on the latent variables, which include PPDB Regulation, Education Administration Principles, Web-based PPDB Model, PPDB Service Quality, Education Service Quality, and Infrastructure Availability.

Table 2. Loading Factor Table of Indicators on Latent Variables

	PPDB Regulation	Principles of Education Administration	Web-based PPDB Model	PPDB Service Quality	Quality of Education Services	Infrastructure Availability
1	0.957					
2	0.972					
3	0.953					
4		0.940				
5		0.938				
6		0.934				
7			0.912			
8			0.947			
9			0.938			
10				0.873		
11				0.917		
12				0.923		
13				0.873		
14				0.895		
15					0.912	
16					0.908	
17					0.942	
18						0.952
19						0.958

These results show that all indicators have excellent convergent validity values, with loading factor values above the minimum threshold (0.7). Thus, the measurement model can be considered valid, and further structural model analysis can be carried out. This indicates that regulation, administration, the web-based PPDB model, service quality, and infrastructure collectively contribute to improving the quality of education services. The following table presents the results of the validity and reliability evaluation of the research variables.

Table 3. Construct Validity and Reliability Evaluation Table in the PLS-SEM Model

	Cronbach' s alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Infrastructure Availability	0.903	0.907	0.954	0.912
PPDB Service Quality	0.939	0.939	0.953	0.804
Web-based PPDB Model	0.925	0.928	0.952	0.870
Quality of Education Services	0.910	0.912	0.944	0.848
Principles of Education Administration	0.931	0.931	0.956	0.878
PPDB Regulation	0.958	0.959	0.973	0.923

Overall, these results indicate that all variables have excellent convergent validity and construct reliability, so the model can be considered eligible to proceed to the evaluation of the structural model (inner model). These results also reinforce that the indicators used in this study can represent constructs significantly and consistently.

The following table presents the results of the correlation between constructs and the AVE square root value for each latent variable in this research model.

Table 4. Table of Inter-Construct Correlation and Discriminant Validity (Fornell-Larcker Criterion)

	PPDB Regulation	Principles of Education Administration	Web-based PPDB Model	PPDB Service Quality	Quality of Education Services	Infrastructure Availability
PPDB Regulation	0.961	0.876	0.667	0.807	0.746	0.592
Principles of Education Administration		0.937	0.730	0.842	0.796	0.653
Web-based PPDB Model			0.933	0.832		0.726
PPDB Service Quality				0.896		0.752
Quality of Education Services			0.825	0.886	0.921	0.802
Infrastructure Availability						0.955

Overall, these results indicate that discriminant validity in the model has been met. Thus, each construct can reliably represent the measured concept, and the model is eligible for further analysis in the structural model evaluation stage. This provides a strong foundation for interpreting the causal relationships between the latent variables in the research model.

The inner or structural model is evaluated using Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze the causal relationship between latent variables in the model. To understand the extent to which exogenous variables in the model affect endogenous variables, the coefficient of determination (R-square) and adjusted R-square are analyzed. The following table presents the results of the R-square and adjusted R-square evaluations for the latent variables in this study.

Table 5. Table of Coefficient of Determination (R-square and Adjusted R-square) in PLS-SEM Model

	R-square	R-square adjusted
PPDB Regulation	0.768	0.767
PPDB Service Quality	0.785	0.785
Quality of Education Services	0.841	0.840

Overall, the R-square values indicate that the model has a strong explanatory power, especially for the PPDB Service Quality and Education Service Quality variables, which are in the high category. The adjusted R-square value close to the R-square indicates the model's stability and the predictors' relevance in explaining the endogenous variables. This suggests that the relationship between latent variables in this model is significant and supports the validity of the structural model that has been

developed. The following table presents the results of the effect size evaluation (f-square) for each relationship in this research model.

Table 6. Table of Effect Size (f-square) Between Latent Variables in PLS-SEM Model

	f-square
PPDB Regulation -> PPDB Service Quality	0.085
Principles of Education Administration -> PPDB Regulation	3.302
Principles of Education Administration -> Quality of PPDB Services	0.074
Web-based PPDB Model -> PPDB Service Quality	0.275
Quality of PPDB Services -> Quality of Education Services	3.651
Infrastructure Availability x Web-based PPDB Model -> PPDB Service Quality	0.000
Infrastructure Availability -> PPDB Service Quality	0.099

The results of the f-square analysis show the effect size of each relationship between latent variables in the model, which provides an overview of the relative contribution of independent variables to the dependent variable. The following table presents the results of the path coefficient estimation in the PLS-SEM model used in this study.

Table 7. Table of Path Coefficients Results and Significance of Relationships Between Latent Variables

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Infrastructure Availability -> PPDB Service Quality	0.196	0.195	0.042	4.707	0.000
Quality of PPDB Services -> Quality of Education Services	0.886	0.885	0.022	40.981	0.000
Web-based PPDB Model -> PPDB Service Quality	0.350	0.354	0.041	8.504	0.000
Principles of Education Administration -> Quality of PPDB Services	0.254	0.249	0.071	3.574	0.000
Principles of Education Administration -> PPDB Regulation	0.876	0.874	0.029	30.354	0.000
PPDB Regulation -> PPDB Service Quality	0.243	0.246	0.070	3.483	0.000
Infrastructure Availability x Web-based PPDB Model -> PPDB Service Quality	0.005	0.006	0.016	0.329	0.742

Overall, the results show that the most influential factor in improving the quality of education services is the quality of PPDB services, which is strongly influenced by good regulations, effective education administration, and optimal implementation of the web-based PPDB model. Thus, to improve the quality of education services, the main focus should be strengthening regulations, improving the quality of PPDB services, and utilizing a more efficient web-based system.

Model Fit Evaluation in Partial Least Squares - Structural Equation Modeling (PLS-SEM) is carried out to assess the extent to which the research model developed is by the empirical data obtained. In addition, some studies also use Exact Model Fit Criteria to see if the model fulfils more stringent fit assumptions. By analyzing these indicators, we can assess whether the model used can be used as a strong basis for drawing research conclusions. The following table presents the results of the model fit evaluation in this study.

Table 8. Model Fit Evaluation Results Table

	Saturated Model	Estimated Model
SRMR	0.045	0.054
d_ ULS	0.379	0.551
d_ G	0.489	0.555
Chi-square	1655.368	1801.114
NFI	0.875	0.865

Based on these results, the model tested in this study fits well with the data, as indicated by the low SRMR value and relatively small d_ ULS and d_ G. Although the NFI is slightly below 0.90, the model is still considered feasible enough for further analyses of the relationships between latent variables. Therefore, this model can be used to interpret how factors such as PPDB regulations, education administration, and the web-based PPDB model affect the quality of education services.

The research findings show that the relationship model has a value with each variable affecting service quality; this is based on the research Komariah & Triatna, (2005:16 that states that "*service quality can be defined as the external discrepancy between customers' expectations or desires and their perceptions*". This means that service quality can be defined as the external difference between customers' expectations or desires and their perceptions. From the above description, it is clear that service quality is a service that meets the customer's expectations. Service quality measures how well customer expectations meet the level of service (Zeithaml et al., 1985). Perceived service quality reflects customers' opinion of a product or service's excellence or overall superiority, but service quality is difficult to measure objectively (Patterson & Sharma, 1999).

Overall, these results indicate that all variables have excellent convergent validity and construct reliability, so the model can be considered suitable for evaluating the structural model (inner model). It can represent the construct significantly and consistently. The research results make it clear that the concept of total quality management must meet the specifications set. Operationally, quality is determined by two factors: the fulfillment of the given specifications, the so-called factual quality, and the fulfillment of the expected specifications according to the demands and needs of the service users, the so-called quality (Zazin, 2011).

Evaluation of the inner model or structural model in Partial Least Squares - Structural Equation Modeling (PLS-SEM), the research results follow the results of previous quality research can be measured by parameters such as: Number of customer complaints, number of errors, target achievement and so on. According to Michael Le Boeuf, on average, businesses with low service quality gain only 1% additional new customers and lose two market shares annually. On the other hand, businesses with excellent service quality gain an average of 12% additional new customers, achieve 6% market share per year and can generally set prices relatively high (Siedjas, 2014). Production quality measures actual quality standards according to criteria with specifications that are suitable for manufacture and use, have no defects (zero defects), and are good from the start (right the first time and every time). Perceived quality is measured by customer or user satisfaction, increased customer interest, expectations, and satisfaction (Zazin, 2011).

Furthermore, the model's results in this study agree with the data. Although the NFI is slightly below 0.90, this model is still feasible enough to analyze the relationship between latent variables further. According to Gronroos' research findings from his numerous studies in the services field, he proposes several factors (criteria) that determine service quality. These criteria are professionalism and skills; attitudes and behavior; accessibility and flexibility; reliability and trustworthiness; recovery; and reputation and credibility. Lehtinen suggests two dimensions of service quality: process quality (customer evaluation during the service provided) and output quality (evaluation of the quality outcomes of the services offered). In addition, he can also distinguish between physical quality (relationship with the product and its followers), interactive quality (relationship between customers and the company), and corporate quality (relationship with the company's image) (Ruslan, 2017).

CONCLUSION

The implementation of PPDB is based on the applicable regulations, which are both transparent and efficient. However, optimizations are still needed, especially in terms of the accessibility of the system and the readiness of the school infrastructure to support the web-based PPDB. The effect of PPDB with a web-based information system on the quality of educational services is significant. This can be seen in the increased efficiency of school administration, easy access to information for students and parents, and transparency in the admission process for new students. This study aims to integrate the principles of educational administration, PPDB regulations, and quality standards for educational services. The contribution of this model is the integration of information systems, appropriate infrastructure and educational service standards that address user needs, data security aspects, efficiency of the admission process and greater user involvement in the web-based PPDB system, and help to increase the operational efficiency of schools, reduce discriminatory practices in the selection of students and increase the satisfaction of system users. By optimizing the implementation of this model, the quality of educational services can be further improved.

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