

# Evaluating Beneficiary Satisfaction in the BSPS Program through Structural Equation Modeling: The Synergy of Planning Quality and Field Supervision in Tolitoli Regency

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**Abstract:** This study evaluates the success of the Self-Help Housing Stimulant Assistance (BSPS) Program in Tolitoli Regency by analyzing the impact of planning quality and field supervision on beneficiary satisfaction. Using an explanatory quantitative approach, data were collected from 240 program beneficiaries (2023–2024) via purposive sampling and analyzed using Partial Least Squares-Structural Equation Modeling (PLS-SEM). The results show that planning quality and field supervision have a positive and significant effect, both partially and simultaneously, on beneficiary satisfaction. The model's R-Square value of 0.952 indicates that these two constructs determine 95.2% of satisfaction variance. The dimensions "Safety, Comfort, and Health of Housing" and "Construction Inspection and Supervision" emerged as the dominant predictors. Conclusively, integrating precise planning with intensive technical assistance from Field Facilitators (TFL) is essential to maximize program effectiveness and ensure housing meets safety standards.

**Keywords:** Satisfaction, Planning Quality, Field Supervision, Stimulus Assistance, PLS-SEM.

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## I. INTRODUCTION

Fulfilling the need for decent housing is not merely an effort to meet physical spatial needs, but a fundamental instrument in elevating human dignity, productivity, and the socio-economic welfare of the community (Oliver, 1980). In the context of national development in Indonesia, handling Uninhabitable Houses (RTLH) and reducing the housing backlog for Low-Income Communities (MBR) is addressed by the government through the Self-Help Housing Stimulant Assistance (BSPS) scheme. Based on the Minister of Public Works and Public Housing Regulation Number 7 of 2022, this program utilizes stimulant funds as a catalyst to stimulate self-reliance, mutual cooperation, and the mobilization of community self-help savings to independently improve the quality of their residences.

Although conceptually this program focuses on community-based empowerment aspects, empirical realities in the field show that the successful execution of the BSPS program faces highly complex managerial and operational challenges. In Tolitoli Regency, the successful absorption of assistance and targeting accuracy are not solely determined by the amount of financial allocation provided but depend absolutely on mature project planning quality from the initial phase (Wardhani et al., 2025). Weak planning, which includes inaccuracies in identifying building damage, non-transparent preparation of the Budget Plan (RAB), and unrealistic scheduling, poses a high risk of triggering cost inaccuracy that leads to stalled house rehabilitation processes due to the community's limited companion funds (Mirhosseini et al., 2022).

In addition to the planning dimension, the success of this self-help program is simultaneously controlled by the effectiveness of field supervision. Considering that most Low-Income Communities do not have a background of expertise or technical literacy in civil construction disciplines, the presence of Field Facilitators (TFL) transforms into a crucial quality control instrument (Kerzner, 2017). Intensive field supervision serves to ensure that all stages of physical reconstruction remain within the corridors of standard technical specifications and Detail Engineering Design (DED) (Tengan et al., 2019). Weaknesses in this supervisory function not only degrade time efficiency but also threaten the long-term functional feasibility of the building due to the potential for post-construction structural failure.

From the perspective of public project management, the culmination of integrating planning and supervision governance reflects directly on the satisfaction level of the beneficiaries as the primary stakeholders. To simultaneously unravel, model, and validate the causal interaction patterns among these multidimensional

latent constructs, utilizing the variance-based Structural Equation Modeling (SEM) approach or Partial Least Squares (PLS-SEM) is the most relevant methodological choice in this study.

Previous studies have often analyzed planning and supervision aspects partially or placed them within the context of conventional, capital-intensive construction projects executed by professional contractors (Alzahrani & Emsley, 2013; Rahman et al., 2022). There is a limitation in literature specifically evaluating the synergy of these two aspects in a labor-intensive self-help construction scheme involving Low-Income Communities as the main builders. Therefore, this study aims to fill this empirical gap through structural equation modeling. Using the PLS-SEM approach, this study was designed to scientifically prove how planning quality and the reliability of field supervision interact simultaneously in determining beneficiary satisfaction in the BSPS Program in Tolitoli Regency, thus serving as a basis for strategic policymaking in alleviating slum settlements in the future.

## **II. EXPERIMENTAL PROCEDURE**

### **2.1 Research Design, Population, and Sample**

This study employed a quantitative approach with an explanatory research design to analyze causality relationships between variables (Sugiyono, 2019). The research was conducted in Tolitoli Regency, Central Sulawesi Province, focusing on evaluating the beneficiaries of the Self-Help Housing Stimulant Assistance (BSPS) Program.

The research population included all Heads of Households (KK) who are beneficiaries of the BSPS Program in Tolitoli Regency for the 2023 and 2024 Fiscal Years, totaling 265 households. Sampling was conducted using a non-probability sampling technique with a purposive sampling approach. The sample inclusion criterion was respondents who had completed all stages of physical housing construction in full (100% progress). Based on the 10-times rule criterion in structural equation modeling (Hair, 2014), the minimum sample size was set at ten times the number of manifest indicators. With a total of 24 indicators, the final sample size in this study was set at 240 respondents (N = 240).

### **2.2 Variable Operationalization**

Primary data collection used a structured questionnaire instrument with a 5-point Likert Scale (1 = Strongly Disagree; 5 = Strongly Agree). The latent constructs in this study were operationalized into reflective indicators as follows:

1. Planning Quality Variable (X)  
Measured through three main dimensions:
  - a. Resource and Budget Planning (X1): Clarity of material information, transparency of material prices in the Budget Plan (RAB), and accuracy of distribution time.
  - b. Construction Standards and Building Safety (X2): Mechanical resistance of the main framework to weather/earthquakes, standard material quality, and long-term safety guarantees.
  - c. Safety, Comfort, and Health of Housing (X3): Cross-ventilation circulation, adequate natural lighting, and comfort of domestic spatial layout.
2. Field Supervision Variable (X)  
Measured through three quality control dimensions:
  - a. Construction Inspection and Supervision (X4): Frequency of TFL physical inspections, speed of resolving technical constraints, and physical schedule control.
  - b. Quality and Building Safety Supervision (X5): Checking the quality of supplier materials, clarity of technical instructions, and inspection of main structural elements (sloof, columns, ring balk).
  - c. Environmental Aspects and Occupational Safety Supervision (X6): Cleanliness of site layout, compliance with wearing basic PPE, and mitigation of occupational environmental risks.
3. Beneficiary Satisfaction Variable (Y)  
This is the single endogenous variable representing the psychological response of beneficiaries, measured through six indicators including: satisfaction with information transparency, physical reliability of the building, bureaucratic process, TFL assistance, housing environment safety, and intention to recommend the program.

### **2.3 Data Analysis Technique (PLS-SEM)**

Data analysis was performed using the Partial Least Squares - Structural Equation Modeling (PLS-SEM) method with the help of SmartPLS 4 software. This variance-based approach was selected because it is reliable in handling complex models without requiring the assumption of multivariate normal distribution (Hair, 2014). Statistical testing was executed through two main stages:

1. Measurement Model Evaluation (Outer Model)  
Evaluation was conducted to ensure instrument validity and reliability with the following criteria:

- a. Convergent Validity: The outer loading value of each indicator must be  $> 0.70$ , and the Average Variance Extracted (AVE) value for each construct must be  $\geq 0.50$ .
  - b. Discriminant Validity: Tested using the Fornell-Larcker Criterion (the square root of the AVE of a construct must be higher than its correlation with other constructs) and the Heterotrait-Monotrait (HTMT) ratio with a criterion value of  $< 0.90$ .
  - c. Construct Reliability: Measured based on Cronbach's Alpha and Composite Reliability (CR) values with a minimum threshold of  $\geq 0.70$ .
2. Structural Model Evaluation (Inner Model) and Hypothesis Testing
- Structural model testing was used to observe the predictive power of the model and test hypotheses with the following parameters:
- a. Multicollinearity Test: The Variance Inflation Factor (Inner VIF) value among exogenous variables must be  $< 5.00$ .
  - b. Coefficient of Determination (R<sup>2</sup>): Measures the percentage of endogenous construct variance that can be explained by exogenous constructs.
  - c. Effect Size (f<sup>2</sup>): Assesses the relative contribution of exogenous constructs to endogenous constructs.
  - d. Predictive Relevance (Q<sup>2</sup>): Estimated through a blindfolding procedure to assess out-of-sample predictive capacity with the condition that the value must be  $> 0$ .
  - e. Model Fit: Tested using the Standardized Root Mean Square Residual (SRMR) value with a tolerance limit of  $\leq 0.08$ .

Significance testing of path coefficients to prove the hypotheses (H<sub>1</sub> to H<sub>6</sub>) was conducted using the Bootstrapping resampling method (5,000 sample iterations). A hypothesis is accepted if the t-statistic value is  $> 1.96$  (two-tailed test) and the p-value is  $< 0.05$ .

### **III. RESULTS AND DISCUSSIONS**

#### **3.1 Descriptive Analysis of Respondent Characteristics**

A descriptive analysis of 240 respondents showed that the beneficiaries of the BSPS Program in Tolitoli Regency were dominated by male household heads (63%), with an average respondent age of 54.6 years. The largest age concentration was in the pre-elderly and elderly groups (accumulating to 76.67%). Based on educational background, the majority of respondents were at the basic education level (Elementary/Junior High School) with an accumulation of 49.58%. This educational profile aligns with the dominant livelihood distribution in the informal sector, such as fishermen (27%) and daily laborers (9%). These demographic characteristics confirm that program targeting in the research location has been accurate and prioritized socio-economically vulnerable community groups.

#### **3.2 Measurement Model Evaluation (Outer Model)**

Measurement model evaluation was conducted to test the validity and reliability of all manifest indicators forming latent constructs before hypothesis testing was performed.

##### **3.2.1 Convergent Validity and Construct Reliability**

SmartPLS 4 analysis results showed that all indicators measuring the Planning Quality (X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>), Field Supervision (X<sub>4</sub>, X<sub>5</sub>, X<sub>6</sub>), and Beneficiary Satisfaction (Y) constructs have outer loading values between 0.969 and 0.980, which are well above the standard threshold of  $> 0.70$ . Convergent validity was reinforced by the Average Variance Extracted (AVE) value for each latent construct ranging from 0.943 to 0.952, exceeding the minimum requirement of  $\geq 0.50$ .

Internal consistency and instrument reliability proved to be very solid. Cronbach's Alpha coefficient values ranged from 0.970 to 0.989, and Composite Reliability (CR) values ranged from 0.980 to 0.991. All these parameters have surpassed the critical statistical passing limit of  $\geq 0.70$ .

##### **3.2.2 Discriminant Validity**

Discriminant validity testing was evaluated using the Fornell-Larcker criteria and the Heterotrait-Monotrait (HTMT) ratio. The Fornell-Larcker test results showed that the square root of AVE on the main diagonal is consistently greater than the correlation values between constructs in the columns below it. In addition, all HTMT ratio values were in the score range of 0.611 to 0.831. Because no HTMT value touched or exceeded the absolute threshold of  $< 0.90$ , all latent constructs in this model were declared valid, unique, and proven not to overlap conceptually.

#### **3.3 Structural Model Evaluation (Inner Model) and Hypothesis Testing**

Before evaluating the structural model, a multicollinearity test was conducted by examining the Variance Inflation Factor (Inner VIF) values. Estimation results showed VIF values for all relationship paths ranged from 2.047 to 2.324. These values are far below the tolerance limit of  $< 5.00$ , meaning the model is declared free from collinearity bias.

Structural model testing resulted in a coefficient of determination ( $R^2$ ) value of 0.952 on the endogenous construct of Beneficiary Satisfaction (Y). This empirically proves that 95.2% of the variance or fluctuation in community satisfaction levels can be simultaneously and strongly explained by the dimensions of Planning Quality and Field Supervision. The remaining 4.8% is determined by other factors outside this research model. The predictive power of this model is reinforced by the Predictive Relevance value  $Q^2 = 0.950$  ( $Q^2 > 0$ ) obtained through the blindfolding procedure, as well as the global model fit index with an SRMR value = 0.014 which met the goodness of fit criteria as it was below the standard of  $\leq 0.08$ .

Path coefficient significance testing to answer the six research hypotheses (H1 to H6) was executed using the Bootstrapping resampling method set to 5,000 sample iterations. A summary of the structural testing results is presented in Table 1 below:

**Table 1.** Structural Path Hypothesis Testing Results (Bootstrapping Output)

Hypothesis	Structural Path Relationship (Exogenous Construct → Endogenous)	Path Coefficient	t-Statistic	p-Value	Empirical Conclusion
H <sub>1</sub>	Resource & Budget Planning (X <sub>1</sub> ) → Satisfaction (Y)	0.186	8.171	0.000	Accepted (Significant)
H <sub>2</sub>	Construction Standards & Building Safety (X <sub>2</sub> ) → Satisfaction (Y)	0.211	8.312	0.000	Accepted (Significant)
H <sub>3</sub>	Housing Safety, Comfort & Health (X <sub>3</sub> ) → Satisfaction (Y)	0.217	10.108	0.000	Accepted (Significant)
H <sub>4</sub>	Construction Inspection & Supervision (X <sub>4</sub> ) → Satisfaction (Y)	0.201	9.035	0.000	Accepted (Significant)
H <sub>5</sub>	Quality & Building Safety Supervision (X <sub>5</sub> ) → Satisfaction (Y)	0.191	8.074	0.000	Accepted (Significant)
H <sub>6</sub>	Environmental Aspects & OHS Supervision (X <sub>6</sub> ) → Satisfaction (Y)	0.181	7.923	0.000	Accepted (Significant)

### 3.4 Discussion of Empirical Findings

#### 3.4.1 Contribution of Planning Quality Variables (X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>) to Satisfaction (Y)

Hypothesis testing results empirically proved that all three Planning Quality dimensions had a positive and significant influence in determining final community satisfaction. The Housing Safety, Comfort, and Health dimension (X<sub>3</sub>) was identified as the most dominant predictor in the overall model ( $t = 10.108$ ; coefficient = 0.217). Based on behavioral architecture and settlement planning principles, this occurs because physical quality improvements such as adequate cross-ventilation and optimized natural sunlight openings provide daily comfort impacts that are directly felt by poor families who previously lived in uninhabitable shacks (Sani & Altamirano, 2023).

The success of this dimension was linearly supported by the Construction Standards and Building Safety dimension (X<sub>2</sub>) ( $t = 8.312$ ). Planning compliance with technical standards of structural elements (foundation, sloof, practical columns, and ring balk reinforcements according to earthquake-resistant house principles) provides a very high guarantee of physical security (safety needs) for the beneficiary community. Meanwhile, the Resource and Budget Planning dimension (X<sub>1</sub>) ( $t = 8.171$ ) confirmed that openness of information regarding material specifications and transparency of material unit prices at the Community Self-Help Group (KSM) level effectively mitigates the risk of cost inaccuracy, thereby minimizing the potential for stalled project completion due to limited community self-help funds (Mirhosseini et al., 2022).

#### 3.4.2 Contribution of Field Supervision Variables (X<sub>4</sub>, X<sub>5</sub>, X<sub>6</sub>) to Satisfaction (Y)

During the physical execution phase, field supervision acted as a crucial active quality control instrument to bridge the community's limited construction literacy. The Construction Inspection and Supervision dimension (X<sub>4</sub>) recorded the highest influence value in the supervision variable group ( $t = 9.035$ ; coefficient = 0.201). The intensity of the Field Facilitator's (TFL) physical presence at the construction site functioned effectively as a solver of technical carpentry constraints, accelerated material absorption, and ensured that the physical project progress schedule ran on time (project control) (Kerzner, 2017).

Furthermore, the Quality and Building Safety Supervision dimension (X<sub>5</sub>) ( $t = 8.074$ ) proved that the facilitator's preventive actions in calibrating the quality of materials delivered by suppliers (such as concrete block thickness, wood frame quality, and iron specifications) successfully maintained the reliability of building structure quality even when executed by local self-help workers with a skill gap. Finally, the Environmental Aspects and Occupational Safety Supervision dimension (X<sub>6</sub>) ( $t = 7.923$ ) remained a significant contributor through the arrangement of material layouts (site layout) and organizing the cleanup of dismantled waste, which maintains safety in dense residential areas and minimizes the risk of occupational incidents during labor-intensive construction periods (Tengan et al., 2019). The tangible synergy between transparent detailed planning documents and precise physical supervision in the field becomes an absolute prerequisite to produce comprehensive beneficiary satisfaction.

### 3.5 Study Limitations

However, this study has several limitations that should be acknowledged. First, the research was conducted exclusively in Tolitoli Regency, meaning the findings may not be fully generalizable to other regions with different socio-economic or geographical characteristics. Second, the structural model successfully captured planning and supervision dimensions but left 4.8% of the variance in beneficiary satisfaction unexplained. Future studies are encouraged to expand upon this framework by incorporating other potential moderating variables, such as the community's financial readiness, the specific role of local leadership, or geographical constraints in material distribution.

## IV. CONCLUSION

Based on the Partial Least Squares (PLS-SEM) modeling results on the BPS Program in Tolitoli Regency, planning quality and field supervision proved to contribute very strongly in determining beneficiary satisfaction with a coefficient of determination ( $R^2$ ) of 95.2%. In the planning quality dimension group, the housing safety, comfort, and health aspect ( $X_3$ ) emerged as the most dominant predictor ( $t = 10.108$ ) because meeting the standards for cross-ventilation and natural lighting provides daily comfort directly felt by the community. Meanwhile, in the physical execution phase, the construction inspection and supervision dimension ( $X_4$ ) became the primary quality control factor ( $t = 9.035$ ), where the intensive presence of Field Facilitators (TFL) effectively solved technical carpentry constraints and ensured schedule accuracy in the field.

The Tolitoli Regency Department of Public Housing and Settlement Areas is expected to maintain technical planning standards for self-help housing, especially regarding the fulfillment of adequate air circulation and natural light. Additionally, the technical capacity of TFL needs to be periodically strengthened through structural training to oversee local workers' compliance in applying earthquake-resistant housing principles (sloof, columns, and ring barks). For future research, the model could be expanded by integrating new variables such as the community's level of pure self-help participation or the geographic accessibility index of building material distribution locations.

### Conflict of Interest

There is no conflict to disclose.

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