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The Effect of PERISAI Agent Application Updates on the Effectiveness of Self-Employed Worker Participant Registration: A Survey of Agents' Perceptions at the Gorontalo Branch Office of BPJS Ketenagakerjaan

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Abstract

Updates to agency applications may change how agents register self-employed workers, yet evidence from the agents' perspective remains limited. This study examines the association between perceived updates to the PERISAI agent application and the effectiveness of registering self-employed (non-wage-earner, or BPU) participants at the Gorontalo Branch Office of BPJS Ketenagakerjaan. A cross-sectional online survey using Google Forms collected responses from 68 active PERISAI agents through convenience sampling. The instrument included 15 items on perceived application updates, 12 items on perceived registration effectiveness, and six numeric items comparing performance before and after the update. Data were analyzed using simple and multiple linear regression, HC3 standard errors, bootstrap confidence intervals, and the Wilcoxon signed-rank test. Perceived application updates were positively and significantly associated with registration effectiveness (B = 0.795; 95% CI [0.646, 0.944]; R^2 = 0.633). In the multiple regression model, process speed, reliability and security, and outreach and mentoring support were significant, whereas ease of use and feature completeness were not. Outreach and mentoring support had the largest standardized coefficient (β = 0.349), although the bootstrap intervals of the three significant dimensions overlapped. According to agents' reports, the time required to register one participant decreased from 22.5 to 15.8 minutes, the number of new participants per month increased from 9.7 to 13.6 (median: 9 to 10), and failed registrations per 10 attempts decreased from 2.4 to 1.7. These before-and-after differences remained after two respondents with unusual response patterns were excluded. Because the data are self-reported and there was no comparison group, the findings indicate associations rather than causation. The branch office should prioritize application stability, verification speed, and agent mentoring.

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Keywords:BPJS Ketenagakerjaan, information system quality, PERISAI application, registration effectiveness, self-employed workes.

INTRODUCTION

Informal-sector workers constitute the largest segment of Indonesia's labor market, but their coverage by employment social security remains limited. The February 2026 National Labor Force Survey recorded 87.74 million informal workers, equivalent to 59.42% of employed people (Statistics Indonesia [BPS], 2026b). In May 2026, the number reached 87.88 million, or 59.30% of employed people (BPS, 2026a). BPJS Ketenagakerjaan reported that, as of August 2025, 8.6 million informal workers had enrolled as participants either independently or through communities (Kontan, 2025). These figures refer to different periods and definitions and therefore cannot be compared precisely; nevertheless, they indicate that a large proportion of informal workers remain unenrolled. Expanding coverage among non-wage-earner (Bukan Penerima Upah, BPU) participants requires broader outreach than services delivered through branch offices alone.

To reach this segment, BPJS Ketenagakerjaan operates the PERISAI agency scheme (Penggerak Jaminan Sosial Indonesia, or Indonesian Social Security Mobilizers). Agents conduct outreach, education, participant acquisition, and membership consultations; assist with BPU registration; and receive contributions from prospective participants (BPJS Ketenagakerjaan, n.d.-a).

Agents use the PERISAI application to register participants and process their first contribution payment. Under the registration service rules, coverage becomes active after a prospective participant registers and pays the first contribution (BPJS Ketenagakerjaan, n.d.-b). Application quality therefore affects the entire registration process. In 2026, several branch offices introduced new registration procedures through the PERISAI application and supported agents in using the updated application. For example, outreach at the Jambi Branch Office covered eight data elements required to register new individual BPU participants and the deadline for using the bulk-upload feature (RRI Jambi, 2026). In this study, the PERISAI agent application update refers to the update introduced in March 2026 for agents operating within the service area of the Gorontalo Branch Office of BPJS Ketenagakerjaan. Agents' assessments were based on their experience using the application before and after that update.

The PERISAI studies identified in the literature search for this article focus on system-user satisfaction and participants' psychological factors. Pranita et al. (2019) assessed satisfaction with the PERISAI agency system at the Palembang Branch Office using the End-User Computing Satisfaction (EUCS) model; most responses fell into the agree or strongly agree categories. Sangadji et al. (2025) examined how perceived agent

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credibility, competence, and trust related to brand awareness and purchase interest among BPU participants in Jakarta. Neither study compared conditions before and after an application update or measured agents' registration outcomes.

An unresolved question in the literature reviewed for this article is whether an agency application update is associated with the effectiveness of self-employed participant registration from the agents' perspective. The answer matters to branch offices because it can inform priorities for application stability, verification speed, and agent mentoring. This study addresses the question among agents operating within the Gorontalo Branch Office's service area. It makes three contributions: testing the association between application updates and registration effectiveness, identifying the update dimensions most strongly associated with effectiveness, and comparing registration-performance indicators before and after the update.

Objectives

The objectives are to describe agents' perceptions, test the association between the update and registration effectiveness, identify the update dimensions most strongly associated with effectiveness, and compare registration performance before and after the update. In this article, the term "effect" refers to the statistical meaning of regression analysis on cross-sectional survey data based on agents' perceptions; it does not establish causation.

DISCUSSION

PERISAI Agents and BPU Participant Registration

PERISAI is an agency scheme through which members of the public can receive training, certification, and a registration number before serving as an extension of BPJS Ketenagakerjaan (BPJS Ketenagakerjaan, n.d.-a). The scheme draws on Japan's sharoushi concept and has been enhanced with digital information technology to facilitate operations and reduce fraud risks (Pranita et al., 2019). Agents primarily acquire participants from the informal workforce. BPU registration through an agent involves entering a prospective participant's data, selecting a program, and paying the first contribution through the application.

Application Updates as Changes in System Quality

An application update is treated as a change in the information-system quality experienced by users. The information systems success model developed by (DeLone & McLean, 2003) identifies system quality, information quality, and service quality as determinants of use, user satisfaction, and net benefits; measures for these dimensions are reviewed by (Petter et al., 2008). In mobile banking, Tam & Oliveira, 2017) reported

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positive effects of system, information, and service quality on user satisfaction, with use and satisfaction preceding individual performance. (Davis, 1989) emphasized perceived ease of use and perceived usefulness as determinants of technology acceptance, (while Venkatesh et al., 2003) included facilitating conditions—such as access to technical and organizational assistance—as determinants of use behavior. (Doll & Torkzadeh, 1988) measured end-user computing satisfaction through content, accuracy, format, ease of use, and timeliness; the model has also been applied to the PERISAI agency system (Pranita et al., 2019). Version updates can change processing speed, reliability, and workflow simultaneously, potentially increasing agents' need for outreach and mentoring during the transition (Venkatesh et al., 2003). In commercial applications, (Liu et al., 2021) found that the effectiveness of app evolution shaped perceived usefulness and ease of use, which in turn influenced continuance intention. Updates are not always beneficial: for utilitarian apps, lower update frequency was associated with greater consumer interest because perceived risk was lower (Gong et al., 2021). These latter studies examined commercial-app users rather than organizational agents and are therefore used as background rather than direct comparators. Based on this framework, application updates are measured across five dimensions:

1. Ease of use (X1) refers to the extent to which the interface and registration steps are easy to understand and follow (Davis, 1989).
2. Process speed (X2) refers to the speed of page loading, data submission, and verification as aspects of system quality and timeliness (DeLone & McLean, 2003) and (Doll & Torkzadeh, 1988).
3. Feature completeness and workflow clarity (X3) refer to the extent to which features and on-screen instructions meet registration needs (DeLone & McLean, 2003) and (Doll & Torkzadeh, 1988).
4. System reliability and security (X4) refer to application stability, accurate data storage, and participant-data security (DeLone & McLean, 2003).
5. Outreach and mentoring support (X5) refers to branch-office service quality in the form of outreach, guidance, and responses to reported problems (DeLone & McLean, 2003) and (Venkatesh et al., 2003).

Effectiveness of BPU Participant Registration

Registration effectiveness is informed by the usability definition in ISO 9241-11 (International Organization for Standardization, 2018): effectiveness is the accuracy and completeness with which users achieve specified goals, while efficiency concerns the resources used relative to the results achieved. In this study, registration effectiveness is the extent to which registration achieves the intended result with reasonable time and effort. It is measured through four dimensions: timeliness (Y1), data accuracy and

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completeness (Y2), successful completion of registration (Y3), and target achievement and tangible change (Y4). Y1 represents efficiency; Y2 and Y3 represent accurate and complete task achievement; and Y4 represents the agent's contribution to the branch office's organizational goal of increasing participation. Y4 is not derived from ISO; it was formulated by the researchers to represent that organizational goal.

Hypotheses

The hypotheses follow the framework described above. Higher system quality is expected to improve satisfaction and use, which in turn precede individual performance (DeLone & McLean, 2003; Tam & Oliveira, 2017). Application updates that agents perceive as improvements in system quality are therefore expected to be positively associated with registration effectiveness (H1).

The five update dimensions are tested separately (H2a–H2e) because they represent distinct constructs: ease of use (Davis, 1989); process speed and reliability as aspects of system quality (DeLone & McLean, 2003; Doll & Torkzadeh, 1988); feature completeness and workflow clarity as content and functional quality; and outreach and mentoring as service quality and facilitating conditions (DeLone & McLean, 2003; Venkatesh et al., 2003). The theory does not specify a ranking of the dimensions' relative strengths. Accordingly, the question of which dimension is most strongly associated with effectiveness is treated as exploratory rather than as a separate hypothesis.

Hypotheses H3a–H3c examine three performance indicators corresponding to efficiency (registration time), completion accuracy (registration-failure frequency), and work output (new participants registered). One-sided directional tests were specified because the update was intended to make registration faster and smoother. Table 1 summarizes the hypotheses.

Table 1. Research hypotheses

Code	Hypothesis statement
H1	PERISAI application updates (X) are positively and significantly associated with BPU registration effectiveness (Y).
H2a–H2e	Each dimension (X1–X5) is positively and significantly associated with Y.
H3a	The time required to register one participant is shorter after the update than before the update.
H3b	The number of BPU participants successfully registered per month is higher after the update than before the update.

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Code	Hypothesis statement
H3c	The frequency of failed or repeated registrations is lower after the update than before the update.

Source: Prepared by the authors based on the theoretical framework and previous studies, 2026.

Design and Respondents

This study used a quantitative, associational approach with a cross-sectional survey (Sugiyono, 2019). A Google Forms link was distributed through agent coordinators to active PERISAI agents in the service area of the Gorontalo Branch Office. Non-probability convenience sampling was used to recruit 68 active PERISAI agents, and data were collected from October 20 to 23, 2026. Respondents had to provide consent and confirm that they had used the PERISAI application both before and after the update.

A total of 71 forms were received. Three were excluded: two respondents declined to participate, and one was not an active agent. Thus, 68 responses were analyzed. This sample is below (Green's, 1991) rule-of-thumb recommendations for five predictors—at least 90 respondents for testing the overall model and 109 for testing individual predictors—although simulation evidence suggests that regression-coefficient estimation may require substantially fewer observations per predictor (Austin & Steyerberg, 2015). At a 5% significance level and 0.80 power, n = 68 can detect an effect size of approximately $f^2 = 0.21$ for the overall model and $f^2 = 0.12$ for a single predictor. Smaller effects may go undetected; consequently, non-significant findings should be interpreted cautiously. One respondent gave a score of 4 on all perception items. This respondent was retained, and a reanalysis excluding the respondent led to the same conclusions.

Instrument and Measures

The questionnaire covered respondent characteristics (six items), perceived application updates (15 items across five dimensions), perceived registration effectiveness (12 items across four dimensions), and six numeric items comparing performance before and after the update. Two open-ended questions were optional. Each response was assigned to one primary category based on its content, and category frequencies were counted. Perception items used a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Mean scores were interpreted using 0.80-point intervals: very low (1.00–1.80), low (1.81–2.60), moderate (2.61–3.40), high (3.41–4.20), and very high (4.21–5.00). Items were developed from the dimensions described in Section 2. All questionnaire items are included in Appendix A. The English wording in Appendix A is a translation of the Indonesian questionnaire administered to respondents.

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Data Analysis

Item validity was assessed using corrected Pearson correlations, and reliability was assessed using Cronbach's alpha (Cronbach, 1951). Regression assumptions were examined using the Shapiro–Wilk, Breusch–Pagan, and Glejser tests, variance inflation factors (VIF), and the Durbin–Watson statistic (Ghozali, 2018). H1 was tested using simple linear regression, and H2a–H2e were tested using multiple linear regression with mean scores for the five dimensions. Mean Likert-item scores were treated as interval-level data, a practice considered defensible for composite scores (Norman, 2010); Spearman correlations were used as a nonparametric check. H3a–H3c were tested using one-sided Wilcoxon signed-rank tests, with paired t-tests and Cohen's dz reported for comparison. When the multiple-regression residuals deviated from normality, coefficients were re-evaluated using HC3 heteroskedasticity-consistent standard errors and 95% percentile bootstrap intervals based on 5,000 resamples. Sensitivity analyses excluded the respondent with uniform perception responses. For H3, additional sensitivity analyses excluded the respondent with an extreme participant count (respondent 5) and the respondent with an unusual response pattern (respondent 32). Typical changes were summarized using the Hodges–Lehmann estimator, mean differences were accompanied by 95% percentile bootstrap intervals, and Holm correction was applied to the three H3 tests. Analyses by agent tenure used Spearman correlations and were exploratory. Potential common-method bias was examined using Harman's single-factor test (Podsakoff et al., 2003), and sensitivity power was calculated using the noncentral F distribution. The significance level was 5%.

Research Ethics

Participation was voluntary, and consent was obtained on the first page of the form. Respondents' names and agent registration numbers were not collected. Data are reported in aggregate and were used only for research purposes.

Results

Results are presented sequentially, from respondent characteristics and instrument quality to tests of the three hypothesis groups. Overall, perceived application updates were strongly associated with registration effectiveness. Three of the five update dimensions were significant in the partial regression, and all three performance indicators improved in the before-and-after comparisons.

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Respondent Profile

Most respondents were aged 25–44 years (63.2%) and held a bachelor's degree (45.6%). Most used Android devices (86.8%). Nearly half operated primarily in Gorontalo City (48.5%). The full profile is presented in Table 2.

Table 2. Respondent Profile

Characteristic	Respondent distribution (n = 68)
Age group	25–34 years: 22 (32.4%); 35–44 years: 21 (30.9%); 45–54 years: 15 (22.1%); under 25 years: 6 (8.8%); 55 years or older: 4 (5.9%).
Gender	Male: 41 (60.3%); female: 27 (39.7%).
Highest educational attainment	Bachelor's degree: 31 (45.6%); senior high school or equivalent: 25 (36.8%); diploma: 8 (11.8%); other: 3 (4.4%); postgraduate degree: 1 (1.5%).
Agent tenure	1–2 years: 20 (29.4%); more than 2 to 3 years: 18 (26.5%); more than 3 to 5 years: 18 (26.5%); less than 1 year: 7 (10.3%); more than 5 years: 5 (7.4%).
Primary device	Android: 59 (86.8%); iOS: 9 (13.2%).
Main operating area	Gorontalo City: 33 (48.5%); Gorontalo Regency: 21 (30.9%); Bone Bolango Regency: 14 (20.6%).

Source: Authors' analysis of primary data, 2026.

Instrument Quality

All 27 perception items were valid. The calculated r values ranged from 0.316 (item TD3) to 0.667 (item KD2), exceeding the critical r value of 0.239 at n = 68 and a 5% significance level. The overall variables and all dimensions met the reliability criterion (Table 3). Harman's single-factor test showed that the first factor accounted for 34.2% of the variance across all items, below the 50% threshold, indicating that a single general factor did not dominate. This result does not completely rule out common-method bias.

Table 3. Instrument Reliability

Scope	Number of items	Cronbach's alpha
Application updates (X)	15	0.89
X1 – Ease of use	3	0.75

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Scope	Number of items	Cronbach's alpha
X2 – Process speed	3	0.70
X3 – Feature completeness and workflow clarity	3	0.70
X4 – Reliability and security	3	0.81
X5 – Outreach and mentoring support	3	0.80
Registration effectiveness (Y)	12	0.83
Y1 – Timeliness	3	0.75
Y2 – Data accuracy and completeness	3	0.82
Y3 – Successful completion	3	0.76
Y4 – Target achievement and tangible change	3	0.82

Source: Authors' analysis of primary data, 2026

Descriptive Statistics of the Variables

Perceptions of application updates fell in the high category (mean = 3.80; Table 4), as did registration effectiveness (mean = 3.85). Outreach and mentoring support had the lowest mean (3.59). Reliability and security (3.92) and ease of use (3.91) had the highest dimension means.

At the item level, the highest means were for participant-data security (KD3, 4.18), correct data storage (KD2, 4.10), and consistency between participant data and identity documents (TD1, 4.07). The lowest means were for responses to reported problems (DK3, 3.41), infrequency of application disruptions (KD1, 3.47), and clarity of guidance (DK2, 3.51).

Table 4. Descriptive statistics for variables and dimensions

Variable and dimension	Mean	Standard deviation	Category
X – Application updates	3.80	0.57	High
X1 – Ease of use	3.91	0.75	High
X2 – Process speed	3.76	0.69	High
X3 – Feature completeness and workflow clarity	3.81	0.67	High

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Variable and dimension	Mean	Standard deviation	Category
X4 – Reliability and security	3.92	0.79	High
X5 – Outreach and mentoring support	3.59	0.79	High
Y – Registration effectiveness	3.85	0.57	High
Y1 – Timeliness	3.79	0.77	High
Y2 – Data accuracy and completeness	3.93	0.81	High
Y3 – Successful completion	3.82	0.80	High
Y4 – Target achievement and tangible change	3.86	0.84	High

Source: Authors' analysis of primary data, 2026.

Regression Assumption Tests

For the simple regression, the residuals were normally distributed (Shapiro–Wilk W = 0.982; p = 0.442). No heteroskedasticity was detected (Breusch–Pagan p = 0.628; Glejser p = 0.523), and the Durbin–Watson statistic was 2.20.

For the multiple regression, residuals showed a mild deviation from normality (W = 0.962; p = 0.036). No heteroskedasticity was detected (Breusch–Pagan p = 0.491; Glejser p = 0.321), and the Durbin–Watson statistic was 2.26. VIF values ranged from 1.45 to 2.11, with a minimum tolerance of 0.475, indicating no multicollinearity. The normality deviation was examined further using HC3 standard errors and bootstrap intervals, which are reported alongside the multiple-regression results.

Application Updates and Registration Effectiveness (H1)

Application updates were positively and statistically significantly associated with registration effectiveness (B = 0.795; 95% confidence interval [0.646, 0.944]; p < 0.001; R^2 = 0.633). This relationship represents an association in perception-based data, not evidence of a causal effect.

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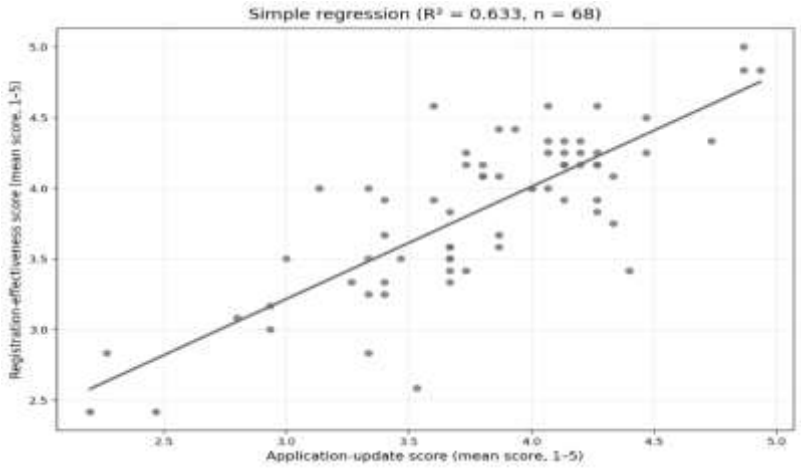


Figure 1. Scatterplot of perceived application-update scores and registration-effectiveness scores with the regression line

Update Dimensions and Registration Effectiveness (H2)

The multiple-regression model was significant ($F(5, 62) = 23.63$; $p < 0.001$; $R^2 = 0.656$; adjusted $R^2 = 0.628$). Three dimensions were significant: process speed, reliability and security, and outreach and mentoring support. The last dimension had the largest standardized coefficient, although the bootstrap intervals for the three significant dimensions overlapped. H2b, H2d, and H2e were supported, whereas H2a and H2c were not. Table 5 presents the coefficients for each dimension.

Table 5. Multiple linear regression results (dependent variable)

Predictor	B	Standard error	β	t	p
Constant	0.864	0.295		2.92	0.005
X1 – Ease of use	0.062	0.081	0.082	0.76	0.449
X2 – Process speed	0.223	0.074	0.272	3.03	0.004
X3 – Feature completeness and workflow clarity	0.076	0.079	0.090	0.96	0.339
X4 – Reliability and security	0.184	0.073	0.256	2.51	0.015
X5 – Outreach and mentoring support	0.248	0.068	0.349	3.68	< 0.001

Source: Authors' analysis of primary data, 2026.

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Robustness checks supported these results. Using HC3 standard errors (t test, 62 degrees of freedom), the p values for X2, X4, and X5 were < 0.001, 0.017, and < 0.001, respectively, whereas X1 (p = 0.447) and X3 (p = 0.432) remained non-significant. The 95% percentile bootstrap intervals for B (5,000 resamples; random seed 2026) did not include zero for X2 (0.115–0.350), X4 (0.059–0.346), and X5 (0.126–0.366). The intervals for X1 (−0.115–0.187) and X3 (−0.077–0.276) included zero. All dimensions remained positively correlated with effectiveness (r = 0.54–0.68), and correlations among the update dimensions ranged from 0.38 to 0.64.

Before-and-After Comparison (H3)

All three indicators moved in the expected direction. The time required to register one participant decreased by 29.9%, the monthly number of new participants increased by 40.5%, and failures per 10 attempts decreased by 28.6%. The largest change was in registration time (Cohen's dz = −1.31). The Hodges–Lehmann estimator, which is more robust to outliers than the mean difference, indicated typical changes of −6.5 minutes, +3 participants per month, and −0.5 failed attempts. The 95% percentile bootstrap intervals for the mean differences did not include zero for any of the three indicators (Table B.21). H3a, H3b, and H3c were supported (Table 6).

Table 6. Registration performance before and after the application update

Indicator	Before (mean; median)	After (mean; median)	Mean difference	Wilcoxon W	p (one-sided)	Cohen's dz	Respondents improved
Time per participant (minutes)	22.54; 21.5	15.79; 15.0	-6.75	25.0	< 0.001	-1.31	61 (89.7%)
New participants per month (persons)	9.66; 9.0	13.57; 10.0	+3.91	1,560.5	< 0.001	0.56	49 (72.1%)
Failures per 10 attempts (count)	2.37; 2.0	1.69; 1.0	-0.68	562.0	0.010	-0.31	39 (57.4%)

Source: Authors' analysis of primary data, 2026.

Note. W is the sum of positive ranks (after minus before). A respondent was classified as improved if registration time or failures decreased, or if the number of

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participants increased. The two-sided Wilcoxon p values were < 0.001, < 0.001, and 0.021, respectively. Hodges–Lehmann estimates for the after-minus-before differences were −6.5 minutes, +3 participants, and −0.5 failures.

The change in participant numbers was influenced by one respondent who reported an increase from 46 to 90 participants per month (respondent 5), the highest value in both measurement periods. Without this respondent (n = 67), the mean number of participants increased from 9.12 to 12.43, and the difference remained significant (Cohen's dz = 0.66; one-sided Wilcoxon p < 0.001). Respondent 32 reported zero new participants per month both before and after the update, despite rating item PT1 (the number of participants increased) as 4. Their reported registration time decreased from 40 to 18 minutes. Both respondents were retained because the data provided no conclusive basis for treating their answers as erroneous. Decisions for all three hypotheses remained unchanged when the two respondents were excluded separately or together (Table B.21). Holm correction for the three tests also did not change the conclusions (two-sided adjusted p values: < 0.001, < 0.001, and 0.021).

Not all respondents experienced improvement. Two respondents reported longer registration times, 10 reported fewer participants, and 19 (27.9%) reported more frequent failures. The change in participant counts from the numeric items was only weakly correlated with the perceived score on item PT1 (Spearman ρ = 0.21; p = 0.083), and eight respondents agreed or strongly agreed with PT1 without reporting an increase in participant numbers. Perception-based measures and numeric self-reports therefore cannot be treated as interchangeable. Figure 2 summarizes the changes in all three indicators.

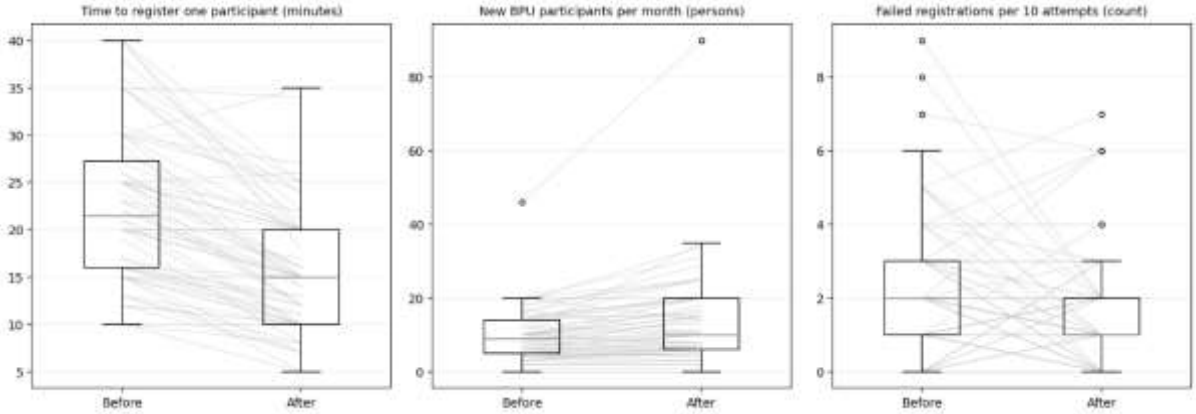


Figure 2. Comparison of registration time, monthly participant counts, and failures before and after the application update

Exploratory analyses by agent tenure showed that the increase in the mean number of participants per month was not monotonic. From the shortest to the longest tenure group, the increases were 1.1, 2.2, 3.9, 2.6, and 19.4 participants, respectively

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(Table B.17). The group with more than five years of tenure (n = 5) included respondent 5. Without that respondent (n = 4), the mean number of participants rose from 11.5 to 24.8, remaining the largest increase but based on only four individuals. The Spearman correlation between tenure and the change in participant numbers was weak (ρ = 0.29; p = 0.015; excluding respondent 5: ρ = 0.26; p = 0.033), whereas changes in registration time (ρ = 0.08) and failures (ρ = 0.00) were not associated with tenure. These analyses were exploratory and were not adjusted for multiple testing. More experienced agents also had higher baseline participant counts; therefore, the findings should not be interpreted as evidence that the update benefited longer-tenured agents more.

Open-Ended Responses

Forty respondents answered the question about the main difficulty they experienced. The most frequently reported issue was application instability—such as the application closing unexpectedly, requiring users to log in again, or becoming unresponsive—which was mentioned by 17 respondents. Six respondents reported slow data verification, five reported delays in updating contribution-payment status, three mentioned weak networks and slow loading, three reported unclear error messages, and three had difficulty adapting to the new interface. One respondent mentioned that older participants found the application confusing, while two reported no significant difficulties.

Thirty-four respondents provided suggestions for improvement. The most frequent suggestion was a shorter guide or video tutorial (9 respondents), followed by clearer error messages (7), registration-status notifications (5), improved stability on weak networks (5), and more regular outreach and mentoring (5). Three respondents offered general appreciation.

Application Updates and Registration Effectiveness

The H1 result indicates a strong association between application updates and registration effectiveness. This finding is consistent with the (DeLone & McLean, 2003) information-systems success framework, in which improvements in system and service quality can translate into net benefits for users. In this study, the perceived benefits take the form of faster registration, greater accuracy, and more frequent completion of registration processes.

The direction of this relationship is similar to the findings of (Tam & Oliveira, 2017) among mobile-banking users, where system, information, and service quality were associated with user satisfaction, and use and satisfaction preceded individual performance. This study did not measure satisfaction or use as mediating variables; it tested the direct association between perceived application updates and registration effectiveness, so the mediating pathways cannot be assessed. Because the contexts and

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respondents differ, this consistency in direction should not be treated as a replication. A meta-review of 53 studies on information-systems success models reported that some relationships among model dimensions were supported only sporadically and that the full model had not been tested consistently (Jeyaraj, 2020). The findings from one branch office should therefore be viewed as additional evidence rather than comprehensive confirmation.

The strength of the relationship (r = 0.80) should be interpreted cautiously. Both variables were measured using the same respondents' perceptions, so common-method bias may have increased the correlation. Did not use agreement scales, and all three changed in the expected direction, suggesting that the relationship is not solely an artifact of using the same response scale. However, these indicators are also retrospective self-reports, and the change in participant counts was only weakly correlated with the perceived score on item PT1 (Section 4.7). The two types of measures therefore do not strongly corroborate each other. Harman's single-factor test also cannot completely rule out common-method bias (Podsakoff et al., 2003).

Previous PERISAI studies focused on system-user satisfaction (Pranita et al., 2019) and participants' psychological factors (Sangadji et al., 2025). This study adds an agent-level measure of registration effectiveness and a before-and-after comparison in one branch office. Because the earlier studies used different outcomes, respondents, and geographic settings, comparisons are qualitative rather than direct.

Dimensions Most Strongly Associated with Effectiveness

Process speed, reliability and security, and outreach and mentoring support were significantly associated with effectiveness after the other dimensions were controlled. Agents' work is repetitive and time-sensitive. Registration is completed only when verification proceeds quickly, data are stored accurately, and the first contribution can be paid; it is therefore reasonable that speed and reliability are closely related to effectiveness.

Outreach and mentoring support had the largest standardized coefficient (β = 0.349), although it had the lowest mean score (3.59). This dimension therefore represents both the clearest improvement opportunity and a potentially important lever. The bootstrap intervals for the three significant dimensions overlapped, so their relative strengths cannot be ranked confidently. During a transition, agents who understand the changes and receive prompt assistance may find it easier to complete registrations. This finding is consistent with the facilitating-conditions concept in technology-acceptance theory (Venkatesh et al., 2003). (Sangadji et al., 2025) also recommended strengthening trust in PERISAI agents through education, transparency, and communication. That study focused on participants rather than agents and examined brand awareness and purchase

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interest; the overlap is therefore limited to the broader message that human and service factors matter alongside the system itself.

Ease of use and feature completeness were not significant in the partial regression. This does not mean they are unimportant. Both were positively correlated with effectiveness (r = 0.60 and 0.54, respectively) and were moderately to strongly correlated with other dimensions, such as the correlation of r = 0.64 between ease of use and reliability. Their unique contributions were smaller when all dimensions were included in the same model. Another possible explanation is that experienced agents are already skilled, making differences in ease of use less consequential for their outcomes. This interpretation was not tested and requires data that distinguish newer from longer-tenured agents.

This pattern differs from (Pranita et al., 2019), who found that ease of use significantly affected PERISAI user satisfaction in Palembang, whereas timeliness did not. In the present study, process speed was significant, but ease of use was not. The difference may stem from the dependent variable (satisfaction versus registration effectiveness), the earlier study's sample of 100 agents and participants, its measurement framework (EUCS does not include the service-support dimension that was strongest in this study), and the timing of data collection, when the system had only recently been launched. These explanations have not been tested. The two studies therefore cannot be compared directly, and their differing results should not be treated as a contradiction.

Reported Performance Before and After the Update

The clearest improvement was in registration time. Mean time decreased from 22.5 to 15.8 minutes, and 61 of the 68 respondents (89.7%) reported shorter registration times. The effect size was large (Cohen's dz = −1.31), and the Hodges–Lehmann estimate indicated a typical decrease of 6.5 minutes.

The increase in new participants per month (40.5% in the mean) should be interpreted more cautiously. The median increased only from 9 to 10 participants, and the Hodges–Lehmann estimate was 3 participants, indicating that the increase was concentrated among some agents. One respondent (respondent 5, from 46 to 90 participants) accounted for approximately 17% of the total increase; without that respondent, the mean still rose by 36.3% (from 9.12 to 12.43). Ten respondents reported fewer participants. The pattern by agent tenure was non-monotonic and exploratory (Section 4.7), so it should not be interpreted as a particular advantage for longer-tenured agents.

The reduction in registration failures had the smallest effect (Cohen's dz = −0.31; 95% bootstrap interval for the mean difference: −1.21 to −0.16 failures), and 19

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respondents (27.9%) reported more frequent failures. This aligns with the open-ended responses: 17 of the 40 respondents identified application instability as their main difficulty. The reported changes therefore appear beneficial for most agents, but improvements in stability have not been uniform.

Theoretical and Practical Implications

Theoretically, this study applies an information-systems success framework to a context not specifically identified in the literature reviewed for this article: intermediary agents using an organizational application to register social-security participants. The service dimension—outreach and mentoring support—was significantly associated with effectiveness alongside system-quality dimensions. This finding supports assessing service quality alongside system quality when evaluating application updates (DeLone & McLean, 2003; Petter et al., 2008). Because the design is cross-sectional and perception-based, the findings provide a basis for hypotheses to be tested with system-generated data and a comparison group rather than a comprehensive test of the theory. Practically, the results point to four priorities:

1. Prioritize application stability. Unexpected closures, repeated login requests, and similar disruptions were the most frequently reported problems. Data verification should also be accelerated during peak hours.
2. Maintain and strengthen agent mentoring. Responses to reported problems received the lowest item score (3.41), while support was the dimension most strongly associated with effectiveness. Regular meetings and a responsive help channel may assist agents in completing registrations.
3. Improve user guides and error messages. Nine respondents recommended shorter guides or video tutorials, and seven recommended clearer error messages. These changes address problems explicitly reported by agents and may be especially useful for new agents.
4. Consider registration-status notifications. Five respondents requested registration-status notifications, and five reported delays in updating contribution-payment status. Notifications could reduce uncertainty for agents and prospective participants.

Limitations

The data are self-reported and therefore vulnerable to social-desirability and common-method biases. Harman's single-factor test (first factor: 34.2%) does not eliminate these biases, and the perception measures were only weakly correlated with the numeric self-report measures (Section 4.7). The before-and-after comparison depends on respondents' recall, and numeric estimates may have been rounded. Recall

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bias could either exaggerate or reduce the differences. Respondent 32 reported zero participants in both periods despite a positive perception rating, so an input error cannot be ruled out, although the main conclusions did not change when this respondent was excluded. The instrument was developed for this study and assessed for item validity and reliability, but its dimensional structure has not been confirmed through factor analysis.

The cross-sectional survey had no comparison group and did not measure perceptions before the update. The reported performance changes cannot be separated from other factors that may have changed at the same time, including agent incentives, registration seasonality, accumulated experience, and outreach programs. The findings therefore represent statistical associations rather than causation; the term “effect” in the title and hypotheses should be understood in this statistical sense (Section 1.2).

The sample was drawn through non-probability convenience sampling from a single branch office, so the findings do not represent all agents and cannot be generalized to other regions. Agents who agreed to participate and remained active at the time of the survey may have been more satisfied or successful than those who had stopped working, creating a potential upward selection bias. The sample size (n = 68) was below the rule-of-thumb recommendation for five predictors (Green, 1991), although the sensitivity power analysis indicated that the model could detect a per-predictor effect of approximately $f^2 = 0.12$ with 0.80 power (Section 3.1). The non-significant dimensions (X1 and X3) may therefore reflect limited power and correlations among dimensions (r = 0.38–0.64), rather than an absence of association. The mild normality deviation in the multiple regression was examined using HC3 standard errors and bootstrap intervals, and the conclusions were unchanged. Tenure analyses were exploratory, based on small groups, and were not adjusted for multiple testing.

CONCLUSION

Among the 68 PERISAI agents at the Gorontalo Branch Office of BPJS Ketenagakerjaan, perceived application updates (mean = 3.80) and registration effectiveness (mean = 3.85) were both rated high. Outreach and mentoring support had the lowest mean (3.59). The regression analysis showed that perceived application updates were positively and significantly associated with registration effectiveness ($B = 0.795$; $p < 0.001$; $R^2 = 0.633$). In the multiple regression, process speed, reliability and security, and outreach and mentoring support were significant, while ease of use and feature completeness were not. Outreach and mentoring support had the largest standardized coefficient ($\beta = 0.349$), but the bootstrap intervals for the three significant dimensions overlapped, so their relative strengths could not be established conclusively.

According to agents’ reports, after the update, mean registration time decreased from 22.5 to 15.8 minutes, the mean number of new participants per month increased

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from 9.7 to 13.6 (median: 9 to 10), and failures per 10 attempts decreased from 2.4 to 1.7. All three differences were statistically significant and remained after sensitivity analyses excluding respondents with unusual response patterns; the largest effect was observed for registration time. However, 19 respondents (27.9%) reported more frequent failures, and the before-and-after differences cannot be separated from other factors that may have changed concurrently. Given the self-reported, retrospective data and the lack of a comparison group, the findings should be interpreted cautiously and do not establish causation.

For the Gorontalo Branch Office, agent mentoring should be strengthened and responses to reported problems accelerated, particularly because the item measuring response to reported problems received the lowest score (3.41). Application developers should prioritize system stability, faster verification during peak hours, clearer error messages, and registration-status notifications.

Future research should use objective system-generated data, such as processing time and registrations per agent, and employ a comparison group or repeated measurements before and after an update to test causal explanations more rigorously. Studies should also cover multiple branch offices using probability sampling, confirm the instrument's dimensional structure through factor analysis, and test whether agent tenure moderates the association between application updates and registration effectiveness.

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