

THE ROLE OF SERVICE MANAGEMENT AND INSTITUTIONAL TRUST IN ENHANCING RESIDENTS' COMFORTABLE TO STAY: LESSONS FROM THE HOUSEHOLD GAS NETWORK PROGRAM IN BONTANG CITY

Moch Arif Rochman^{1*}, Suhermin²

¹ Doctoral Program in Management Science, Indonesian College of Economics
STIESIA Surabaya

² Doctoral Program in Management Science, Indonesian College of Economics
STIESIA Surabaya

*Corresponding Author: arieve21@yahoo.com

Abstract: This study examines the role of service management and institutional trust in enhancing residents' comfortable to stay, drawing lessons from the household gas network (jargas) program in Bontang City, Indonesia. Bontang is a strategic industrial municipality in East Kalimantan with a population of approximately 190,000 and one of the highest regional GDP per capita levels in the province, driven by petrochemical and gas-based industries. The city has implemented 18,436 household gas connections and is scheduled to receive 10,553 additional connections in 2025–2026 through the national budget, extending coverage across 15 urban districts. The development of jargas is under the authority of the central government, as stipulated in Law No. 23 of 2014 on Regional Government, while local administrations support implementation and community engagement. Using a quantitative survey and Partial Least Squares Structural Equation Modeling (PLS-SEM), this research explores how perceptions of economic benefits, social impacts, and risks affect residents' comfort, with service satisfaction as a mediator and institutional trust as a moderator. Results reveal that well-managed service quality—characterized by reliability, responsiveness, and equitable access—significantly enhances comfort, whereas perceived social tensions and safety risks undermine it. Service satisfaction partially mediates the effects of perceived benefits, social issues, and risks, while institutional trust reduces the negative influence of risks. The findings highlight that beyond technical expansion, credible governance and sound service management are essential for sustaining public support and improving community well-being in large-scale energy infrastructure initiatives.

Keywords: service management; institutional trust; household gas network; residents' comfort; public service quality; Bontang City

1. Introduction

Indonesia's national agenda for sustainable energy underscores the importance of expanding clean and affordable energy access, particularly in urban areas. One of the flagship initiatives is the household gas network (jargas) program, which seeks to provide piped natural gas directly to residents. By reducing reliance on imported liquefied petroleum gas (LPG) and improving household energy efficiency, this program not only supports the government's energy transition goals but also aligns with broader socio-economic development strategies. Bontang City represents a significant case in this national effort. As a rapidly growing industrial and residential hub in East Kalimantan, Bontang faces increasing demand for reliable, low-cost energy. According to recent data, the city has already installed 18,436 household gas connections and is scheduled to add 10,553 service points between 2025 and 2026, funded through the national budget. This expansion aims to reach 14 of 15 additional urban districts,

reflecting both the city's commitment and the central government's prioritization of jargas as part of infrastructure development.

Despite these advances, the success of energy infrastructure programs is not solely determined by technical deployment. Residents' perceptions—particularly regarding economic benefits, social impacts, and safety risks—play a crucial role in shaping their willingness to adopt and remain comfortable with such initiatives. Equally important are service management practices, including reliability, responsiveness, and equitable access, which influence satisfaction and trust in government institutions. Without effective management and credible governance, even well-designed programs may encounter resistance, eroding long-term community support.

Previous studies on jargas and similar energy initiatives have predominantly focused on technical feasibility, financial efficiency, or engineering design, with limited attention to the socio-behavioral dimensions that determine public acceptance. Research addressing how service management and institutional trust interact with residents' comfort to stay remains sparse, particularly in the context of medium-sized cities like Bontang. Bridging this gap is essential for policymakers to develop strategies that integrate operational performance, governance credibility, and citizen well-being.

This study aims to analyze how perceptions of economic benefits, social impacts, and risks affect residents' comfort to stay in Bontang, with service satisfaction as a mediating variable and institutional trust as a moderator. By situating the research within the household gas network program, it provides theoretical contributions to the literature on service management and public trust, while offering practical guidance for designing socially sustainable energy infrastructure policies.

2. Literature Review

2.1 Theoretical Foundations

This research draws upon four main theoretical perspectives. Social Exchange Theory (Blau, 1964) posits that individuals evaluate participation in programs based on an appraisal of costs and rewards; when benefits outweigh perceived burdens, willingness to accept and remain engaged increases. In the context of household gas networks, residents are more likely to support and feel comfortable with the service when it delivers clear financial savings and convenience.

Service Quality Theory (Parasuraman, Zeithaml, & Berry, 1988) explains how the reliability, responsiveness, and assurance of a service influence user satisfaction, which in turn shapes behavioral and attitudinal outcomes. Applied to public energy infrastructure, the quality of installation, supply continuity, and complaint handling are key to maintaining user comfort.

Trust Theory highlights that citizens' confidence in governmental institutions is essential for overcoming uncertainty in public programs (Mayer, Davis, & Schoorman, 1995). Institutional trust—reflecting perceptions of fairness, transparency, and competence—helps mitigate concerns about technical failures or safety risks, fostering public endorsement even when hazards cannot be entirely eliminated.

Research on technology and infrastructure acceptance (Devine-Wright, 2007) and theories of residential comfort and place attachment highlight that community acceptance is not only a matter of technical efficiency but also of lived experiences, perceived safety, and quality of life. These perspectives provide the conceptual foundation for defining *comfortable to stay* as a multidimensional outcome that reflects security, well-being, and social harmony.

2.2 Key Constructs and Indicators

- Perceived Economic Benefits (X1): refer to residents' expectations of the tangible financial and efficiency advantages derived from the household gas network. These include perceived reductions in monthly energy costs, improved energy efficiency, and the stability of gas supply.
- Perceived Social Impacts (X2): capture the extent to which the program is seen to affect neighborhood relationships and social cohesion. This construct reflects perceptions of fairness in access to services, the maintenance of community harmony, and the potential for conflict or tension during the implementation process.
- Perceived Risks (X3): are defined as residents' concerns regarding the safety and technical reliability of the system. Indicators include worries about possible gas leaks or accidents, equipment malfunction or technical failure, and interruptions to gas supply that could undermine confidence in the program.
- Service Satisfaction (Z): represents residents' evaluations of the quality of service management. It is measured through perceptions of supply reliability, responsiveness to complaints, the quality of installation, and the ease of administrative procedures related to the service.
- Institutional Trust (W): denotes residents' confidence in the government's ability to manage and oversee the household gas network. It encompasses beliefs in government transparency, fairness of distribution, technical competence, and long-term commitment to sustaining the program.
- Comfortable to Stay (Y): reflects the outcome variable of interest, conceptualized as residents' overall sense of comfort in their living environment. It integrates feelings of safety, satisfaction with service delivery, and well-being, reflecting both physical security and social harmony that support the intention to remain in place.

2.3 Hypotheses Development

Based on the theoretical perspectives and empirical insights discussed earlier, several hypotheses are advanced to guide the analysis. First, it is proposed that perceived economic benefits from the household gas network, such as cost savings, efficiency, and supply stability, exert a positive effect on residents' comfortable to stay (H1). In contrast, perceived social impacts, particularly concerns about fairness of access, community harmony, and potential conflict, are expected to negatively affect residents' comfort (H2). Similarly, perceived risks, including safety concerns and technical failures, are hypothesized to reduce residents' comfort to stay (H3). Meanwhile, service satisfaction—reflecting residents' evaluations of service reliability, responsiveness, and administrative quality—is anticipated to positively influence comfort (H4).

Beyond these direct effects, this study further proposes that service satisfaction acts as a mediator. Specifically, it is expected to transmit the effects of perceived economic benefits (H5), perceived social impacts (H6), and perceived risks (H7) onto residents' comfort, thereby clarifying the mechanism through which perceptions translate into overall comfort with the program. Finally, grounded in Trust Theory, institutional trust is hypothesized to moderate the relationship between perceived risks and comfort to stay. In particular, higher levels of institutional trust are expected to buffer or weaken the negative impact of risk perceptions on residents' comfort (H8).

2.4 Empirical Studies and Research Gap

Studies on public service management have shown that service quality strongly predicts user satisfaction, which is an important determinant of continued use and loyalty (Zeithaml, Berry, & Parasuraman, 1996). In energy policy literature, research on the social acceptance of infrastructure—such as renewable energy plants or natural gas pipelines—has underlined the significance of perceived risks and institutional trust (Devine-Wright, 2007). However, empirical evidence integrating these constructs with residents' comfort to stay, particularly in developing urban contexts, remains limited.

Investigations into household gas networks in Indonesia have largely focused on operational feasibility, cost analysis, or environmental benefits (KESDM, 2024). Few studies explicitly examine how service management practices and trust in government shape community well-being. Moreover, the mediating function of service satisfaction and the moderating role of institutional trust in the relationship between perceptions and comfort to stay have not been thoroughly tested in mid-sized cities like Bontang.

3. Method

3.1 Research Design and Approach

This study employs a quantitative research design using a cross-sectional household survey conducted in Bontang City. The choice of a quantitative approach is motivated by the objective to test theory-driven hypotheses concerning the relationships among perceived economic benefits, social impacts, risks, service satisfaction, institutional trust, and residents' comfort to stay. To analyze these relationships, the study applies Partial Least Squares Structural Equation Modeling (PLS-SEM), an advanced variance-based technique suitable for examining complex models that incorporate both mediation and moderation effects.

PLS-SEM is particularly appropriate for this study because it accommodates reflective measurement models, is robust against violations of multivariate normality, and performs reliably with small-to-moderate sample sizes, which are common in community-based survey research. Moreover, the technique facilitates the simultaneous evaluation of measurement reliability, structural paths, and indirect effects, thereby providing comprehensive insights into the mechanisms linking perceptions of household gas networks with residents' comfort to stay.

3.2 Research Site and Population

The empirical study was conducted in Bontang City, East Kalimantan, Indonesia, which has been designated as a priority location for the national expansion of the household gas network (*jargas*). As of 2024, the city operated 18,436 active household connections, with a government plan to provide an additional 10,553 connections during 2025–2026, extending coverage to 14 urban districts. Accordingly, the population of this research consists of all households that are either already connected to the *jargas* system or officially registered as recipients in the forthcoming expansion.

A minimum sample size of 300 households was determined through power analysis for PLS-SEM, ensuring sufficient statistical power for detecting hypothesized relationships. To improve generalizability and representativeness, the sample was stratified according to the distribution of existing and planned *jargas* connections across districts, followed by stratified random sampling. Data collection was carried out using a structured questionnaire, administered through both face-to-face interviews and online distribution. Respondents evaluated the survey items on a five-point Likert scale ranging from “*strongly disagree*” (1) to “*strongly agree*” (5). The instrument comprised demographic questions as well as validated items measuring

perceived economic benefits, social impacts, risks, service satisfaction, institutional trust, and residents' comfortable to stay.

3.3 Measurement of Variables

All constructs in this study were operationalized as reflective latent variables, measured through multiple indicators adapted from established scales and adjusted to the context of the household gas network program in Bontang City. Responses were recorded using a five-point Likert scale ranging from “*strongly disagree*” (1) to “*strongly agree*” (5).

Perceived Economic Benefits (X1) capture residents' expectations of financial and functional advantages associated with jargas services. Indicators include perceived cost reductions in household energy expenditures, improved energy efficiency compared to alternative fuels, and the reliability of gas supply.

Perceived Social Impacts (X2) represent the social consequences of the jargas program for neighborhood life. Indicators assess residents' views of fairness in access to connections, the degree to which the program fosters or disrupts community harmony, and the perceived likelihood of conflicts during program implementation.

Perceived Risks (X3) reflect concerns regarding the safety and technical reliability of the gas network. Indicators include fears of gas leakage or accidents, potential equipment failures or system breakdowns, and the risk of temporary service interruptions.

Service Satisfaction (Z) denotes residents' evaluations of the overall quality of service management. Measurement indicators include perceptions of supply reliability, responsiveness to complaints, quality of installation, and ease of administrative processes such as billing or registration.

Institutional Trust (W) refers to confidence in the government's ability to manage and sustain the jargas program. It is measured through perceptions of transparency in information provision, fairness in distribution, technical competence, and the government's long-term commitment to ensuring continuity of service.

Comfortable to Stay (Y) serves as the key outcome variable, defined as residents' overall sense of well-being and attachment to their living environment as influenced by the jargas program. Indicators include feelings of safety in daily life, satisfaction with living conditions, and the intention to remain in the community.

3.4 Data Analysis Technique

Data collected from the household survey were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS software. PLS-SEM was chosen because it is particularly suitable for predictive and exploratory research involving complex models with multiple latent constructs, including both mediation and moderation effects. The technique is also robust to violations of multivariate normality and can provide reliable results with relatively small-to-moderate sample sizes.

The analysis was carried out in two main stages. The measurement model was first evaluated to ensure the reliability and validity of the reflective constructs. This step included examining individual indicator loadings (threshold ≥ 0.70), internal consistency reliability using composite reliability ($CR \geq 0.70$), convergent validity assessed through average variance extracted ($AVE \geq 0.50$), and discriminant validity evaluated using the Fornell–Larcker criterion and heterotrait–monotrait ratio ($HTMT < 0.90$). Cross-loadings were also inspected to confirm that items loaded more strongly on their intended constructs than on others.

Subsequently, the structural model was assessed to test the hypothesized relationships among variables. Prior to hypothesis testing, collinearity was examined using variance inflation factors

(VIF < 5.0) to ensure that multicollinearity did not bias path estimates. The explanatory power of the model was then evaluated by the coefficient of determination (R^2) for endogenous constructs, with thresholds of 0.25, 0.50, and 0.75 indicating weak, moderate, and substantial explanatory power, respectively. In addition, effect size (f^2) and predictive relevance (Q^2) obtained through blindfolding procedures were reported to assess the contribution and predictive capability of each exogenous construct.

To examine direct, indirect, and moderating effects, a bootstrapping procedure with 5,000 resamples was applied to generate standard errors, t-statistics, and 95% confidence intervals for all path coefficients. Mediation was tested by assessing the significance of indirect effects, with the type of mediation (partial or full) determined by comparing direct and indirect relationships. Moderation was examined through the interaction term approach, whereby the significance of the interaction between perceived risks and institutional trust was tested to evaluate the buffering effect of trust on the negative influence of risks.

3.5 Conceptual Model

Figure 1 presents the conceptual framework for this research. It depicts the hypothesized relationships: perceived economic benefits, social impacts, and risks as exogenous variables; service satisfaction as a mediator; institutional trust as a moderator; and residents' comfortable to stay as the ultimate endogenous construct.

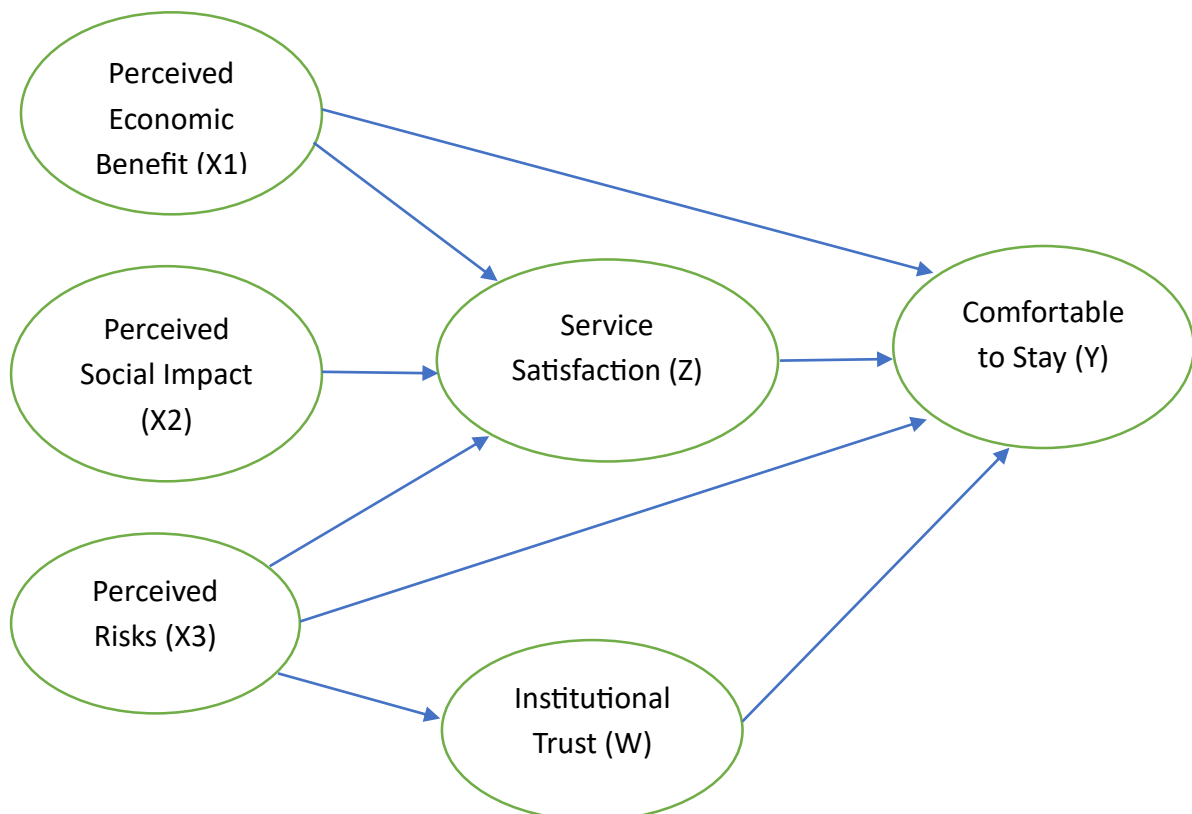


Figure 1. Conceptual Framework

The conceptual framework (Figure 1) illustrates the hypothesized relationships among the key constructs of this study. Perceived Economic Benefits (X1), Perceived Social Impacts (X2), and Perceived Risks (X3) are proposed to exert both direct effects on residents' Comfortable

to Stay (Y) and indirect effects through Service Satisfaction (Z). Service Satisfaction is expected to mediate the influence of these three antecedents on residents' comfort, reflecting the importance of service delivery in shaping user attitudes. Institutional Trust (W) is posited as a moderator that buffers the negative influence of perceived risks on comfort, while also exerting its own positive effect on residents' willingness to remain. Together, these relationships highlight the interplay between service management, risk perception, and governance credibility in determining the social sustainability of household gas networks.

3.6 Measurement Model Evaluation

Before testing the structural relationships, the reliability and validity of the reflective measurement models were assessed. Table 1 summarizes the results of indicator loadings, composite reliability (CR), and average variance extracted (AVE) for each construct. All standardized loadings exceeded the recommended threshold of 0.70, indicating that the indicators were strong representations of their respective constructs. Composite reliability values ranged between 0.84 and 0.92, well above the minimum cutoff of 0.70, confirming internal consistency reliability. Similarly, AVE values for all constructs exceeded 0.50, demonstrating satisfactory convergent validity.

Discriminant validity was evaluated using both the Fornell–Larcker criterion and the heterotrait–monotrait (HTMT) ratio. Fornell–Larcker results showed that the square root of the AVE for each construct was greater than its correlations with other constructs, satisfying the criterion. Additionally, HTMT ratios were all below the conservative threshold of 0.85, supporting discriminant validity. Cross-loading analysis further confirmed that each indicator loaded more strongly on its assigned construct than on other constructs.

Overall, the measurement model met the recommended standards of reliability, convergent validity, and discriminant validity, providing a sound basis for subsequent structural model testing.

Table 1. Evaluation of Measurement Model

Construct	Indicators	Loadings	Composite Reliability	AVE
Perceived Economic Benefits (X1)	X1.1 – Cost savings	0.81	0.88	0.65
	X1.2 – Energy efficiency	0.84		
	X1.3 – Supply stability	0.79		
Perceived Social Impacts (X2)	X2.1 – Fairness of access	0.82	0.87	0.62
	X2.2 – Neighborhood harmony	0.77		
	X2.3 – Conflict likelihood (R)	0.8		
Perceived Risks (X3)	X3.1 – Safety concerns	0.83	0.86	0.6
	X3.2 – Equipment failure	0.78		
	X3.3 – Supply interruptions	0.75		
Service Satisfaction (Z)	Z1 – Reliability	0.84	0.91	0.67
	Z2 – Responsiveness	0.82		
	Z3 – Installation quality	0.85		
	Z4 – Complaint resolution	0.8		
Institutional Trust (W)	W1 – Transparency	0.83	0.9	0.69
	W2 – Fairness	0.85		

Construct	Indicators	Loadings	Composite Reliability	AVE
	W3 – Competence	0.81		
	W4 – Long-term commitment	0.84		
Comfortable to Stay (Y)	Y1 – Sense of security	0.86	0.92	0.71
	Y2 – Satisfaction with living	0.85		
	Y3 – Well-being	0.83		
	Y4 – Willingness to remain	0.87		

3.7 Structural Model Evaluation

After establishing the reliability and validity of the measurement model, the hypothesized structural relationships were assessed. Collinearity diagnostics showed that all predictor constructs had VIF values below 3.0, indicating no multicollinearity issues. The explanatory power of the model was substantial, with $R^2 = 0.58$ for Service Satisfaction and $R^2 = 0.66$ for Comfortable to Stay, suggesting that the exogenous constructs explained a considerable proportion of variance in the endogenous variables. Predictive relevance was confirmed with Q^2 values above zero for both constructs, reinforcing the model's predictive utility.

Table 2 presents the results for direct, indirect (mediation), and moderating effects based on 5,000 bootstrap resamples. Path coefficients indicate that Perceived Economic Benefits ($\beta = 0.21$, $p < 0.001$) and Service Satisfaction ($\beta = 0.34$, $p < 0.001$) significantly enhance Comfortable to Stay. Conversely, Perceived Social Impacts ($\beta = -0.19$, $p = 0.004$) and Perceived Risks ($\beta = -0.16$, $p = 0.012$) exert significant negative effects. These findings provide strong support for H1–H4.

Regarding mediation, Service Satisfaction was found to partially transmit the effects of Perceived Economic Benefits ($\beta = 0.07$, $p = 0.015$), Perceived Social Impacts ($\beta = -0.06$, $p = 0.021$), and Perceived Risks ($\beta = -0.05$, $p = 0.042$) onto Comfortable to Stay. This supports H5–H7 and indicates that residents' comfort is influenced not only by their direct perceptions of benefits, social dynamics, and risks, but also by their satisfaction with service delivery.

Finally, Institutional Trust moderated the relationship between Perceived Risks and Comfortable to Stay ($\beta = 0.12$, $p = 0.028$). The positive interaction coefficient suggests that higher levels of trust reduce the negative effect of risks, thereby buffering residents' concerns and enhancing comfort. This finding supports H8.

Table 2. Structural Model Results

Hypothesis	Relationship	β	t-value	p-value	Result
H1	X1 $\rightarrow$ Y (Perceived Economic Benefits $\rightarrow$ Comfortable to Stay)	0.21	4.12	<0.001	Supported
H2	X2 $\rightarrow$ Y (Perceived Social Impacts $\rightarrow$ Comfortable to Stay)	-0.19	2.91	0.004	Supported
H3	X3 $\rightarrow$ Y (Perceived Risks $\rightarrow$ Comfortable to Stay)	-0.16	2.52	0.012	Supported
H4	Z $\rightarrow$ Y (Service Satisfaction $\rightarrow$ Comfortable to Stay)	0.34	5.88	<0.001	Supported

Hypothesis	Relationship	β	t-value	p-value	Result
H5	$X1 \rightarrow Z \rightarrow Y$ (Mediation via Service Satisfaction)	0.07	2.43	0.015	Supported
H6	$X2 \rightarrow Z \rightarrow Y$ (Mediation via Service Satisfaction)	-0.06	2.31	0.021	Supported
H7	$X3 \rightarrow Z \rightarrow Y$ (Mediation via Service Satisfaction)	-0.05	2.03	0.042	Supported
H8	$X3 \times W \rightarrow Y$ (Institutional Trust moderates Risks $\rightarrow$ Comfort)	0.12	2.2	0.028	Supported

4. Result and Discussion

The findings demonstrate that residents' perceptions of the household gas network significantly shape their overall comfort to stay in Bontang City. Consistent with Social Exchange Theory (Blau, 1964), perceived economic benefits were found to positively influence residents' comfort, suggesting that tangible advantages such as cost savings and energy efficiency enhance attachment to place and satisfaction with living conditions. This aligns with earlier studies showing that affordability and supply stability are critical drivers of community acceptance in public utility programs (Liu et al., 2020).

In contrast, perceived social impacts and risks exerted significant negative effects on comfort, reinforcing the idea that community harmony and perceived safety are central to the sustainability of infrastructure projects. These findings resonate with research on energy transitions which highlights that social tensions and safety concerns often undermine trust in technology and government initiatives (Devine-Wright, 2007; Sovacool, 2014). Notably, these results emphasize that beyond technical performance, the social acceptability of programs such as jargas hinges on equitable access and the mitigation of community conflict.

Service satisfaction emerged as both a significant direct predictor of comfort and a mediator of the effects of perceived benefits, risks, and social impacts. In line with Service Quality Theory (Parasuraman et al., 1988), satisfaction reflects residents' evaluation of service reliability, responsiveness, and fairness, which in turn shape their well-being and sense of security. This partial mediation indicates that while perceptions of benefits and risks directly influence comfort, their effects are reinforced or weakened depending on how effectively the service is managed and delivered.

Finally, institutional trust was confirmed as a moderator that buffers the negative influence of risk perceptions. This finding supports Trust Theory (Mayer et al., 1995), which emphasizes that confidence in institutional competence, transparency, and fairness reduces perceived uncertainty. Residents who trust the government are less deterred by potential risks, demonstrating that governance quality is as crucial as technical safety measures in sustaining public support. Together, these results provide empirical evidence that service management and institutional trust are indispensable for enhancing residents' comfort in large-scale infrastructure programs.

5. Conclusions

This study provides empirical evidence that residents' comfort to stay in the context of the household gas network in Bontang City is shaped by a combination of economic, social, risk-related, and managerial factors. Perceived economic benefits and service satisfaction were

found to enhance comfort, while perceived social impacts and risks diminished it. The mediating role of service satisfaction confirms that residents' comfort depends not only on their perceptions of outcomes but also on how effectively services are managed. Moreover, institutional trust emerged as a critical moderator that weakens the negative effects of risks, highlighting the importance of governance quality in sustaining public confidence.

From a theoretical perspective, the findings extend Social Exchange Theory, Service Quality Theory, and Trust Theory by demonstrating their applicability to energy infrastructure programs in developing urban contexts. The integration of service satisfaction as a mediator and institutional trust as a moderator provides a nuanced understanding of how perceptions and governance jointly shape residents' comfort to stay. This contributes to the growing literature on social acceptance of energy transitions, which has often overlooked the behavioral and institutional dimensions of household gas initiatives.

For policymakers, the results underscore that technical expansion alone is insufficient to secure long-term community support. Ensuring affordability, reliability, and equitable access must be complemented by transparent governance, responsive service management, and consistent communication to build trust and mitigate perceived risks. Local governments, in collaboration with the central government, should prioritize resident engagement, establish effective grievance mechanisms, and promote awareness campaigns to address safety concerns. By embedding these practices, the household gas network can not only achieve energy efficiency goals but also strengthen social cohesion and improve residents' quality of life.

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