

The Impact of Legal Subject and Object Complexity on Legal Document Completion Duration and Opportunity Cost in Built-to-Suit Tower Projects: Evidence from Protelindo Group

Rosalendro Eddy Nugroho^{1*}, Agustinus Hariadi DP¹

¹Mercu Buana University, Jalan Meruya Selatan No.1 Jakarta Barat, Indonesia

DOI: <https://doi.org/10.36348/sjbms.2026.v1i10.005>

| Received: 27.07.2026 | Accepted: 21.09.2026 | Published: 22.10.2026

*Corresponding author: Rosalendro Eddy Nugroho

Mercu Buana University, Jalan Meruya Selatan No.1 Jakarta Barat, Indonesia

Abstract

This study examines the effect of legal subject and legal object complexity on legal-document completion duration and its relationship with opportunity cost in built-to-suit (BTS) tower projects at Protelindo Group. Legal-subject categories comprise individuals, heirs, legal entities, government institutions, and religious-property managers, while legal-object status distinguishes certified and non-certified land. A quantitative explanatory design was applied using a five-point Likert questionnaire administered to 200 respondents from the Protelindo Legal team, SITAC BTS team, and experienced turnkey vendors. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The results show that legal subject and object complexity has a positive and significant effect on completion duration ($\beta = 0.758$; $t = 24.588$; $p < 0.001$), while completion duration positively and significantly affects opportunity cost ($\beta = 0.325$; $t = 5.403$; $p < 0.001$). Legal complexity also has a direct positive and significant effect on opportunity cost ($\beta = 0.543$; $t = 9.470$; $p < 0.001$). The model explains 57.4% of the variance in completion duration and 66.8% of the variance in opportunity cost. The findings indicate that legal complexity should be screened at the front end of BTS land-acquisition processes because incomplete documentation, repeated clarification, external coordination, and administrative rework can extend lead time and consume productive resources.

Keywords: Legal complexity, Legal subjects, Legal objects, BTS towers, Document completion duration, Opportunity cost, PLS-SEM.

Copyright © 2026 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Built-to-suit (BTS) tower development requires coordinated land acquisition, legal documentation, permitting, and construction under commercially constrained schedules. Telecommunications infrastructure sharing and tower development depend on timely site readiness and effective coordination among project parties (Norton Rose Fulbright, 2016). In the BTS context, land-related legal processing is a critical upstream activity because ownership verification and supporting documentation provide the basis for contractual binding and subsequent project execution. Evidence from telecommunications infrastructure projects also indicates that lead time is an important determinant of BTS project performance (Wibowo, 2021).

Project completion is commonly evaluated through the alignment of scope, quality, time, and cost, while inadequate planning and coordination can create delays and additional costs (Komarudin & Nugroho, 2022). Land acquisition may be particularly challenging when ownership, title status, compensation, administrative validation, or supporting documents are not straightforward. Studies of land procurement identify procedural and documentary constraints as potential sources of delay (Nugraha *et al.*, 2022; Partha & Aidi, 2024). From an agrarian-law perspective, land status and ownership documentation are fundamental to establishing legal certainty (Harsono, 2008), while land-compensation and acquisition processes may involve multiple administrative and juridical considerations (Ujung *et al.*, 2025).

Citation: Nugroho, R. E., & Hariadi, A. D. P. (2026). The Impact of Legal Subject and Object Complexity on Legal Document Completion Duration and Opportunity Cost in Built-to-Suit Tower Projects: Evidence from Protelindo Group. *Saudi J Bus Manag Stud*, 11(10), 363-369. <https://doi.org/10.36348/sjbms.2026.v1i10.005>

At Protelindo Group, the research dataset records BTS legal-document requests during 2020–2024. Individuals represented 88.45% of legal subjects, followed by heirs (9.88%), government institutions (0.91%), legal entities (0.62%), and religious institutions (0.14%). On the legal-object side, 54.14% of land was certified and 45.86% was non-certified. The dataset also identifies recurring administrative issues, including contract-clause deviations (30%), differences in land-

title numbers (24%), notary cover-note inconsistencies (14%), village/subdistrict or district validation revisions (14%), mortgaged-land verification (13%), inheritance-document inconsistencies (4%), and institutional approval requirements (1%). These conditions indicate that legal-document completion may involve repeated clarification, verification, revision, and external coordination.

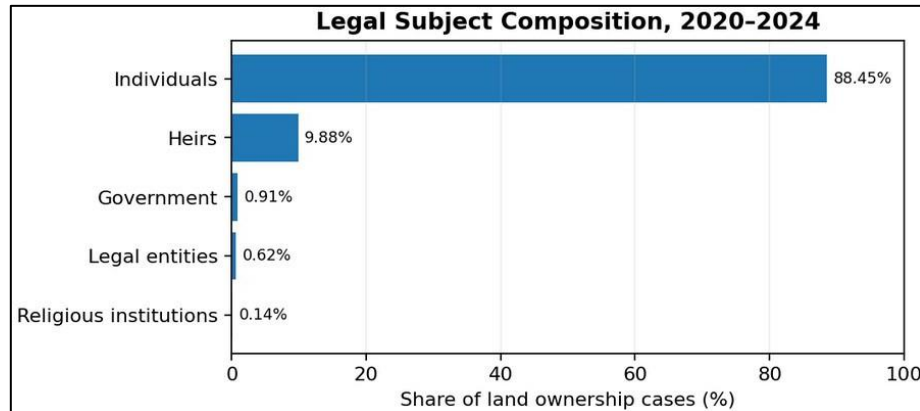


Figure 1: Legal subject composition in BTS land-acquisition cases, 2020–2024

Source: Internal Protelindo Group research dataset

Legal complexity is relevant because the interaction of multiple legal subjects, object status, and administrative requirements can increase the number of relationships and verification activities that must be managed. Complexity theory has been applied to law and society to explain how interconnected legal elements can generate dynamic and difficult-to-manage outcomes (Ruhl, 1996), while Ruhl, Katz, and Bommarito (2017) emphasize the practical significance of legal complexity for legal systems. In operational settings, prolonged processing also consumes time and resources that could otherwise be allocated to productive activities (Slack *et al.*, 2019; Sumarti & Anugerah, 2023). Accordingly, this study examines three constructs: legal subject and object complexity (X), legal-document completion duration (Y), and opportunity cost (Z).

LITERATURE REVIEW AND HYPOTHESES

Legal complexity. Legal complexity in this study is operationalized through the combination of legal subject and legal object. The subject dimension distinguishes individuals, heirs, legal entities, government institutions, and religious-property managers, while the object dimension distinguishes certified and non-certified land. This operationalization reflects the proposition that increasing variation, uncertainty, and interdependence among legal elements can increase the need for verification and coordination (Ruhl, 1996; Ruhl *et al.*, 2017). Land-document and acquisition constraints provide a contextual basis for considering ownership and administrative status as

sources of process difficulty (Harsono, 2008; Nugraha *et al.*, 2022; Partha & Aidi, 2024).

Legal-document completion duration. Duration represents the perceived time required to complete legal documentation from identification through completion by the Legal team. The construct is represented by timeliness, completeness of landowner documents, external coordination, repeated clarification and communication, and internal document revision. Operations-management literature treats time as a core dimension of operational performance and emphasizes the importance of controlling process flow and delays (Heizer & Render, 2015; Slack *et al.*, 2019). Project-delay research similarly demonstrates that weak planning and process constraints can extend completion time (Kaelan *et al.*, 2020; Komarudin & Nugroho, 2022).

Opportunity cost. Opportunity cost refers to benefits or productive uses forgone when resources are committed to a delayed activity. In infrastructure-project decisions, opportunity cost can arise when time, labor, and operating resources are tied up in activities that do not directly create additional productive output (Sumarti & Anugerah, 2023). In this study, the construct is represented by wasted working time, additional operating cost, increased administrative workload, reduced productivity, and rework risk. The operational interpretation is consistent with the broader operations-management emphasis on resource utilization, time, and cost (Heizer & Render, 2015; Slack *et al.*, 2019).

Research model and hypotheses. The conceptual model positions legal complexity as the

exogenous construct (X), completion duration as the intervening construct (Y), and opportunity cost as the endogenous construct (Z). Based on the theoretical relationships above and the empirical problem identified in BTS land-document processing, the hypotheses are:

H1: Legal subject and object complexity positively affects legal-document completion duration.

H2: Legal-document completion duration positively affects opportunity cost.

H3: Legal subject and object complexity positively affects opportunity cost.

RESEARCH METHOD

Research design. The study uses a quantitative explanatory design, appropriate for testing directional relationships among measurable constructs (Creswell, 2014). Data were collected using a five-point Likert-

scale questionnaire. The questionnaire items were developed from theoretical and empirical indicators and reviewed for contextual relevance by the Protelindo Legal team. A pilot assessment was conducted to evaluate clarity and instrument reliability before the main survey.

Population and sample. The population comprises parties involved in managing and completing legal documents for BTS tower projects at Protelindo Group. The analytical unit includes the Protelindo Legal team, SITAC BTS team, and turnkey vendors. Purposive sampling was applied to respondents with direct experience in legal-document processing and BTS project activities during 2020–2024. With 20 indicators and application of the 10-times rule, the minimum sample requirement was 200 respondents; 200 usable responses were analyzed.

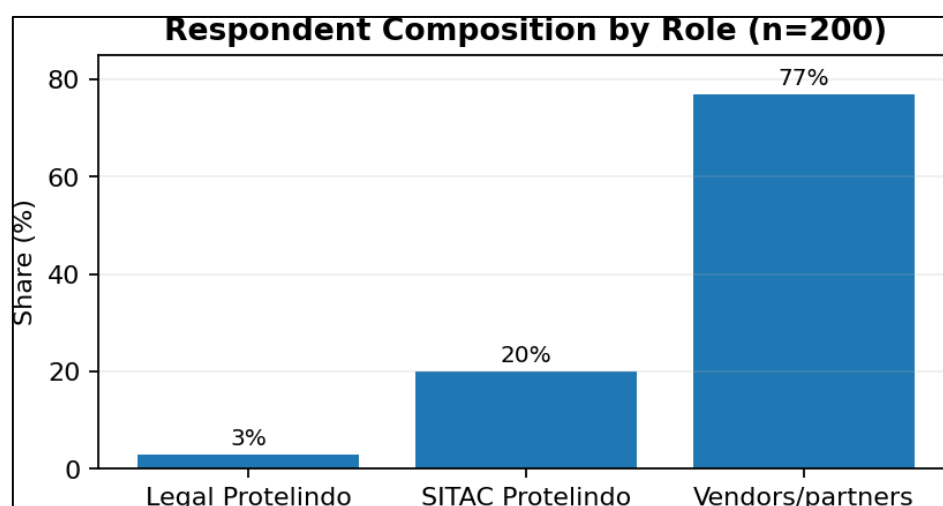


Figure 2: Respondent composition by role (n = 200).

Source: Research data, 2026.

Measurement and analysis. Legal complexity (X) was measured using 10 combinations of legal subject and legal-object status; completion duration (Y) used five indicators; and opportunity cost (Z) used five indicators. PLS-SEM was selected to assess the measurement model and structural relationships simultaneously. The analysis covered convergent validity, discriminant validity, reliability, R^2 , f^2 , model-fit statistics, and bootstrapped path coefficients, following the PLS-SEM approach described by Hair et al. (2017).

RESULTS AND DISCUSSION

Respondent characteristics. The 200 respondents represent the three principal operational groups involved in BTS legal-document processing. Vendors/partners account for 77%, SITAC for 20%, and the Protelindo Legal function for 3%. Experience is distributed across ≤ 5 years (25%), 6–10 years (32.5%), 11–15 years (30%), and ≥ 15 years (12.5%). Educational attainment comprises high-school equivalent (42%), S1 (31%), D3 (23%), and S2 (4%).

Table 1: Respondent profile

Profile	Category	n	%
Role	Legal Protelindo Group	6	3.0
	SITAC Protelindo Group	40	20.0
	Vendor/partner	154	77.0
Experience	≤ 5 years	50	25.0
	6–10 years	65	32.5
	11–15 years	60	30.0
	≥ 15 years	25	12.5

Profile	Category	n	%
Education	S2	8	4.0
	S1	62	31.0
	D3	46	23.0
	High school equivalent	84	42.0

Operational duration pattern. Internal Protelindo data show that most legal-document processes fall within one to six months, although a meaningful proportion extends beyond six months. In 2024, 41.87% were completed within one to three months, 40.54% within three to six months, 15.70% within six to twelve

months, and 1.89% exceeded one year. This pattern illustrates why lead-time control is important in BTS project execution, consistent with prior project-delay and BTS lead-time studies (Kaelan *et al.*, 2020; Wibowo, 2021).

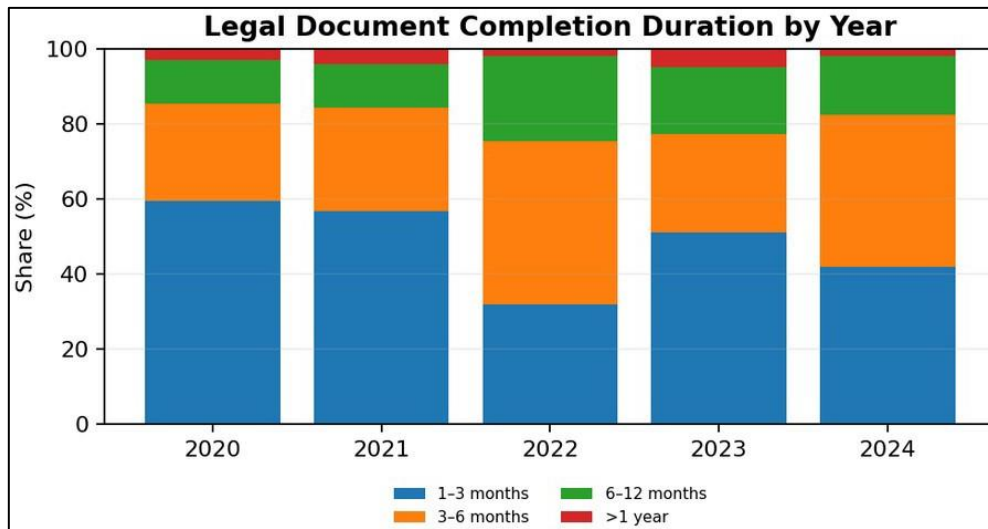


Figure 3: Distribution of legal-document completion duration, 2020–2024.

Source: Internal Protelindo Group data

Measurement model. All ten legal-complexity indicators exceeded the 0.70 loading threshold, ranging from 0.845 to 0.868. The five completion-duration loadings ranged from 0.844 to 0.892, with completeness of landowner documents (Y2 = 0.892) as the strongest indicator. Opportunity-cost loadings ranged from 0.882

to 0.910, with reduced productivity (Z4 = 0.910) as the strongest indicator. These results indicate that the indicators consistently represent their respective constructs and satisfy the measurement expectations used in PLS-SEM analysis (Hair *et al.*, 2017).

Table 2: Reliability and convergent validity

Construct	Cronbach α	Composite reliability	AVE	Assessment
Legal complexity (X)	0.961	0.966	0.738	Valid & reliable
Completion duration (Y)	0.911	0.934	0.738	Valid & reliable
Opportunity cost (Z)	0.938	0.953	0.801	Valid & reliable

Discriminant validity was supported by HTMT ratios of 0.809 for Y–X, 0.797 for Y–Z, and 0.831 for X–Z, all below the 0.90 criterion. Model-fit statistics were favorable, with SRMR = 0.034 and NFI = 0.938. The

results therefore support the adequacy of the measurement and structural model for hypothesis testing (Hair *et al.*, 2017).

Table 3: Structural model results

Hypothesis / Path	β	t	p	Decision
H1: X $\rightarrow$ Y	0.758	24.588	<0.001	Supported
H2: Y $\rightarrow$ Z	0.325	5.403	<0.001	Supported
H3: X $\rightarrow$ Z	0.543	9.470	<0.001	Supported

PLS-SEM structural model and standardized path coefficients. *** $p < 0.001$.

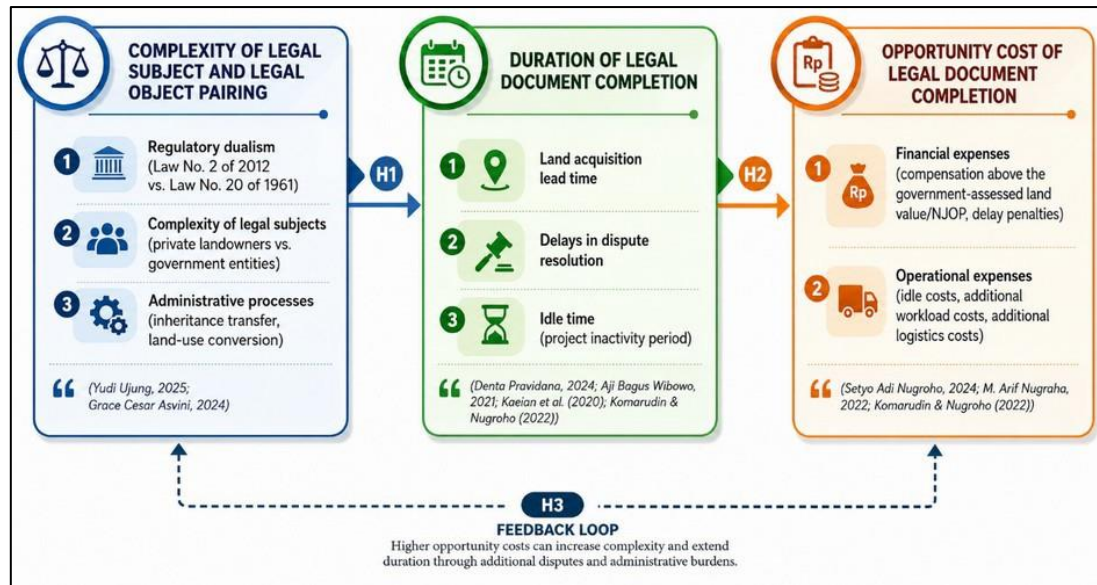


Figure 4: Conceptual framework of the research model

Structural relationships. The strongest relationship is between legal complexity and completion duration ($\beta = 0.758$; $t = 24.588$; $p < 0.001$). The positive coefficient indicates that more complicated subject-object combinations are associated with longer legal-document completion times. This finding is theoretically consistent with legal-complexity perspectives (Ruhl, 1996; Ruhl *et al.*, 2017) and operationally consistent with land-acquisition constraints that can require additional verification, administrative validation, and coordination (Nugraha *et al.*, 2022; Partha & Aidi, 2024).

Completion duration and opportunity cost. Completion duration has a positive and significant relationship with opportunity cost ($\beta = 0.325$; $t = 5.403$; $p < 0.001$). Prolonged legal processing is associated with wasted working time, additional operating expenditure, administrative burden, lower productivity, and rework risk. This relationship is consistent with the operations-management view that inefficient process time consumes scarce organizational resources (Heizer & Render, 2015; Slack *et al.*, 2019) and with the opportunity-cost perspective applied to infrastructure decisions (Sumarti & Anugerah, 2023).

Legal complexity also has a significant direct relationship with opportunity cost ($\beta = 0.543$; $t = 9.470$; $p < 0.001$). This indicates that complexity can consume resources beyond the time channel represented by completion duration. In practice, multiple parties, inconsistent documents, repeated clarification, and external coordination can create administrative workload even before a project reaches a formal completion delay.

Explanatory power and effect size. The model explains 57.4% of the variance in completion duration ($R^2 = 0.574$) and 66.8% of the variance in opportunity cost ($R^2 = 0.668$). Effect sizes are large for $X \rightarrow Y$ ($f^2 = 1.348$) and $X \rightarrow Z$ ($f^2 = 0.378$), while $Y \rightarrow Z$ is $f^2 = 0.136$.

These results indicate that legal complexity is an important managerial variable at the front end of BTS land acquisition. The finding is also consistent with the broader project-management literature emphasizing the relationship between time, cost, and resource coordination (Kaelan *et al.*, 2020; Komarudin & Nugroho, 2022).

Methodological note. The source research contains an apparent label inversion in the second row of its f^2 table; the narrative interpretation and structural path table specify $Y \rightarrow Z$. This revised manuscript follows the internally consistent path specification. The source describes Y as a mediating construct, but no bootstrapped indirect-effect coefficient and p-value are reported. Therefore, this manuscript reports the three tested direct effects and does not claim a statistically significant mediation effect.

MANAGERIAL IMPLICATIONS

The findings support a front-end legal-complexity screening mechanism for BTS projects. Before detailed document processing begins, the project team should classify each site by legal-subject category and land status, flagging combinations that are likely to require additional verification. Particular attention should be given to non-certified land and ownership structures involving multiple parties or institutional approvals. This recommendation follows the study findings and the documented importance of land status and administrative certainty in land-related processes (Harsono, 2008; Partha & Aidi, 2024).

Second, the legal process should be managed as a measurable operational flow rather than only as an administrative back-office activity. A document-completeness checklist, clear responsibility matrix, escalation route for external coordination, and ageing dashboard can reduce repeated clarification and internal

revision. Because document completeness is the strongest duration indicator ($Y2 = 0.892$), early completeness checks should be prioritized. This approach is consistent with operations-management principles emphasizing process control, time performance, and efficient resource utilization (Heizer & Render, 2015; Slack *et al.*, 2019).

Third, management should monitor opportunity-cost indicators alongside legal lead time. Reduced productivity has the highest loading on the opportunity-cost construct ($Z4 = 0.910$), suggesting that management should track productive capacity consumed by repeated follow-up, coordination, and rework. The resulting information can support risk-based prioritization and allocation of Legal, SITAC, vendor, and external-party resources (Sumarti & Anugerah, 2023).

LIMITATIONS AND FUTURE RESEARCH

The duration construct is based on respondent perceptions of time required for different legal subject-object combinations rather than site-level transaction logs with actual timestamps. The study is also focused on the Protelindo Group BTS context, which limits direct generalization to other infrastructure sectors or organizations. Future research can test individual subject categories or land-status categories separately and add coordination quality, staff competence, digital document-management maturity, and actual transaction lead time. A future study should also report the bootstrapped indirect effect explicitly if mediation is a primary research objective.

CONCLUSION

This study demonstrates that legal subject and object complexity is a significant determinant of legal-document completion duration in BTS tower projects. Higher complexity is associated with longer processing time ($\beta = 0.758$), while longer completion duration is associated with higher opportunity cost ($\beta = 0.325$). Legal complexity also has a significant direct association with opportunity cost ($\beta = 0.543$). With R^2 values of 0.574 for duration and 0.668 for opportunity cost, the model provides substantial explanatory value for the operational phenomenon studied.

From a managerial perspective, legal complexity should be identified and controlled before it becomes a schedule problem. Early document-completeness screening, risk-based site classification, stronger coordination governance, and monitoring of productive-time losses can improve the efficiency of BTS land-acquisition and legal-document processes. These actions complement established project-management concerns with time, cost, and coordination performance (Kaelan *et al.*, 2020; Komarudin & Nugroho, 2022).

ACKNOWLEDGMENT

The author acknowledges the support of Universitas Mercu Buana and the Protelindo Group personnel who contributed operational access, contextual information, and questionnaire responses for the underlying research.

REFERENCES

- Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approach (4th ed.). Sage Publications.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). A primer on partial least squares structural equation modeling (PLS-SEM) (2nd ed.). Sage Publications.
- Harsono, B. (2008). Hukum agraria Indonesia: Sejarah pembentukan Undang-Undang Pokok Agraria, isi, dan pelaksanaannya. Djambatan.
- Heizer, J., & Render, B. (2015). Operations management (11th ed.). Pearson Education.
- Kaelan, S., Bintoro, B. P. K., & Nugroho, R. E. (2020). Analysis of the factors causing delay in completion of Light Rail Transit (LRT) project on Cawang–East Bekasi. *International Journal of Research and Review*, 7(10), 356–368.
- Komarudin, M., & Nugroho, R. E. (2022). Analysis of the project success factor through time, cost, labour, health safety environment and quality aspects at PT XYZ. *International Journal of Production Management and Engineering*, 10(1), 33–49.
- Nugraha, M. A., Oktaviani, C. Z., & Bulba, A. T. (2022). Pengaruh keterlambatan proses pengadaan tanah terhadap pencapaian waktu proyek. 5(1), 59–68.
- Norton Rose Fulbright. (2016). Berbagi infrastruktur telekomunikasi–peluang pada tahun 2016.
- Partha, G. C. A., & Aidi, Z. (2024). Kendala perolehan tanah untuk kegiatan usaha perseroan (studi kasus di Kabupaten Klaten), 17(3), 2055–2072.
- Ruhl, J. B. (1996). Complexity theory as a paradigm for the dynamical law-and-society system. *Duke Law Journal*, 45(5), 849–928.
- Ruhl, J. B., Katz, D. M., & Bommarito, M. J. (2017). Harnessing legal complexity. *Science*, 355(6332), 1377–1378.
- Slack, N., Brandon-Jones, A., & Johnston, R. (2019). Operations management (9th ed.). Pearson Education Limited.
- Sumarti, S., & Anugerah, D. (2023). Opportunity cost dalam pengambilan keputusan investasi proyek infrastruktur. *Jurnal Ekonomi dan Keuangan Strategis*, 12(1), 45–58.
- Ujung, Y., Kalalo, F. P., & Lumintang, D. W. (2025). Tinjauan yuridis pelaksanaan ganti rugi pengadaan tanah bagi pembangunan untuk

kepentingan umum di Melonguane Daerah
Kabupaten Kepulauan Talaud.

- Wibowo, A. B. (2021). Analisis faktor pengaruh
lead time pembangunan built to suit (B2S) menara
telekomunikasi (studi kasus: PT Tower Bersama

Infrastruktur, Tbk.). Master's thesis, Institut
Teknologi Sepuluh Nopember.