P ISSN: 2528-0821
E ISSN: 2580-5479

TURNING TIME INTO VALUE: ENHANCING CUSTOMER EXPERIENCE THROUGH AVERAGE HANDLING TIME (AHT) OPTIMIZATION

Hubertus Davy Yulianto[1], Rini Oktaviani[2], Dendhy Indra Wijaya[3]
[1]PJJ Teknik Industri, Universitas Bina Nusantara, Jakarta, Indonesia, 11480
Email: hubertus.yulianto@binus.ac.id

Received: 25 September 2025 | Revised: 29 September 2025 | Accepted: 29 September 2025

ABSTRACT

This study highlights the importance of Average Handling Time (AHT) as a key operational efficiency metric in the Business Process Outsourcing (BPO) industry, particularly in customer service. The research aims to identify critical factors influencing AHT performance and to formulate improvement strategies based on systematic analysis. Using multiple linear regression methods, the study statistically analyzes the relationships between ticket characteristics, agent competencies, and AHT outcomes. Data were collected from 100 customer service agents through a 5-point Likert scale questionnaire and analyzed using SPSS software. The results showed significant improvement, with AHT decreasing from 92.38 minutes to 19.06 minutes (a 79.4% improvement). However, the handling duration remained 4.06 minutes above the target, indicating room for further enhancement. Agent competencies were found to have a substantial impact on AHT variation, with the model explaining 90.9% of performance differences. These findings led to strategic recommendations such as competency training, communication enhancement, time management optimization, technology integration, and improved ticket management, all aimed at boosting operational efficiency and customer satisfaction.

***Keywords**: Average Handling Time (AHT); Business Process Outsourcing (BPO); Multiple linear regression; Performance optimization*

ABSTRAK

Penelitian ini menyoroti pentingnya Average Handling Time (AHT) sebagai metrik utama efisiensi operasional dalam industri Business Process Outsourcing (BPO), khususnya pada layanan pelanggan. Tujuan dari penelitian ini adalah untuk mengidentifikasi faktor-faktor krusial yang memengaruhi kinerja AHT serta merumuskan strategi peningkatan berdasarkan analisis sistematis. Dengan menggunakan metode regresi linier berganda, studi ini menganalisis secara statistik hubungan antara karakteristik tiket, kompetensi agen, dan hasil AHT. Data dikumpulkan dari 100 agen layanan pelanggan melalui kuesioner berskala Likert 5 poin, dan dianalisis menggunakan perangkat lunak SPSS. Hasil penelitian menunjukkan adanya peningkatan signifikan, di mana AHT menurun dari 92,38 menit menjadi 19,06 menit (peningkatan sebesar 79,4%). Namun, durasi penanganan masih 4,06 menit di atas target, yang menunjukkan masih adanya ruang untuk perbaikan. Kompetensi agen terbukti memiliki pengaruh besar terhadap variasi AHT, dengan model menjelaskan 90,9% dari perbedaan kinerja. Temuan ini menghasilkan rekomendasi strategis seperti pelatihan kompetensi, peningkatan komunikasi, optimalisasi manajemen waktu, integrasi teknologi, dan pengelolaan tiket yang lebih baik, yang semuanya bertujuan untuk meningkatkan efisiensi operasional dan kepuasan pelanggan.

***Kata Kunci**: Average Handling Time (AHT); Business Process Outsourcing (BPO); Multiple linear regression; Performance optimization*

P ISSN: 2528-0821
E ISSN: 2580-5479

INTRODUCTION

In today's competitive business environment, organizations must deliver excellent customer service through responsive and efficient operations (Kediya et al., 2024). Average Handling Time (AHT) serves as a key performance metric for evaluating customer service effectiveness and service quality in Business Process Outsourcing (BPO). AHT measures the mean duration required by representatives to resolve customer interactions (Duan et al., 2025), from initial contact through final resolution and administrative tasks. In the context of BPO operations, AHT encompasses talk time, hold time, and after-call work, and is widely recognized as an indicator of both efficiency and resource utilization (Zendesk, 2025; AmplifAI, 2025).

At PT. XYZ, elevated AHT levels negatively impact agent productivity, customer satisfaction, and organizational reputation. Agent productivity is assessed through interaction volumes processed within operational timeframes. Higher AHT directly reduces case volumes agents can manage, decreasing operational efficiency (Invoca, 2025; Mihup, 2024).Previous research demonstrates strong correlations between AHT and performance indicators including first-contact resolution rates, both linked to customer satisfaction and service quality (Putra & Putra, 2024). Multiple linear regression analysis effectively identifies variables influencing AHT performance, including ticket complexity, urgency levels, and agent competencies such as communication skills, product knowledge, and time management capabilities (Luo & Song, 2023).

Based on Ingsih et al. (2024), agents' ability to use digital technology significantly influences service quality and performance, including efficiency in handling time (AHT). Wardhani et al. (2025) emphasize that process speed and facility reliability mediate customer satisfaction, which is relevant in relation to service effectiveness and operational efficiency. Alhazemi (2023) shows that agent competence is crucial in building customer trust, which in turn affects satisfaction and loyalty. Pacella et al. (2024) add that real-time sentiment and topic analysis can reduce agent workload, improve resolution speed (AHT), and enhance both agent well-being and customer experience.

Industry benchmarks reveal significant variations across sectors provide in Figure 1, with retail operations averaging 3-4 minutes, banking and financial services requiring 4-6 minutes, telecommunications maintaining 5-7 minutes, and technical support extending to 8-10 minutes (Tantawy et al., n.d.; Pacella et al., 2024; Orellana et al., 2024). These variations underscore the complexity of performance optimization and highlight the need for sophisticated analytical approaches to understand underlying factors driving AHT performance.

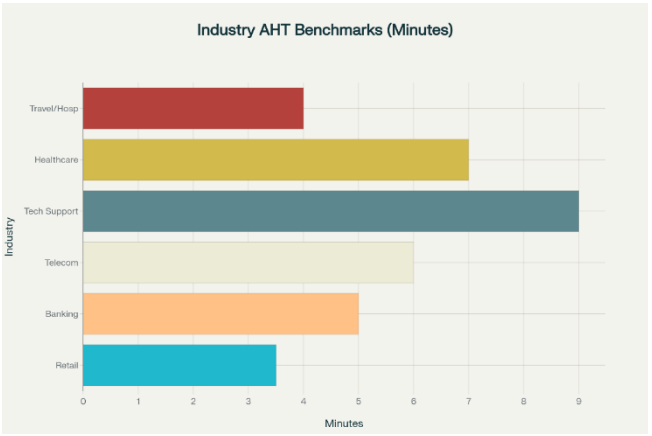

Figure 1. Bpo industry analytics dashboard: aht benchmarks

Correlation analysis serves as a critical tool for understanding relationships between

operational variables and performance outcomes. Business leaders utilize correlation analysis to identify patterns in historical data, enabling informed decisions related to resource allocation, process optimization, and strategic planning. The methodology provides organizations with quantitative insights into how changes in specific factors may influence overall performance, supporting evidence-based improvement initiatives.

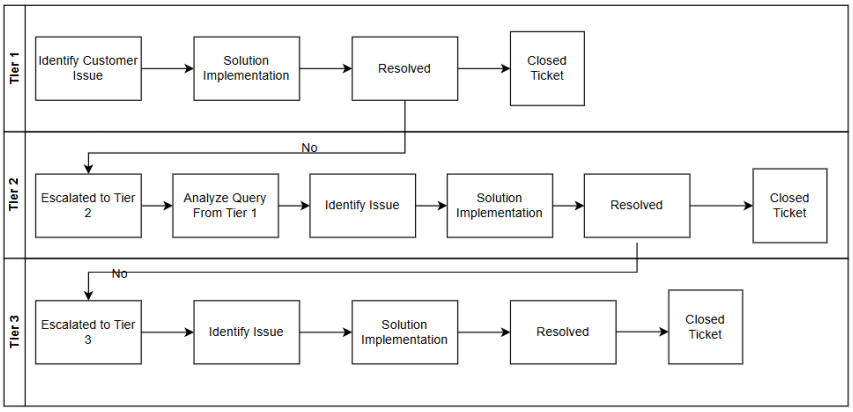

Figure 2. Flow process customer service agent

This study examines factors contributing to elevated AHT and their impact on productivity metrics. PT. XYZ operates a tiered support framework where complex issues escalate to higher-tier agents with specialized skills, targeting 15-minute resolution objectives through systematic processes and automation. The three-tier support model Figure 2 provides a systematic framework: Tier 1 handles basic issues with direct resolution, Tier 2 provides advanced troubleshooting for escalated problems, and Tier 3 offers expert solutions with comprehensive system authority. This structure optimizes resource allocation by matching problem complexity with appropriate expertise levels, enabling analysis of escalation patterns, resolution effectiveness, and operational cost-benefit relationships.

Observations at PT. XYZ reveal complex tickets require longer handling times, while skilled agents demonstrate greater resolution efficiency. However, actual AHT consistently exceeds client service level agreements, indicating significant performance gaps.

RESEARCH METHODOLOGY

This quantitative study employed a correlational design to examine relationships between customer service productivity variables and Average Handling Time (AHT) at PT. XYZ, a Business Process Outsourcing company serving e-commerce projects. Figure 3 presents a systematic eight-stage cyclical research methodology flowchart progressing from Field Operation (problem identification) through Problem Gratification (problem articulation), Study of Literature (theoretical review), Data Collection, Data Analysis, Hypothesis (proposition testing), Improvement (methodological refinement), and Conclusion before returning to Field Operation. This circular framework emphasizes the iterative, self-improving nature of scientific research, where each investigation cycle informs subsequent endeavors, ensuring continuous methodological advancement through systematic yet flexible approaches.

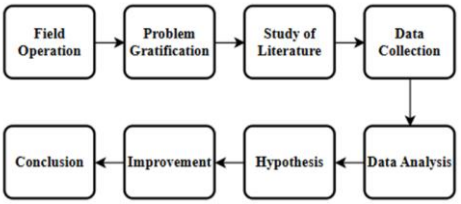

Figure 3. Research methodology flowchart

The study population comprised all 100 customer service agents working on e-commerce projects at PT. XYZ from July 2023 to June 2024. A census approach was utilized, including all agents to eliminate sampling error and ensure comprehensive representation. Two primary data collection methods were employed are questionnaire surveys and Historical Average Handling Time data. For the questionnaire surveys a structured questionnaire using a 5-point Likert scale (1=Strongly Disagree to 5=Strongly Agree) was distributed to all 100 customer service agents. The questionnaire was developed in consultation with the Quality Assurance team to ensure relevance and was administered via Google Forms. The instrument measured agent competencies including communication skills, product knowledge, and time management. For historical AHT data was collected from PT. XYZ's ticket management system covering the period from July 2023 to June 2024. This data included AHT metrics, ticket characteristics (complexity and urgency), and agent skillset information.

The data were analyzed using **SPSS v.27** through several steps: (1) validity and reliability testing with Pearson Product Moment and Cronbach's Alpha (>0.7); (2) classical assumption tests (normality, multicollinearity, heteroscedasticity, autocorrelation) to ensure data suitability; (3) multiple linear regression analysis to model the relationship between AHT and independent variables; and (4) hypothesis testing using t-test (partial effects), F-test (simultaneous effects), and the coefficient of determination (R^2) to measure the variance in AHT explained by the model.

RESULT AND DISCUSSION

Questionnaire Data Analysis

Prior to the main analysis, we tested the validity and reliability of the questionnaire instrument as pictured on Table 1. With a sample of 100 respondents (DF=98) and α=0.05, the critical r-value was 0.1966. All Pearson correlation values exceeded this threshold with p-values less than 0.05, confirming the validity of the questionnaire items. The reliability analysis yielded a Cronbach's Alpha of 0.707, indicating acceptable internal consistency of the measurement instrument.

Table 1. Reliability statistic

Cronbach's Alpha	N of Items
.707	9

The data successfully passed all classical assumption tests. The Kolmogorov-Smirnov test showed a significance value of 0.200 in Table 2, confirming normal distribution. Multicollinearity testing revealed that all variables had tolerance values greater than 0.10 in Table 3 and VIF values less than 10 in Table 4, indicating no multicollinearity issues. The Glejser test for heteroscedasticity showed significance values greater than 0.05 for all variables, confirming homoscedasticity.

Table 2. One-sample kolmogorov-smirnov test

		Unstandardized Residual
N		100
Normal Parameters [a, b]	Mean	.0000000
	Std. Deviation	.34109077
Most Extreme Differences	Absolute	.065
	Positive	.065
	Negative	-.059
Test Statistic		.065
Asymp . Sig. (2 - tailed)[c]		.200[d]

Monte Carlo Sig. (2-tailed)[e]	Sig.		.385
	99% Confidence Interval	Lower Bound	.373
		Upper Bound	.398

a. Test distribution is Normal
b. Calculated from data.
c. Lilliefors Significance Correction.
This is a lower bound of the true significance.

Table 3. Multicollinearity test result

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.959	.278		7.033	.000		
	Avg. Communication Skills	.143	.050	.217	2.855	.005	.669	1.496
	Avg. Product Knowledge	-.120	.051	-.150	-2.373	.020	.966	1.035
	Avg. Time Management	.461	.058	.607	7.943	.000	.658	1.519

a. Dependent Variable: AHT

Table 4. Heteroscedasticity test results using the glejser test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.845	.166		5.099	.000		
	Avg. Communication Skills	-.045	.030	-.174	-1.490	.139	.669	1.496
	Avg. Product Knowledge	-.052	.030	-.167	-1.721	.089	.966	1.035
	Avg. Time Management	-.064	.035	-.216	-1.840	.069	.658	1.519

a. Dependent Variable: ABS_RES

The multiple regression analysis examining the influence of agent competencies on AHT yielded the following Table 5 and equation:

Table 5. T-Test results
coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.959	.278		7.033	.000		
	Avg. Communication Skills	.143	.050	.217	2.855	.005	.669	1.496
	Avg. Product Knowledge	-.120	.051	-.150	-2.373	.020	.966	1.035
	Avg. Time Management	.461	.058	.607	7.943	.000	.658	1.519

a. Dependent Variable: AHT

$$Y = 1.959 + 0.143X_1 - 0.120X_2 + 0.461X_3 + e$$

Where:

Y represents Average Handling Time
X_1 represents Communication Skills
X_2 represents Product Knowledge
X_3 represents Time Management

This model reveals that both communication skills and time management have positive relationships with AHT, while product knowledge has a negative relationship. The constant value of 1.959 indicates the baseline AHT when all independent variables are zero.

Hypothesis Testing Results

The t-test results showed that communication skills ($p=0.005$) and time management ($p<0.001$) had statistically significant partial effects on AHT, while product knowledge ($p=0.020$) did not significantly influence AHT at the 0.05 significance level.

The F-test yielded a significance value of 0.0001, confirming that the three agent competency variables collectively had a significant effect on AHT as shown on Table 6. The adjusted R^2 value of 0.619 indicates that 61.9% of the variation in AHT can be explained by these three agent competency variables on Table 7.

Table 6. F-test results

ANOVA [a]

Model		Sum of Squares	d f	Mean Square	F	Sig.
1	Regression	19.667	3	6.556	54.640	.0001 [b]
	Residual	11.518	96	.120		
	Total	31.185	99			

a. Dependent Variable: AHT
b. Predictors: (Constant), Avg. Time Management, Avg. Product Knowledge, Avg. Communication Skill

Table 7. Adjusted R^2 results

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df 1	df 2	Sig. F Change
1	.794 [a]	.631	.619	.34638	.631	54.640	3	96	.000

a. Predictors: (Constant), Avg. Time Management, Avg. Product Knowledge, Avg. Communication Skill
b. Dependent Variable: AHT

Historical AHT Data Analysis

The historical AHT data also passed all classical assumption tests. The Kolmogorov-Smirnov test showed a significance value of 0.193 on Table 8, confirming normal distribution. Multicollinearity testing revealed tolerance values greater than 0.10 and VIF values less than 10 for all variables on Table 9. The Durbin-Watson statistic of 2.097 fell within the acceptable range ($1.8640 < 2.097 < 2.136$).

The Durbin-Watson statistic serves as a fundamental diagnostic tool for detecting first-order autocorrelation in regression residuals. Values near 2.0 indicate no autocorrelation, while values approaching 0 suggest positive autocorrelation and values near 4 indicate negative autocorrelation. The observed value of 2.097 represents an optimal result, falling comfortably within the critical bounds that define the "no autocorrelation" region as shown at Figure 4.

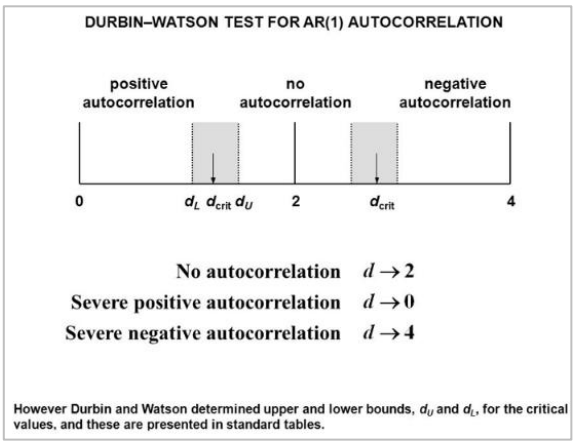

Figure 4. Autocorrelation Curve

This Table 11 shows the statistical results of testing (T-Test) which factors significantly affect Average Handling Time (AHT) in customer service operations and equation:

Table 8. T-Test results

coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	194.954	60.201		3.238	.012		
	Complexity	12.881	11.460	.111	1.124	.294	.860	1.163
	Urgency	-42.529	26.761	-.145	-1.589	.151	.996	1.004
	Skillset	-28.810	3.154	-.900	-9.135	.000	.857	1.167

a. Dependent Variable: AHT

$$Y = 194.954 + 12.881X_1 - 42.529X_2 - 28.810X_3 + e$$

Where:

Y represents Average Handling Time
X_1 represents Ticket Complexity
X_2 represents Ticket Urgency
X_3 represents Agent Skillset

This model shows that ticket complexity has a positive relationship with AHT, while ticket urgency and agent skillset have negative relationships. The constant value of 194.954 represents the baseline AHT when all independent variables are zero.

Hypothesis Testing Results

The t-test results showed that only agent skillset ($p<0.001$) had a statistically significant partial effect on AHT, while ticket complexity ($p=0.294$) and ticket urgency ($p=0.151$) did not significantly influence AHT. The F-test yielded a significance value of 0.001, confirming that the three variables collectively had a significant effect on AHT as shown at Table 12. The

adjusted R^2 value of 0.909 indicates that 90.9% of the variation in AHT can be explained by these three variables, demonstrating a very strong explanatory power.

Trend Analysis

An additional analysis of AHT data from July 2024 to September 2024 (beyond the main study period) showed a progressive downward trend in AHT, although the target AHT of 15 minutes agreed between PT. XYZ and the client had not yet been fully achieved. This indicates that the company was making progress in improving handling times, but further optimization was still needed as shown at Figure 5.

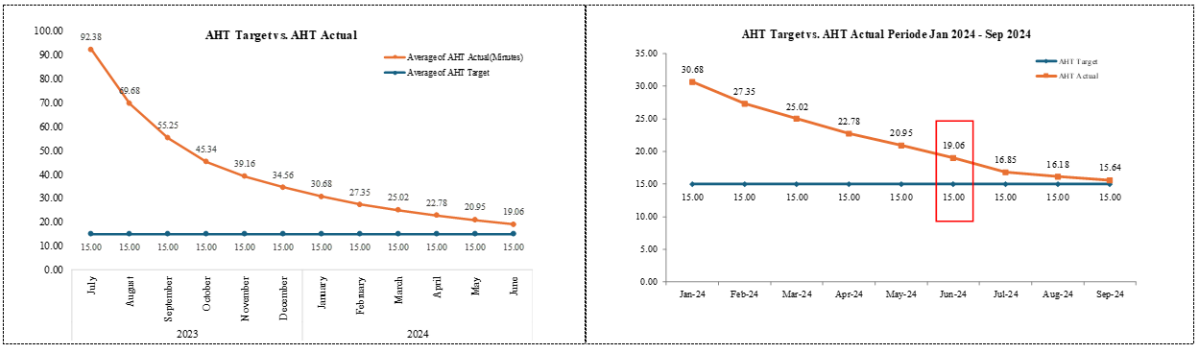

Figure 5. AHT Trend January 2024 – September 2024

Comparative Analysis

The comparison showed that questionnaire data identified communication skills and time management as key predictors, while historical AHT data highlighted agent skillset as the only significant factor. Moreover, the historical model had higher explanatory power (90.9% vs. 61.9%), indicating that objective performance data provide more reliable insights than self-reported assessments.

Practical Implications

Based on these findings, several practical implications emerge for improving customer service productivity at PT. XYZ as presented in Table 14:

Table 9. Organizational strategies for improving customer service average handling time

Aspects	Explanatory
Agent Skillset Development	Given the strong negative relationship between agent skillset and AHT in the historical data analysis, investing in comprehensive agent training and skill development should be a priority.
Communication Skills and Time Management Training	The significant impact of these competencies on AHT in the questionnaire data suggests that targeted training programs focusing on these specific skills could yield substantial improvements.
Ticket Management System Optimization	While ticket characteristics did not show significant individual effects on AHT, their collective impact was significant, suggesting that improvements in ticket categorization and routing could enhance overall productivity.
Technology Integration	The gap between current and target AHT levels indicates a need for technological solutions to streamline customer service processes and reduce handling times.

These findings provide valuable insights for PT. XYZ and similar BPO companies seeking to optimize their customer service operations and achieve their performance targets.

Analysis revealed that self-reported questionnaire responses showed different variable significance patterns compared to objective operational measurements, suggesting that perception-based assessments may not accurately reflect actual performance indicators. The operational data model demonstrated markedly superior predictive validity and explanatory power compared to the questionnaire-based model, indicating that objective operational metrics provide more robust analytical foundations than subjective agent self-evaluations for understanding AHT determinants.

CONCLUSION

This research demonstrates the value of a dual-data methodological approach, integrating subjective questionnaire responses with objective historical AHT records to enhance validity through triangulation and generate comprehensive insights into organizational performance. Although post-study monitoring indicated notable improvements in AHT, contractual targets were not fully achieved, reflecting the inherent complexity of meeting optimal performance benchmarks despite structured intervention strategies. These findings underscore the necessity of prioritizing objective operational data over subjective assessments for more accurate evaluation, evidence-based strategic decision-making, and sustainable performance enhancement within Business Process Outsourcing environments.

REFERENCES

Alhazemi, A. A. (2023). Impact of employee competence and behaviour on banking customer trust: Empirical study in Saudi Arabia. *Archives of Business Research, 11*(8), 71–81. https://doi.org/10.14738/abr.118.15049

AmplifAI. (2025). Call center average handle time: A comprehensive guide. AmplifAI. https://www.amplifai.com/

Duan, W.-Y., Wu, T.-J., & Liang, Y. (2025). Are resources always beneficial? The three-way interaction between slashies' role stress, self-efficacy and job autonomy. Asia Pacific Journal of Management, 1–31. https://doi.org/10.1007/s10490-025-09937-6

Ingsih, K., Astuti, S. D., & Riyanto, F. (2024). The role of digital competence in improving service quality and employee performance. *SA Journal of Human Resource Management, 22*, a2689. https://doi.org/10.4102/sajhrm.v22i0.2689

Invoca. (2025). What is average handle time (AHT) and why it matters? Invoca. https://www.invoca.com/

Kediya, S., Mohanty, V., Gurjar, A., Chouhan, N., Sharma, R., & Golar, P. (2024). Chatbots in customer service: A comparative analysis of performance and customer satisfaction. *2024 2nd DMIHER International Conference on Artificial Intelligence in Healthcare, Education and Industry (IDICAIEI)*, 1–6. https://doi.org/10.1109/IDICAIEI57460.2024.10645670

Luo, L., & Song, P. X. (2023). Multivariate online regression analysis with heterogeneous streaming data. Canadian Journal of Statistics, 51*(1), 111–133. https://doi.org/10.1002/cjs.11766

Mihup. (2024). How to reduce average handle time in call centers. Mihup. https://mihup.com/

Orellana, S., Magga, L., Gorgi, P., Kweon, H., & Bahamonde, F. (2024). Estimating causal effects of customer satisfaction on downstream metrics in a multi-queue contact center [Preprint]. arXiv. https://doi.org/10.48550/arXiv.2412.04860

Pacella, M., Vasco, P., Papadia, G., & Giliberti, V. (2024). An assessment of digitalization techniques in contact centers and their impact on agent performance and well-being. *Sustainability, 16*(2), 714. https://doi.org/10.3390/su16020714

Putra, N. A., & Putra, A. (2024). Communication planning of ICONNET 150678 contact center in handling customer complaints. Eduvest-Journal of Universal Studies, 4(8), 6642–6656. https://doi.org/10.36418/edv.v4i8.2732

Tantawy, A. A., Abdelhady, H. R., Zaki, S., & Ismail, M. M. (n.d.). Data-driven approach for enhancing customer satisfaction: A case study in service operations management. International Journal of Services and Operations Management. (in press).

Wardhani, A. G., Simarmata, J., & Abdurachman, E. (2025). The influence of personnel competence, facility reliability and speed of process on customer satisfaction through service performance at Terminal 3 of Soekarno-Hatta International Airport. *Jurnal Ekonomi Manajemen Sistem Informasi, 6*(6), 4309–4319. https://doi.org/10.38035/jemsi.v6i6.5986

Zendesk. (2025). Average handle time benchmarks across industries. Zendesk. https://www.z