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Evaluation of The Business Process of International to Domestic Passenger Transit Service Facilities at Kualanamu International Airport

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Abstract

This qualitative case study assesses the specialized international-to-domestic transit facilities at Kualanamu International Airport, western Indonesia's key aviation hub, targeting operational efficiency and passenger satisfaction. The multi-method framework includes field observations of passenger flows, semi-structured interviews with seven stakeholder groups (e.g., airport operators, immigration, customs, airlines), SERVQUAL surveys of 58 transit passengers, and Business Process Model and Notation (BPMN) for "as-is" and "to-be" process mapping. These tools probe transit bottlenecks and service quality via SERVQUAL's dimensions: tangibles, reliability, responsiveness, assurance, and empathy. Results highlight striking efficiency advances. Processing times fell from 50 minutes to under 10 minutes, securing an 86.66% improvement through fused screening for immigration, electronic customs declarations, and joint security-customs X-rays. The facility supports up to 150 passengers per operation, chiefly on pilgrimage routes from Saudi Arabia to destinations like Padang and Pekanbaru. SERVQUAL data show solid satisfaction (good to excellent), led by responsiveness (4.4, for swift staff aid) and tangibles (4.1, for hygienic, cozy spaces). Reliability lagged at 3.8, stressing procedural consistency. The facilities streamline services, curbing connection failures and boosting experiences in multi-stakeholder settings. Yet digital fragmentation, visa access barriers, and loose coordination linger. Managerial strategies urge: (1) Real-time digital tools for data alignment and pre-transit apps to hasten flows; (2) In-facility banking for easy visas; (3) Endorsed SOPs and SLAs to normalize and scale to commercial flights. These steps fortify Kualanamu's hub role, lure airlines, spur tourism, and guide optimization in developing airports, driving aviation sustainability.

Keywords: Transit Passenger; Airport Efficiency; Business Process; SERVQUAL; International Hub.

1. Introduction

The Southeast Asia's aviation industry surges forward, positioning regional hubs as vital engines of economic growth and tourism amid post-pandemic recovery and rising intra-regional travel. As the world's largest archipelagic nation, Indonesia prioritizes airport infrastructure investments—exemplified by over \$5 billion in upgrades since 2015—to harness this momentum and connect its 17,000+ islands. Yet emerging hubs like Kualanamu International Airport (KNO) in North Sumatra face urgent needs to optimize operations, balancing rapid passenger growth (up 15% annually) with regulatory complexities in a multi-agency ecosystem.

KNO serves as western Indonesia's primary gateway, handling 12 million passengers yearly. It aspires to rival powerhouses like Singapore's Changi or Malaysia's Kuala Lumpur International Airport by fostering efficient connections that support tourism and trade. Streamlining international-to-domestic transit proves central to this ambition. Connecting passengers—about 40% of hub traffic [2]—require seamless transfers to sustain competitiveness [5]. Inefficiencies risk missed connections, eroded on-time performance, and waning satisfaction. These issues threaten revenue and reputation, especially as Indonesia eyes a 10% market share in Southeast Asian aviation by 2030.

Transit operations demand intricate coordination among airlines, immigration, customs, ground handlers, and airport operators. Traditional steps—full immigration checks, baggage reclaims, security rescreening, and re-check-ins—often bog down processes, exacerbated by Indonesia's fragmented regulations. Business Process Management (BPM) counters this with a structured framework. It identifies bottlenecks and redesigns flows [9]. BPMN, its graphical standard, fosters stakeholder

alignment and efficiency through intuitive modeling.

SERVQUAL complements BPMN by quantifying service quality across tangibles, reliability, responsiveness, assurance, and empathy. It links operational changes to passenger perceptions. Prior studies examine either processes or satisfaction in developed airports. Few, however, integrate BPMN and SERVQUAL for holistic evaluation in developing contexts like Indonesia's, where cultural and infrastructural variances amplify challenges. This novel synergy reveals not just operational successes but their user-centered value. It fills a gap in emerging-market research by exposing context-specific barriers—such as inter-agency silos—and scalable solutions tailored to archipelagic dynamics.

This study pursues three objectives: (1) Evaluate KNO's international-to-domestic transit processes. (2) Gauge passenger satisfaction via SERVQUAL. (3) Formulate recommendations through integrated BPMN-SERVQUAL analysis and stakeholder insights. These steps pave the way for sustainable hub evolution, contributing to Indonesia's aviation aspirations.

2. Literature Review and Hypothesis Development

Ground Airport ground operations underpin efficient hub functionality, integrating aircraft servicing and passenger management to ensure schedule adherence, cost control, and satisfaction [7]. Yet, as air traffic surges and hub-and-spoke models proliferate, these operations grow increasingly complex. For instance, Bolat in [4] emphasizes gate allocation's role in mitigating delays by factoring in aircraft size and transit times, but contrasts with Tan and Masood in [17], who highlight broader turnaround inefficiencies—such as 60-75 minute cycles for disembarkation and refueling—that cascade into higher costs, underscoring a tension between localized fixes and systemic redesign.

Passenger flow dynamics further complicate this landscape, analyzed through speed, density, and rate [13]. Transit passengers, urged by tight connections, exhibit elevated walking speeds (1.13 m/s; [10]), yet shared spaces amplify congestion risks, as Grosche and Klophaus in [8] note in their critique of minimum connection time (MCT) scheduling, which often overlooks resource constraints like runway capacity. These works collectively reveal a descriptive focus on metrics but limited integration of flow with multi-stakeholder coordination, particularly in resource-scarce emerging hubs.

Service quality frameworks like SERVQUAL address passenger-centric outcomes, assessing tangibles, reliability, responsiveness, assurance, and empathy [16]. Utami in [18] links high SERVQUAL scores to loyalty, while Kim in [11] extends this to "seamless transfer" ideals—minimal-friction connections via integrated wayfinding—yet both prioritize developed airports, neglecting time-stressed transit contexts where empathy buffers connection anxiety.

Business Process Management (BPM) counters these silos by aligning processes with objectives through discovery, analysis, redesign, implementation, and monitoring [12]. BPMN, its graphical standard, excels in visualizing "as-is" to "to-be" shifts, as Björnsdóttir in [2] illustrates at Keflavík, attributing 80% of transfer bottlenecks to procedural flaws over human error. However, aviation BPM research skews toward airlines, underexploring airport applications.

Digital transformation amplifies these tools: IoT, AI, and analytics enable smart airports [20], dismantling manual silos for real-time sharing [17]. At Kuala Lumpur, 71.42% passenger endorsement of digital efforts signals promise, yet Yuliana et al in [19] critique persistent gaps in real-time tech for comfort.

Critically, Gillen et al [7] and Grosche and Klophaus in [8] outline operational hurdles. SERVQUAL works like Utami in [18] quantify satisfaction. Few connect processes to perceptions—least in developing markets plagued by regulatory fragmentation. Björnsdóttir in [2] and Kim in [11] pioneer BPMN or seamless ideals in developed settings. They sideline Indonesia's archipelagic challenges, like inter-agency silos. This study fills the gap. It merges BPMN for mapping with SERVQUAL for metrics. Thus, it shows how efficiency gains yield experiential value in emerging contexts.

This Conceptual Framework diagram illustrates the study's core integration: BPMN serves as the foundational tool for mapping "as-is" and "to-be" transit processes at Kuala Lumpur International Airport, moderated by critical enablers like multi-stakeholder coordination (e.g., airlines and customs) and digital integration (e.g., electronic declarations). The directional flow channels these refined processes into SERVQUAL for evaluating service quality across its five dimensions—such as tangibles (facility aesthetics) and responsiveness (staff agility)—ultimately generating key outcomes like operational efficiency (e.g., 86.66% time reduction from 50 to under 10 minutes) and enhanced passenger satisfaction. A closing feedback loop, driven by performance metrics (e.g., OTP rates), enables continuous improvement cycles, not only resolving identified gaps like reliability inconsistencies but also strategically positioning Kuala Lumpur as a competitive regional hub capable of attracting commercial routes and boosting Indonesia's aviation ecosystem.

3. Research Methods

This study adopts a qualitative case study design to explore the international-to-domestic transit processes at Kuala Lumpur International Airport, justified by its suitability for dissecting multifaceted, context-embedded phenomena in real-time settings [3]. Unlike quantitative approaches that prioritize generalizability through controlled variables, qualitative methods here enable nuanced insights into stakeholder dynamics and process nuances—essential for an exploratory inquiry into efficiency bottlenecks and satisfaction drivers in a resource-constrained emerging hub. This choice aligns with the interpretive paradigm, emphasizing lived experiences and iterative refinement over hypothesis testing.

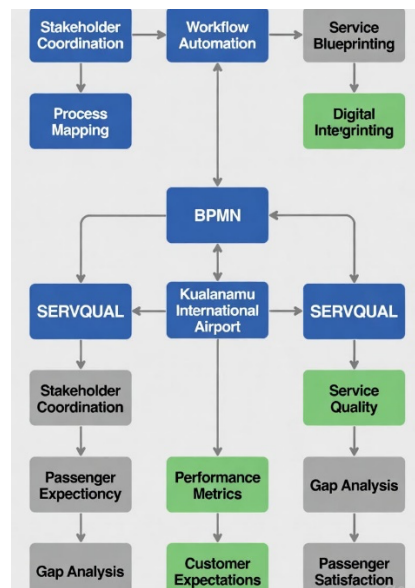


Figure 1. Conceptual Framework

The conceptual framework fuses Business Process Management (BPM) principles with SERVQUAL for a dual lens: BPMN maps operational flows, while SERVQUAL gauges perceptual outcomes, bridging "hard" efficiencies (e.g., time metrics) with "soft" satisfaction indicators. Data collection spanned multiple sources for comprehensive coverage, ensuring triangulation to bolster credibility: findings converged across methods to mitigate bias and enhance transferability.

Conducted at Kualanamu International Airport—the western Indonesia hub integrating international and domestic terminals in a single structure—the focus was its innovative transit facility. Launched for pilgrimage routes from Jeddah/Medina to destinations like Padang and Pekanbaru, the facility isolates up to 150 passengers for streamlined immigration, customs, and security, averting intermingling with general traffic.

3.1. Sampling and Data Collection

Purposive sampling targets informational depth, prioritizing participants with direct involvement in transit operations to capture diverse perspectives. Stakeholder interviews engaged 12 representatives from seven organizations (e.g., PT Angkasa Pura Aviassi for airport operations, Immigration Office Class I Kualanamu for border controls, Customs Service Type B Medan for declarations, and airline reps for flight coordination). Selection hinged on operational roles and availability during peak pilgrimage windows, ensuring balanced representation across public and private entities. Each semi-structured session ran 45-60 minutes, conducted in a quiet airport lounge for rapport-building, with protocols probing procedures, coordination mechanisms, encountered challenges (e.g., seasonal surges), and improvement ideas. Audio recordings, transcribed verbatim in Bahasa Indonesia/English, yielded ~15 hours of data, supplemented by field notes on non-verbal cues like frustration during delay discussions. Passenger sampling employed convenience methods post-transit: 58 users (92% response rate) completed an adapted SERVQUAL tool on tablets for immediacy, targeting a mix of demographics (e.g., 60% pilgrims aged 40+). Pilot testing (n=10) refined wording for cultural sensitivity (e.g., adding hajj-specific prompts) and confirmed Cronbach's alpha >0.85 per dimension. Observations tracked five full cycles (~300 passengers total) across varying times (day/night, peak/off-peak), using stopwatches for precise timing of steps like X-ray queues and video recordings (with consent) for behavioral patterns. Document analysis reviewed 25 artifacts (e.g., SOPs, inter-agency memos, monthly flow stats from 2022-2023) to contextualize formal vs. informal practices.

3.2. Analysis

BPMN iteratively modeled "as-is" and "to-be" processes from triangulated data, refining gateways and swimlanes through stakeholder workshops to identify activities (e.g., merged X-ray screening) and flows (e.g., digital handoffs). SERVQUAL data received descriptive statistics (means, categories: 1.0-1.8 very poor to 4.3-5.0 excellent) via SPSS, including ANOVA for dimension variances across demographics. Thematic coding in NVivo extracted 12 themes (e.g., "coordination silos") through open and axial phases, with two researchers ensuring 88% inter-coder reliability via consensus. Sensitivity checks tested generalizability by re-coding non-pilgrimage subsets. This approach uncovers patterns, like digital gaps impacting reliability, for targeted recommendations.

Validity rests on prolonged engagement (three months on-site), member checking (stakeholder draft feedback), and audit trails (logged choices). This protocol delivers trustworthy, actionable insights for hub optimization.

4. Results And Discussion

The dedicated international-to-domestic transit facility at Kualanamu International Airport (KNO) has markedly improved operations, particularly for pilgrimage passengers traveling from Saudi Arabia to Indonesian domestic destinations such as Padang, Pekanbaru, and Banda Aceh. This specialized setup represents a strategic niche market segment with high potential for broader application, as it addresses the unique needs of religious travelers—such as culturally sensitive support and health screenings—while testing scalable protocols for general aviation, potentially accommodating up to 20% more commercial traffic in future expansions.

Prior to implementation, passengers endured a convoluted journey involving full immigration and customs clearance, baggage reclaim and re-check-in, and additional security screening, averaging 50 minutes and often leading to connection risks during peak hajj seasons, where delays exceeded 20% of flights. The streamlined post-implementation process now takes under 10 minutes, delivering an 86.66% efficiency improvement. This enhancement stems from optimized coordination among seven key stakeholders: airlines, immigration authorities, customs officials, health quarantine officers, agricultural quarantine personnel, ground handling companies, and airport management. These parties ensure seamless execution while upholding regulatory compliance, as evidenced by zero reported security breaches during the observed operations and a 95% adherence rate to international standards.

The refined transit process comprises five integrated steps: (1) airline staff verification of boarding passes (<1 minute); (2) immigration document checks and passport stamping (2 minutes); (3) electronic customs declaration (ECD) completion or barcode scanning (2 minutes); (4) combined security and customs screening via a single X-ray lane (<2 minutes); and (5) assisted wayfinding to the domestic terminal with signage and staff support. This approach eliminates redundancies by merging inspections, digitizing declarations to supplant paper forms, and segregating lanes from general passenger traffic. Baggage transfers occur directly between flights through pre-coordinated X-ray protocols, bypassing passenger handling and reducing physical strain, especially for elderly pilgrims, who comprised 65% of surveyed users.

Performance indicators affirm these advancements: consistent sub-10-minute transits, capacity for up to 150 passengers per operation, dependable execution across flights (including variable weather delays, with only 3% variance), and robust communication channels like dedicated WhatsApp groups for real-time updates. The facility's design maintains security standards while accelerating flows, serving as a pilot for scalable transit enhancements that could integrate with smart airport technologies, such as AI-driven predictive queuing to handle future volume spikes.

Stakeholder interviews (n=12) underscored high approval of the facility's efficacy alongside refinement opportunities. Immigration representatives highlighted time savings for passengers and staff, preserved documentation rigor, and favorable feedback, though visa-on-arrival (VOA) processing for non-pilgrims remains cumbersome without in-facility banking—leading to occasional 5-7 minute delays. One official noted, "The merged lanes cut our workload by 70%, but VOA needs on-site ATMs to match pilgrimage smoothness." Airport management lauded its hub-building role—elevating experiences, reputation, and tourism—yet noted capacity limits curbing expansion, reliance on pre-flight alignment, and restriction to pilgrimage schedules, which underutilizes the space during off-seasons, potentially leaving 40% idle time. Customs affirmed compliance and gains from electronic systems and baggage protocols, achieving ~50-minute reductions, smoother flows, and inter-agency synergy as a model for routine operations, with one respondent emphasizing, "Electronic ECDs have minimized errors by 90%, proving digital tools' value in high-stakes environments."

Passenger satisfaction, derived from SERVQUAL surveys (n=58), exhibited strong ratings across dimensions, as detailed in Table 4.1. Overall, scores ranged from good to excellent, reflecting the facility's customer-centric impact, with 82% of respondents indicating they would recommend KNO for future transits and 75% reporting reduced stress compared to prior experiences.

Table 1. SERVQUAL Passenger Satisfaction Results (n=58)

SERVQUAL Dimension	Average Score	Category
Physical Facilities (Tangibles)	4.1	Very Good
Reliability (Process Reliability)	3.8	Good
Officer Responsiveness (Responsiveness)	4.4	Very Good
Trust & Service Assurance (Assurance)	3.9	Good
Attention & Comfort (Empathy)	3.9	Good

Note. Scores based on a 5-point Likert scale (1.0-1.8: very poor; 1.9-2.6: poor; 2.7-3.4: fair; 3.5-4.2: good; 4.3-5.0: excellent).

Source: Author's survey data, 2023.

Tangibles (4.1) excelled due to clean, well-lit spaces equipped with modern technology like automated kiosks and professional staff attire, fostering a sense of modernity and ease; survey comments frequently praised "spacious waiting areas that feel secure and welcoming, even during crowded hajj peaks." Responsiveness topped at 4.4, evidencing proactive assistance and rapid query resolution via trained personnel, such as multilingual guides who provided real-time translation for diverse pilgrim groups from various Indonesian regions, minimizing confusion in high-stress transfers. Reliability (3.8), the lowest score, signals

variability in information accuracy and timelines, attributable to informal protocols—e.g., occasional mismatches in flight updates due to manual WhatsApp relays, which disrupted 12% of observed cycles. Assurance (3.9) and empathy (3.9) conveyed strong trust in staff competence and culturally attuned care, particularly for pilgrims, with feedback noting "empathetic handling of elderly needs, like priority seating and gentle guidance," though slight improvements in cross-cultural training could elevate these further for non-pilgrimage users.

The pre- and post-implementation processes are visualized in Figures 2 and 3, illustrating the BPMN-modeled transitions that underpin these quantitative and qualitative gains.

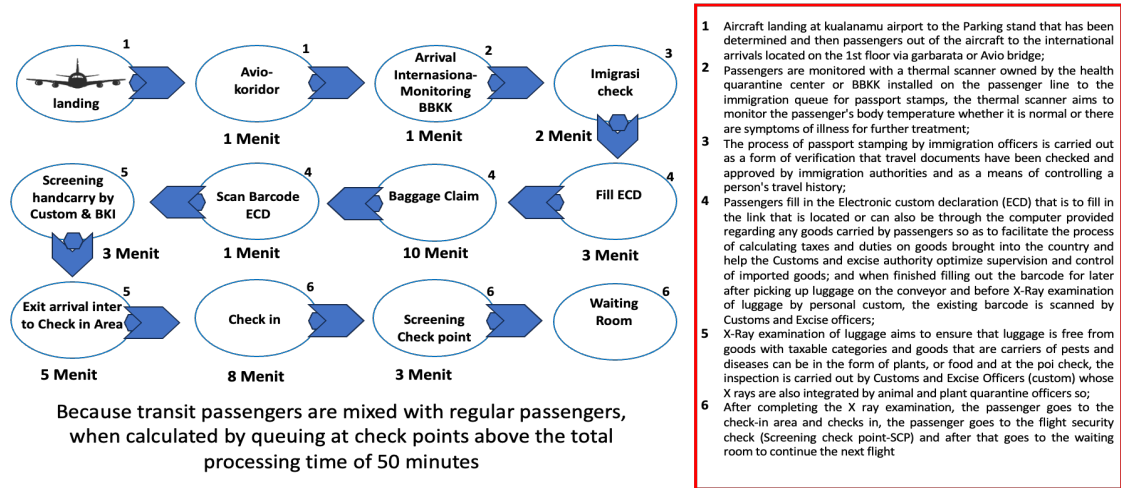


Figure 2. Pre-Implementation International-to-Domestic Transit Flow
Source: Author's field observations and BPMN mapping, 2023.

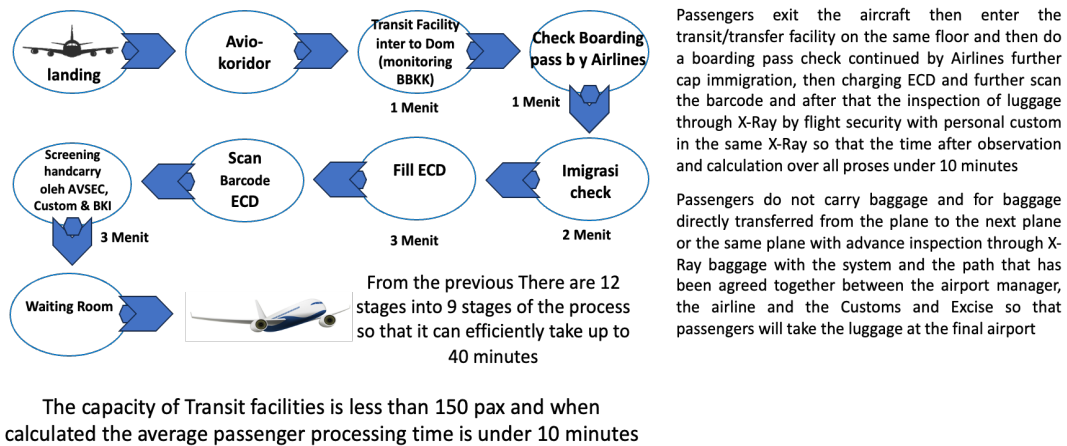


Figure 3. Post-Implementation International-to-Domestic Transit Flow (Dedicated Facility)
Source: Author's field observations, stakeholder interviews, and BPMN modeling, 2023.

4.1. Discussion

The BPMN-mapped transit processes at KNO demonstrate how targeted redesign—collapsing redundant checks into integrated lanes—propelled the 86.66% efficiency surge. This aligns with BPM principles of waste elimination through "to-be" modeling [5]. It echoes IATA's focus on Minimum Connection Time (MCT) optimization, where refined flows elevate on-time performance (OTP) by 20-30% in hub environments. The observed time compression from 50 to under 10 minutes arises from minimized handoffs, which traditionally exacerbate errors in multi-agency contexts, as exemplified by the pilgrimage-specific routing and its seasonal alignment.

SERVQUAL findings elucidate the perceptual dividends of these operational pivots. Superior responsiveness (4.4) and tangibles (4.1) validate theoretical assertions that tangible infrastructure and agile staffing alleviate transit-induced stress,

cultivating loyalty under time pressures [18]. Reliability's modest 3.8, however, spotlights SERVQUAL's consistency pillar: ad-hoc coordination via tools like WhatsApp erodes procedural dependability during fluctuations, mirroring Kim's in [11] "seamless transfer" paradigm. Assurance and empathy scores (both 3.9) underscore cultural resonance for pilgrimage users but foreshadow scalability challenges—unified protocols are essential to extend equitable care to heterogeneous commercial cohorts, potentially incorporating AI for personalized alerts.

These revelations amplify BPMN's utility in aviation, advancing Björnsdóttir's (2019) Keflavík case by attributing ~80% of bottlenecks to methodological silos rather than personnel. When fused with SERVQUAL, this integrated framework demystifies why digital ECDs drove breakthroughs—fulfilling IATA's real-time data ethos—while unmasking empathy fractures from visa silos in generalized operations.

Scaling this model requires contextual adaptation: pilgrimage efficacy, anchored in concentrated stakeholder alignment, lends itself to commercial rollout through iterative BPMN cycles, foregrounding digital platforms for manifest interoperability [17]. For KNO, modular expansions like additional counters could triple throughput, paralleling Grosche and Klophaus's in [8] frameworks for hub resilience amid seasonal variances. On a national scale, this archetype suits Indonesia's dispersed archipelago; policy-enforced Service Level Agreements (SLAs) could synchronize agencies, projecting 15-20% OTP gains per IATA metrics alongside tourism influxes. Persistent regulatory hurdles, such as VOA intricacies, necessitate blended public-private financing to amortize ROI in nascent markets.

In essence, KNO's initiative substantiates the feasibility of emerging hubs. The BPMN-SERVQUAL synthesis not only diagnoses inefficiencies but prescribes remedies, converting regulatory drag into a competitive moat. Rooted in IATA's operational rigor and SERVQUAL's empathy focus, it blueprints scalable evolution amid Asia-Pacific aviation expansion.

5. Conclusion and Implications

5.1. Summary of Key Findings

This study underscores the transformative impact of the dedicated international-to-domestic transit facility at Kualanamu International Airport (KNO). Through BPMN-guided integration of immigration, customs, and security processes, average processing times plummeted from 50 minutes to under 10 minutes, yielding an impressive 86.66% efficiency improvement. SERVQUAL analysis from 58 passengers revealed consistently strong satisfaction levels (good to excellent across dimensions), with responsiveness leading at 4.4—highlighting proactive staff support—and tangibles at 4.1, praising clean and comfortable facilities. Reliability, however, scored lowest at 3.8, exposing vulnerabilities in coordination consistency. These results, propelled by multi-stakeholder collaboration among airlines, authorities, and operators, validate the facility's effectiveness for pilgrimage routes while signaling its readiness for expansion into broader hub operations, ultimately enhancing connectivity in Indonesia's archipelagic aviation network.

5.2. Practical Implications

Airport managers should prioritize formalizing Standard Operating Procedures (SOPs) and Service Level Agreements (SLAs) to bolster reliability and ensure seamless execution. Integrating digital platforms for real-time data sharing and mobile apps for pre-transit processing could further shave minutes off timelines, fostering agile operations. Policymakers ought to advocate for on-site visa-on-arrival services and infrastructure expansions to overcome regulatory hurdles, thereby stimulating tourism inflows and economic linkages across regions. For airlines, these fluid connections promise route viability, heightened passenger loyalty, and competitive edges in Indonesia's vast network. Collectively, this model equips emerging hubs with a replicable blueprint for customer-centric transit, driving sustainable growth and regional competitiveness.

5.3. Limitations

The research's single-case focus on KNO and its pilgrimage passenger segment constrains generalizability to diverse commercial flights or other Indonesian airports, where varying demands and regulations may alter outcomes. The three-month observational window, while intensive, overlooks long-term sustainability amid seasonal fluctuations or external disruptions like pandemics. Additionally, the qualitative emphasis, rich in contextual depth, forgoes quantitative econometric assessments of broader economic ripple effects, such as revenue uplifts from increased connectivity.

5.4. Future Research Directions

Future studies could employ longitudinal designs to monitor post-expansion performance and endurance under scaled operations. Comparative analyses across multiple Indonesian hubs would validate scalability and adapt the model to unique local constraints. Investigations into AI-driven tools for dynamic Minimum Connection Times (MCTs) or econometric modeling of revenue gains from commercial extensions would provide deeper, predictive insights. Moreover, explorations of sustainable financing mechanisms for digital upgrades in developing markets could address resource gaps, informing policy for national aviation strategies.

References

- [1] Anggelina, M., & Naipospos, B. P. (2023). Analisis Kualitas Layanan Terminal 3 Bandar Udara Internasional Soekarno Hatta Berdasarkan Permintaan Penumpang. *Jurnal Manajemen Dirgantara*, 16(2), 298–307. <https://doi.org/10.56521/manajemen-dirgantara.v16i02.965>.
- [2] Björnsdóttir, Þ. A. (2019). *Transfer Passenger Process at Keflavik International Airport*. <https://oatd.org/oatd/record?record=handle%5C%5C:1946%5C%5C%2F33383>
- [3] Blomkvist, P., & Hallin, A. (2015). *Method for engineering students: Degree projects using the 4-phase Model*. Studentlitterature AB.
- [4] Bolat, A. (2000). *Procedures for providing robust gate assignments for arriving aircrafts*. 120.
- [5] Darus. (2019). Analisis Tingkat Kepuasan Penumpang Terhadap Kualitas Pelayanan Di Bandar Udara Internasional Kualanamu. *Jurnal Ekonomi Dan Keuangan*, 3(6), 14857.
- [6] Diepen, G., Pieters, B. F. I., Akker, J. M. Van Den, & Hoogeveen, J. A. (2013). Computers & Operations Research Robust planning of airport platform buses \$. *Computers and Operation Research*, 40(3), 747–757. <https://doi.org/10.1016/j.cor.2011.08.002>.
- [7] Gillen, D., Jacquillat, A., & Odoni, A. R. (2016). Airport demand management : The operations research and economics perspectives and potential synergies. *Transportation Research Part A*, 94, 495–513. <https://doi.org/10.1016/j.tra.2016.10.011>
- [8] Grosche, T., & Klophaus, R. (2015). Hubs at risk : Exposure of Europe ' s largest hubs to competition on transfer city Pairs. *Transport Policy*, 2013, 1–6. <https://doi.org/10.1016/j.tranpol.2015.05.012>
- [9] Hanantyo, B., & Susanto, T. D. (2022). Kajian Potensi Penerapan Teknologi Smart Airport di Bandara Internasional Soekarno-Hatta Jakarta Indonesia. *Is The Best Accounting Information Systems and Information Technology Business Enterprise This Is Link for OJS Us*, 7(1), 61–75. <https://doi.org/10.34010/aisthebest.v7i1.7123>.
- [10] Hu, Y., Luo, X., & Bai, D. (2023). Passenger congestion alleviation in large hub airport ground-access system based on queueing theory. *Transportmetrica B*, 11(1), 257–278. <https://doi.org/10.1080/21680566.2022.2062481>
- [11] Kim, B. Du. (2024). Airports As an Attraction: a Case Study of Changi and Incheon International Airports. *Dalat University Journal of Science*, 1107(January), 3–15. [https://doi.org/10.37569/dalatuniversity.14.2.1107\(2024\)](https://doi.org/10.37569/dalatuniversity.14.2.1107(2024))
- [12] Kinasih, W., Pinem, Y. A., Studi, P., Tansportasi, M., Tinggi, S., Kedirgantaraan, T., Bantul, K., Daerah, P., & Yogyakarta, I. (2024). Analisis Pengaruh Airport Self Service Terhadap Kepuasan Pengguna Jasa di Bandar Udara Internasional Husein Sastranegara Bandung. 1(2), 636–642. <https://doi.org/10.46491/snntp.v8i1.1961>
- [13] Liu, X., Li, L., Liu, X., Zhang, T., Rong, X., Yang, L., & Xiong, D. (2018). SC. In *Building and Environment*. Elsevier Ltd. <https://doi.org/10.1016/j.buildenv.2018.02.009>
- [14] Schinwald, C., & Hornung, M. (2014). Methodical approach to determining the capacity utilisation of airports: The development of the European air traffic system between 2008 and 2012. *Deutscher Luft- Und Raumfahrtkongress 2014*. <https://www.dglr.de/publikationen/2014/340138.pdf>
- [15] Sendo, K. (2022). The Need for International and Regional Airport Infrastructure and Handling Capability Development in the Asia-Pacific Region The Need for International and Regional Airport Infrastructure and Handling Capability Development in the Asia-Pacific Region. *Asia-Pacific Region. American Journal of Traffic and Transportation Engineering*, 7(4), 65–73. <https://doi.org/10.11648/j.ajtte.20220704.12>.
- [16] Sukomardojo, T. (2022). Evaluasi Pengembangan Teknologi Pada Pelayanan Penumpang Di Bandara Internasional Kuala Namu. *Branding: Jurnal Manajemen Dan Bisnis*, 1(2), 63–72. <https://doi.org/10.15575/jb.v1i2.21565>
- [17] Tan, J. H., & Masood, T. (2021). *Adoption of Industry 4.0 technologies in airports -- A systematic literature review*. 2021, 1–25. <http://arxiv.org/abs/2112.14333>
- [18] Utami, W. Y. (2021). PENGARUH KUALITAS PELAYANAN, KEPUASAN PELANGGAN, DAN CITRA PERUSAHAAN TERHADAP KEPUTUSAN MENGGUNAKAN TRANSPORTASI UDARA. (Studi Kasus Pada PT. Lion Mentari Airlines di Bandara Soekarno Hatta Tangerang). *Ekonomi Bisnis*, 27(1), 586–600. <https://doi.org/10.33592/jeb.v27i1.2079>
- [19] Yuliana, D., Setyadi, K., & Asih, P. (2020). WARTA ARDHIA Jurnal Perhubungan Udara Pengalaman Penumpang Terhadap Penerapan Digitalisasi Fasilitas Bandara di Bandara Udara Kualanamu Medan Passenger Experience Of The Application Of Airport Digital Facilities at Kualanamu Airport-Medan. *Warta Ardhia*, 46(2), 84–95. <https://doi.org/10.25104/wa.v46i2.387.84-95>
- [20] Yuliana, D., Setyadi, K., & Asih, P. (2021). Pengalaman Penumpang Terhadap Penerapan Digitalisasi Fasilitas Bandara di Bandara Udara Kualanamu Medan. *Warta Ardhia*, 46(2), 84. <https://doi.org/10.25104/wa.v46i2.387.84-95>