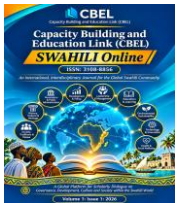
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Faster Transactions, Persistent Queues: Efficiency of Immigration Service Delivery under the E-Border Management System at Julius Nyerere International Airport

Lucas W. Motura Nyakurata[1*], Kassim Rashid Kiliza[1] & Janet Emily Mutebe[1]
[1]*Kampala International University in Tanzania, Dar es Salaam, Tanzania*

*Corresponding author: Lucas W. Motura Nyakurata, Kampala International University in Tanzania, Dar es Salaam, Tanzania. Email: moturanyakurata@gmail.com

ORCID

Lucas W. Motura Nyakurata: https://orcid.org/0009-0001-6911-7179
Kassim Rashid Kiliza: https://orcid.org/0009-0006-4763-0597
Janet Emily Mutebe: https://orcid.org/0009-0002-1187-6596

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Abstract

Purpose: This study evaluated the efficiency of immigration service delivery after the implementation of the E-Border Management System (EBMS) at Julius Nyerere International Airport (JNIA), Tanzania.

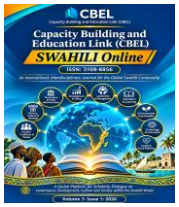
Design/methodology/approach: A mixed-methods design guided by the Technology Acceptance Model and Diffusion of Innovation Theory was used. Structured questionnaires were completed by 399 respondents (international and Tanzanian passengers, immigration officers, airport staff, IT personnel and ground handlers), 18 key informants were interviewed, and system and annual performance reports were reviewed alongside five days of non-participant observation.

Findings: Perceived efficiency was satisfactory (overall M = 4.08, SD = 0.74). Transaction-level indicators were rated highest, processing time (M = 4.16), clearance speed (M = 4.14) and document verification (M = 4.13), while system-level indicators such as waiting time (M = 3.99) and throughput (M = 3.90) were lower. Administrative records showed average processing time falling from 45 to 22 minutes between 2017 and 2022 and throughput rising from 12 to 22 passengers per officer per hour, while downtime incidents rose from 127 to 171 between 2020 and 2022. Passengers rated efficiency higher than staff ($t(397) = 3.42$, $p < .001$).

Research limitations/implications: The study covered one airport, and passenger respondents may over-represent highly educated travellers.

Practical implications: Sustaining EBMS gains requires reliable power and connectivity, peak-hour staffing and queue management, and rapid technical support, not technology alone.

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INTRODUCTION

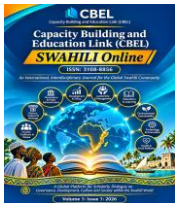
Border management agencies across the world are replacing manual passport inspection with electronic systems that combine biometric verification, automated document checks and integrated traveller databases. Electronic and automated border control systems are expected to shorten processing times, reduce manual errors, increase the number of passengers handled per officer and strengthen security (International Air Transport Association [IATA], 2022). Evidence from European airports shows that automated border control can reduce waiting times and increase throughput during peak periods (Fernández & Bautista, 2021). However, studies in developing-country contexts show that infrastructure weaknesses such as unstable connectivity and system downtime can limit these gains (Amoako et al., 2023; International Organization for Migration [IOM], 2022).

Tanzania introduced the E-Border Management System (EBMS) at Julius Nyerere International Airport (JNIA), the country's largest international airport, to address long processing times, manual verification errors, long queues during peak hours and security vulnerabilities. JNIA handles more than 1.5 million passengers a year and was the first site at which the system was deployed (Tanzania Airports Authority, 2023). Over time, EBMS has been integrated with other national platforms, including visa, permit, national identification and payment systems.

Despite these technological advancements, according to the Tanzania Immigration Services Department Annual Performance Report (2022) there is a challenge of flexible documents during operational at JNIA. Platform downtime incidents increased from 127 cases in 2020 to 171 cases in 2022, representing a 35% increase over a two-year period. Average passenger processing time, although reduced from 45 minutes in 2017 to 22 minutes in 2022, still exceeds the International Civil Aviation Organization (ICAO) recommended standard of 15 minutes for automated border processing. Immigration officers have further reported difficulties relating to system integration, inadequate initial training, and insufficient technical support during platform failures (Tanzania Immigration Services Department, 2022). Passenger complaints are documented by Airport management which also include prolonged delays during system outages, confusion associated with biometric capture procedures, and inconsistent service quality across immigration counters.

Furthermore, infrastructure constraints specific to JNIA continue to affect EBMS performance. The airport's power supply experiences intermittent fluctuations, backup generators possess limited operational capacity, and the local network infrastructure occasionally struggles to accommodate peak passenger volumes (Tanzania Airports Authority, 2022). Staff turnover has also created a continuous need for retraining, yet refresher training programmes are reportedly conducted only once annually. Additionally, the National ICT Policy of 2023, which serves as the primary regulatory framework for e-border management, does not comprehensively address issues related to data privacy, system interoperability, or contingency procedures for electronic system failures, thereby creating legal and operational ambiguities.

Although Kipingu and Shayo (2021) reported that electronic immigration services in Tanzania improved service delivery, no comprehensive study has measured the efficiency gains of EBMS at JNIA using both perceptual and objective indicators, or examined whether gains at the level of individual transactions translate into gains at the level of the whole system. Without such evidence, the Immigration Services Department cannot make informed decisions about system upgrades, staffing or operational adjustments. This article reports the first objective of a broader study on the effects of EBMS on immigration service delivery: to evaluate the efficiency of immigration service delivery after the implementation of EBMS at JNIA.



Theoretical Framework

Technology Acceptance Model

The Technology Acceptance Model was developed by Fred Davis in 1986 and formally published in 1989 in the MIS Quarterly journal. Davis (1989) argues that two major constructs determine technology acceptance: perceived usefulness and perceived ease of use. Perceived usefulness refers to the degree to which an individual believes that using a system will improve job performance, while perceived ease of use refers to the degree to which a system is perceived to be free of effort.

According to Davis et al. (1989), these two perceptions influence user attitude, which in turn determines behavioural intention and actual system usage. This model has been widely applied in studies of e-government systems, including immigration and border control systems, where user acceptance is critical for system success.

In this study, TAM explains how immigration officers and other users judge the usefulness of EBMS in reducing processing time and improving accuracy. If users perceive the system as useful and easy to use, it is more likely to be adopted effectively and to deliver efficiency gains. TAM has, however, been criticised for focusing on individual perceptions while neglecting organisational and infrastructural conditions that shape actual use.

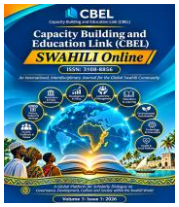
Diffusion of Innovation Theory

The Diffusion of Innovation Theory was developed by Rogers (2003) in his revised edition of Diffusion of Innovations. Rogers explains that innovation adoption depends on five key attributes: relative advantage, compatibility, complexity, trialability, and observability. Rogers (2003) further emphasises that innovations are more likely to be adopted when users perceive clear benefits, low complexity, and strong compatibility with existing systems.

Diffusion of Innovation Theory complements TAM by directing attention to the relative advantage of EBMS over manual procedures and to the complexity and compatibility of the system within existing immigration operations. In this study, relative advantage is reflected in perceived improvements in processing time, clearance speed and verification, while complexity and compatibility help explain why gains may be uneven across operational settings (Rogers, 2003).

Empirical Literature

The literature on EBMS efficiency presents a broadly consistent picture at the transaction level but a more fragmented one at the system level. Fernández and Bautista (2021), studying Automated Border Control systems across major European airports, found reductions in passenger waiting time and increases in throughput during peak travel periods. Their findings suggest that biometric verification shortens identity checks while allowing officers to process larger numbers of travellers without compromising security. This conclusion is reinforced by the International Air Transport Association (IATA, 2022), which reported that digital passenger processing systems improve operational efficiency through automated identity verification, electronic document validation, and integrated passenger information management. The International Civil Aviation Organization (ICAO, 2023) similarly found that digital travel credential systems enhance passenger clearance efficiency by reducing processing time and strengthening identity verification accuracy. Broeders and Ham (2020) added a further dimension, demonstrating that biometric technologies such as facial recognition, fingerprint identification, and iris scanning reduce human errors associated with manual document inspection while simultaneously improving security outcomes. Read together, these studies establish a consistent finding: EBMS improves transaction-level efficiency, and this finding holds across European and global contexts.



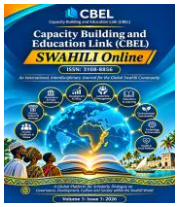
The picture becomes more complex when the evidence base shifts to developing-country contexts. Amoako et al. (2023) observed that electronic immigration management systems in Ghana improved passenger processing speed and reduced manual verification errors, but they also documented persistent infrastructure challenges unstable internet connectivity and occasional system downtime that affected operational consistency. The International Organization for Migration (IOM, 2022) reported similar findings across several African countries, noting that digital border management initiatives improved immigration monitoring and passenger verification but that these gains were constrained by infrastructure limitations. The World Bank (2021) confirmed this pattern, reporting that many digital government systems in Africa continue to face inadequate ICT infrastructure, maintenance challenges, and shortages of skilled personnel. The contrast with European findings is instructive. European studies report both transaction-level and system-level gains; African studies report transaction-level gains but persistent system-level constraints. This divergence suggests that the throughput effect is not an automatic consequence of technology but is conditional on infrastructure reliability a condition more often absent in developing-country airports.

A methodological limitation runs through this literature. Most studies rely on perceptual or self-reported data from airport managers or passengers. The few that use objective system data tend to exclude developing-country airports from their samples. The literature therefore cannot yet answer whether the transaction-level efficiency gains observed in African contexts translate into system-level throughput gains under real operating conditions. Broeders and Dijstelbloem (2021) caution that interoperability challenges, cybersecurity threats, and the management of large biometric databases may further undermine system performance in technologically demanding environments, but their analysis is conceptual rather than empirical. What remains unknown is whether the transaction-level and system-level effects can be measured separately within a single developing-country airport, and whether the gap between them is as pronounced as the cross-national comparisons suggest. This study addresses that gap by combining perceptual measures with objective system data from JNIA.

Other studies extend this evidence. Chen and Liu (2021) examined air passengers' continued use of airport e-gates and showed that users' experience of automated gates shapes their willingness to keep using them, while the UK Home Office (2023) reports routine monitoring of e-passport gate performance as part of border technology management. Tan and Wong (2020) describe Singapore's electronic border management as a regional model that combines automation with strong institutional coordination. In Africa, Adebayo and Ogundimu (2021) documented challenges in implementing electronic border management in Nigeria, including infrastructure and capacity constraints, and Boateng and Agyemang (2019) identified both opportunities and challenges in Ghana. Broader e-government research similarly shows that the performance of digital public services in developing countries depends on infrastructure, skills and institutional readiness (Heeks, 2017; United Nations Department of Economic and Social Affairs [UNDESA], 2022).

In Tanzania, Kimolo and Casmir (2024) evaluated the efficacy of the e-immigration system in the provision of immigration services, and the Controller and Auditor General (2022) conducted a performance audit of electronic border management systems, highlighting the need for stronger monitoring of system performance. Kipingu and Shayo (2021) found that electronic immigration services improved service delivery and reduced processing time, but they did not distinguish between transaction-level and system-level efficiency or triangulate perceptions with system records. The World Bank (2021) similarly cautions that digital government systems in Africa face infrastructure limitations that may constrain their performance. These gaps justify an assessment of EBMS efficiency at JNIA that combines multiple respondent groups, objective indicators, interviews and observation.

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METHOD

Research Design and Approach

The study adopted a pragmatic mixed-methods approach using an explanatory sequential design (Creswell & Plano Clark, 2018). The quantitative phase measured perceptions of efficiency through a structured questionnaire and compiled objective efficiency indicators from administrative records. The qualitative phase used semi-structured interviews and observation to explain the quantitative results. This design was chosen because it allowed the study first to measure the extent of efficiency gains and then to explain why they were distributed as they were.

Study Area

The study was conducted at JNIA in Dar es Salaam. The airport was selected because it is Tanzania's largest international gateway and the primary implementation site of EBMS, serving international passengers, immigration officers and airport authorities who interact with the system daily (Tanzania Airports Authority, 2023).

Population, Sample and Sampling

The population comprised international passengers, Tanzanian frequent passengers, immigration officers, airport and agency staff, IT personnel and airline and ground-handling staff. A sample of 399 was determined and allocated across these categories as shown in Table 1.

Table 1. Target population, sample size and sampling technique

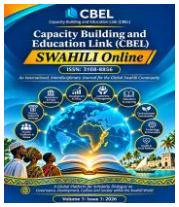
Category	Targeted population	Sample Size	Sampling Technique
International passengers	91,500	220	Systematic random sampling
Tanzanian frequent passengers	30,000	100	Stratified random sampling
Immigration officers	100	30	simple random sampling
Airport/agency staff	50	20	simple random sampling
IT personnel	5	5	simple random sampling
Airline/ground handlers	40	24	Simple random sampling
Total	121695	399	

Source: Field data (2026).

Four sampling techniques were used for different stakeholder groups. Systematic random sampling was applied to international non-Tanzanian passengers: every 28th passenger passing through immigration control was invited to participate, with a random starting point between 1 and 5. Stratified random sampling was applied to Tanzanian citizen/resident frequent passengers: stratification by travel frequency (citizens and non-citizens) and age group (18-35, 36-50, over 50), with simple random sampling within each stratum.

Simple random sampling was applied to immigration officers (selection criteria: minimum one-year EBMS experience, representation from morning, evening, and night shifts, and from different service points such as passport control, visa verification, and biometric data collection).

Key informants for interviews were selected purposively on the basis of their direct involvement in EBMS implementation, operation or oversight, with snowball referrals used to reach additional participants with specialised knowledge.



Data Collection

A structured questionnaire with role-specific sections measured efficiency through seven five-point Likert items covering processing time, clearance speed, document verification, waiting time, overall efficiency, throughput and reduction of manual workload. Items were adapted from established instruments based on TAM and e-government service frameworks. Questionnaires were administered face to face at immigration control points, designated waiting areas and staff offices, which yielded a 100% return rate.

Interviews were conducted with key stakeholders at Julius Nyerere International Airport, including immigration officers, airport management, and technical staff, selected purposively based on EBMS experience. Interviews were conducted until data saturation was reached. A total of 18 interviews were conducted. An interview guide covered EBMS use, challenges, effects on service delivery, and user experiences. Interviews lasted 45-90 minutes, were audio-recorded with consent, and were conducted in private airport offices.

Document analysis was used to gather secondary data on EBMS implementation and performance at Julius Nyerere International Airport. It involved reviewing official reports, EBMS records, training manuals, and system statistics from 2016-2026. Only relevant and accessible documents from immigration and airport authorities were included to support and validate primary data through triangulation.

Non-participant observation was conducted at immigration control points at Julius Nyerere International Airport to examine how EBMS operated in real time without interfering with staff or passengers. It focused on processing time, system usage, officer procedures, passenger flow, and technical interruptions. Observation was carried out for five working days during different traffic periods (morning, afternoon, and peak hours) using a structured checklist and field notes. Data were analysed through simple qualitative coding, categorisation, and interpretation to identify operational patterns and challenges in EBMS performance.

Validity and Reliability

Content validity was established through review by three experts, including a senior immigration officer with practical EBMS experience, who assessed the relevance and clarity of items. The questionnaire was piloted with 30 respondents who were excluded from the main sample, and internal consistency was assessed using Cronbach's alpha, with 0.70 taken as the acceptable threshold (Taber, 2018). For the qualitative data, two independent coders analysed a subset of transcripts, with inter-coder agreement of at least 80% regarded as acceptable.

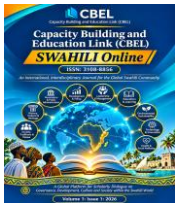
Data Analysis

Quantitative data were analysed using SPSS version 29. Descriptive statistics (frequencies, percentages, means and standard deviations) summarised the efficiency indicators, a one-sample t-test compared the overall efficiency mean with the scale midpoint, and an independent-samples t-test compared passengers and staff. Interview transcripts were translated where necessary and analysed thematically, and the quantitative, qualitative, documentary and observational evidence was integrated at the interpretation stage.

Ethical Considerations

Ethical approval was obtained from the Kampala International University in Tanzania Ethics Committee before data collection, followed by permissions from the Tanzania Airports Authority and the Immigration Services Department to conduct the study at Julius Nyerere International Airport.

Participation was voluntary, with informed consent obtained from all respondents. International passengers were approached in designated waiting areas to avoid time pressure, and refusal did not affect access to services.



Confidentiality was ensured by using codes instead of names, with data stored securely and accessible only to the researcher and supervisor. Data were kept for five years before secure deletion or destruction.

RESULTS

Response Rate and Respondents

All 399 questionnaires were returned and valid (100%): 220 international passengers, 100 Tanzanian frequent passengers, 30 immigration officers, 20 airport and agency staff, 5 IT personnel and 24 airline and ground handlers. Professional respondents were experienced, with 66.6% of immigration officers having seven or more years of service, so most had worked under both manual and electronic systems. Among international passengers, 26.0% held a master's degree or doctorate, which suggests some over-representation of business and academic travellers.

Perceived Efficiency of Immigration Service Delivery

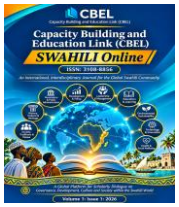
Table 2. Efficiency of immigration service delivery after EBMS implementation (n = 399)

No.	Statement	5	4	3	2	1	Mean	SD	Interpretation
1	EBMS has reduced passenger processing time at JNIA.	180	145	40	24	10	4.16	0.99	Satisfactory
2	EBMS has improved the speed of immigration clearance procedures.	170	155	42	22	10	4.14	0.98	Satisfactory
3	Document verification is faster under EBMS compared to the manual system.	165	160	45	20	9	4.13	0.96	Satisfactory
4	Passenger waiting time has significantly reduced after EBMS implementation.	150	155	50	30	14	3.99	1.12	Satisfactory
5	EBMS has improved overall efficiency of immigration operations.	175	150	43	21	10	4.15	0.96	Satisfactory
6	EBMS has increased the number of passengers processed per officer per hour.	140	150	55	38	16	3.90	1.11	Satisfactory
7	Manual administrative workload has been reduced due to EBMS.	160	155	48	25	11	4.07	1.02	Satisfactory
	Overall Efficiency						4.08	0.74	Satisfactory

Note. 5 = Strongly Agree to 1 = Strongly Disagree. Source: Field data (2026).

The overall efficiency mean of 4.08, drawn from the seven indicators, places respondents' assessments firmly within the "satisfactory" range. Two features of the distribution deserve attention. The first is that the highest-rated items cluster around individual transactions processing time (4.16), clearance speed (4.14), and document verification (4.13) while the lowest-rated items relate to aggregate system performance: throughput (3.90) and waiting time (3.99). This pattern suggests that respondents distinguish between what the system does for them as individuals and what it does for the airport as a whole, and that their positive assessments are concentrated at the individual transaction level. The second is the standard deviations, which range from 0.96 to 1.12 across the seven items. These are high for a five-point scale, and they indicate that the efficiency gains are experienced unevenly. Officers on different shifts, passengers arriving at different times, and staff working at different counters do not appear to be having the same experience of the system. This unevenness is examined further in the cross-tabulation that follows.

The overall efficiency mean of 4.08 is significantly above the midpoint of 3.0 ($t(398) = 29.16$, $p < .001$). Respondents perceive EBMS as having improved efficiency. Three qualifications apply.



First, the effect is positive but moderate. A mean of 4.08 represents about 82% of the scale maximum, which indicates clear improvement but not a transformation of service delivery.

Second, standard deviations are high (0.96–1.12), indicating substantial variation in perceptions. The coefficient of variation for the lowest-rated item (throughput, M = 3.90, SD = 1.11) is 28.5%. For the highest-rated item (processing time, M = 4.16, SD = 0.99), it is 23.8%. The efficiency benefits of EBMS are therefore conditional and are experienced differently depending on role, shift, and operational context.

Third, there is a gap between individual-level and system-level efficiency. The highest-rated items relate to individual transactions, while the lowest-rated items relate to aggregate throughput and waiting time. For the highest-rated item, 81.4% of respondents agreed or strongly agreed and only 8.5% disagreed; for throughput, 72.7% agreed and 13.5% disagreed. Neutral responses ranged from 10.0% to 13.8%, indicating that most respondents held definite views.

Objective Efficiency Indicators

Objective efficiency indicators compiled from immigration and airport records are presented in Table 3.

Table 3. Objective efficiency indicators at JNIA, 2017–2022

Year	Average Processing Time (minutes)	System Downtime Incidents	Passengers Processed (millions)	Throughput (passengers/officer/hour)
2017	45	-	0.9	12
2018	38	-	1.1	15
2019	30	-	1.3	18
2020	26	127	1.4	20
2021	24	149	1.5	21
2022	22	171	1.6	22

Source: Tanzania Immigration Services Department annual performance reports and JNIA operations reports.

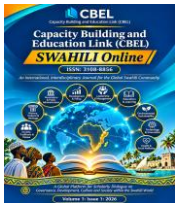
The objective data reveal three trends. Processing time declined by 51% between 2017 and 2022 (from 45 to 22 minutes). Throughput increased by 83% over the same period (from 12 to 22 passengers per officer per hour). System downtime incidents, however, increased by 35% between 2019 and 2022 (from 127 to 171 incidents). These trends suggest that from 2017 to 2022, EBMS accelerated individual transactions but has not proportionally improved system-level throughput, and that system reliability has deteriorated over time.

Interviews with immigration and IT officers indicated that efficiency improved further after 2023, when EBMS was integrated with the visa, permit, INTERPOL, national identification and payment systems. Officers reported average processing times of three to five minutes at immigration booths and about 30 seconds at e-gates for Tanzanian citizens, although system faults and peak-hour congestion could still extend processing beyond five minutes.

Efficiency Ratings by Respondent Category

Table 4. Mean efficiency ratings by respondent category

Respondent category	n	Processing time	Waiting time	Throughput	Overall mean
International passengers	220	4.22	4.05	3.96	4.13
Tanzanian frequent passengers	100	4.18	4.02	3.93	4.10
Immigration officers	30	4.03	3.80	3.70	3.93
Airport/agency staff	20	4.05	3.85	3.75	3.96
IT personnel	5	3.80	3.60	3.40	3.69
Airline/ground handlers	24	4.08	3.88	3.79	3.98



Respondent category	n	Processing time	Waiting time	Throughput	Overall mean
All respondents	399	4.16	3.99	3.90	4.08

Source: Field data (2026).

Passengers rated efficiency more favourably than professional respondents, and the gap was widest for throughput (passengers M = 3.96 and 3.93; immigration officers M = 3.70; IT personnel M = 3.40). An independent-samples t-test showed that passengers (n = 320; M = 4.12, SD = 0.72) rated overall efficiency significantly higher than staff (n = 79; M = 3.92, SD = 0.78), $t(397) = 3.42$, $p < .001$, Cohen's $d = 0.42$. Staff who are responsible for system-level performance are therefore more aware of its constraints.

Qualitative and Observational Findings

Interviews were conducted with 18 participants. Four themes emerged.

Transaction-Level Efficiency Is Real but Conditional

Officers confirmed faster verification: "Since we started using EBMS, checking passenger information has become faster. We do not spend the same amount of time checking everything manually as we used to" (IO2). However, gains depended on system availability: "The system has helped us to clear passengers more quickly, especially when the system is working properly and there are no network problems" (IO5). The conditional clause "when the system is working properly" recurred across interviews.

Throughput Is Constrained by Factors beyond Technology

Respondents explained that throughput depends on more than processing speed: "The system helps us process passengers faster, but the number we can handle in an hour also depends on how many passengers arrive and whether all the counters and machines are working" (IO6). An IT officer added: "Network performance, equipment, staffing and passenger flow can also affect how many passengers are processed" (IT2).

Waiting Time Is a Queue Phenomenon

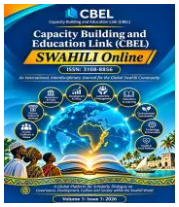
Waiting time reflects arrival rates as well as service rates: "EBMS has reduced the time spent on individual processing, but during peak hours you can still find a long queue because the number of passengers is high" (IO7). A supervisor explained why passengers rate efficiency more highly than staff: "A passenger who clears in two minutes thinks everything is perfect. They do not see the passenger behind them who waited thirty minutes because a machine failed" (SM1).

Observation over five working days confirmed that passenger flow was smooth during moderate-traffic periods but became quite congested during peak periods (13:00–17:00). Officers routinely used EBMS for verification. When connectivity failed, processing slowed until technical support resolved the issue.

DISCUSSION

Transaction-Level and System-Level Efficiency

The findings show that EBMS has clearly improved the efficiency of individual immigration transactions at JNIA. Perceived processing time, clearance speed and verification were rated highly, and administrative records show that processing time fell by about half between 2017 and 2022 while throughput rose by over 80%. However, the gains are weaker at the system level, where waiting time and throughput depend on passenger arrival patterns, counter availability, staffing and equipment uptime. The rising number of downtime incidents shows that reliability has not kept pace with expanded use, which explains the conditional nature of the efficiency gains reported by staff.



The finding aligns with Fernández and Bautista (2021), who found that Automated Border Control systems reduced waiting time and increased throughput in European airports. The JNIA findings suggest the throughput effect is weaker in a developing-country context where infrastructure constraints (power, connectivity, equipment) are more pronounced. This supports the World Bank's (2021) argument that digital government systems in Africa face infrastructure limitations.

The finding also aligns with Kipingu and Shayo (2021), who found that electronic immigration services in Tanzania improved service delivery and reduced processing time. However, the present study adds a crucial qualification: the efficiency gains are conditional on system availability and infrastructure reliability. Kipingu and Shayo did not disaggregate transaction-level from system-level efficiency.

Theoretical Implications

The study extends TAM by showing that perceived usefulness and ease of use may operate differently at different levels: users find EBMS useful and easy for individual transactions, but its contribution is less evident for the coordination of passenger flows. From the perspective of Diffusion of Innovation Theory, the relative advantage of EBMS is clearer at the transaction level than at the organisational level, where compatibility with staffing, infrastructure and queue management determines outcomes (Davis, 1989; Rogers, 2003). The divergence between passengers and staff further shows that efficiency assessments depend on the vantage point of the respondent.

Practical Implications

Improving EBMS efficiency at JNIA requires more than technology. It requires attention to queue management, counter availability, staffing during peak periods, and infrastructure reliability. Technology is necessary but not sufficient.

Limitations

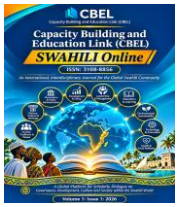
The study was conducted at a single airport, and passengers sampled in waiting areas may over-represent highly educated and business travellers. Professional respondent groups, particularly IT personnel, were small. Objective indicators were drawn from administrative reports with incomplete downtime data for earlier years. Future research should use detailed system logs and queue measurements across several airports and track efficiency after further system integration.

CONCLUSION

This study evaluated the efficiency of immigration service delivery after the implementation of EBMS at JNIA. It concludes that EBMS has substantially improved efficiency at the level of individual transactions, as shown by high ratings for processing time, clearance speed and document verification and by the sharp reduction in recorded processing times. Gains at the system level are more modest: waiting time and throughput remain constrained by peak-hour congestion, counter availability, staffing and rising system downtime. EBMS has therefore made immigration processing faster, but its full efficiency potential depends on the reliability of the infrastructure and the organisation of operations around it.

Recommendations

i. The Immigration Services Department and the Tanzania Airports Authority should strengthen power back-up, network redundancy and equipment maintenance to reduce EBMS downtime incidents.
ii. JNIA management should introduce peak-hour queue management, including dynamic opening of counters and e-gates and staffing aligned with passenger arrival patterns.



iii. A responsive on-site technical support arrangement should be maintained so that system faults are resolved quickly during operating hours.

iv. The Immigration Services Department should routinely monitor objective efficiency indicators, such as processing time, throughput and downtime, and publish them to guide system upgrades and operational decisions.

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Conflict of Interest

The authors declare no conflict of interest.

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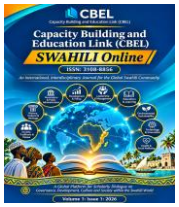
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