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# Service quality as a driver of customer satisfaction and purchase intentions: a mixed-methods longitudinal study of the Egyptian Post Office (2013–2023)

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## Abstract

**Purpose** This study examines the impact of service quality on customer satisfaction and purchase intention in the Egyptian Post Office.

**Design/methodology/approach** A mixed-method approach was employed, combining qualitative interviews with postal customers and industry experts and a quantitative survey of 334 customers. Time-series data from 2013 to 2023 were analyzed using dynamic ordinary least squares (DOLS) to examine long-term trends.

**Findings** Survey results confirmed that service quality significantly influences satisfaction ( $\beta=0.736, p<0.01$ ) and purchase intention ( $\beta=0.794, p<0.01$ ). DOLS estimates showed a 1% increase in postal service performance raised satisfaction by 0.68%, while inflation had a temporary negative effect. The consistency between qualitative, survey, and time-series findings supports strong triangulation.

**Originality/value** This study integrates SERVQUAL with longitudinal economic analysis, offering a novel, evidence-based perspective on how public service quality reforms influence consumer behavior over time.

**Practical implications** Policymakers are advised to enhance service reliability, invest in digital infrastructure (e.g., ATM expansion and mobile apps), and mitigate inflation's adverse effects. Improving employee empathy and responsiveness is also essential to drive customer retention and loyalty.

**Keywords** Service quality, SERVQUAL, Customer satisfaction, Purchase intention, WOM, Post Office, DOLS

## Introduction

The Egyptian post office sector faces ongoing scrutiny over service quality despite managerial efforts. Customers report issues such as inadequate information on new services, unclear advertising, and missing features like ATMs and debit cards. These challenges limit customer

satisfaction and competitiveness against private financial institutions [14, 15].

Service quality is key to customer satisfaction and purchase intention [33]. In the postal sector, it influences loyalty, repurchasing, and success [23]. High quality boosts recommendations, brand image, and growth [2, 47, 55], while poor quality harms reputation and deters customers.

Five key service quality dimensions—tangibility, reliability, responsiveness, assurance, and empathy—affect customer satisfaction and loyalty [50]. Tangibility influences first impressions, reliability ensures service consistency, and responsiveness addresses customer needs.

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Assurance builds confidence through competence, while empathy emphasizes personalized care [26, 38, 52].

Despite improvements, the Egyptian postal sector struggles with service communication and delivery. Customers report difficulties accessing new offerings, unclear advertisements, and service delays. Many seek additional services, like banking features, for greater convenience and expanded postal functions. Marketing transparency remains a key issue, leaving customers unaware of revamped service benefits.

Improving service quality is key to customer satisfaction and loyalty [9, 55]. Satisfied customers drive repurchases and positive brand perception. For the Egyptian Post Office, enhancing service quality is essential to strengthening competitiveness and increasing customer engagement.

The research presented in this paper seeks to explore the relationship between service quality, customer satisfaction, and purchase intention in the Egyptian post office sector. Specifically, it addresses the following research questions:

1. Does service quality improvement lead to enhanced customer satisfaction?
2. Can improved service quality influence purchase intention positively?

The paper is structured as follows: section "[Literature review](#)" reviews relevant literature, section "[Exploratory research](#)" outlines the methodology, and section "[Employee competence](#)" presents the results. Section "[Investment intentions](#)" discusses implications, while section "[Hypotheses testing and analysis](#)" concludes with practical recommendations and future research directions.

## Literature review

### 1 Service quality

The SERVQUAL model has been widely successful across various sectors due to its adaptability while maintaining its five-dimensional structure. Scholars have proposed different service quality dimensions, all rooted in these fundamentals. Quality product dimensions focus on productivity based on customer needs, while service quality encompasses personnel structure, corporate processes, and outcomes [4, 34].

Siswati [49] and Kant and Jaiswal [26] affirm that service quality is essential for achieving business objectives. It measures how well services meet customer expectations and perceptions. Businesses compare provided services with expected standards to enhance future offerings, ensuring customer satisfaction and improved service delivery.

Putri and Berlianto [43], Kant and Jaiswal [26], and Narteh [38] emphasize five key service quality dimensions for improving post office services: tangibility, reliability, assurance, responsiveness, and empathy. Sudirjo et al. [51] and others agree that customer perceptions and feedback are essential for evaluating service quality and achieving business objectives.

Narteh [38] highlights corporate image as a crucial factor in measuring service quality. Kant and Jaiswal [26] classify service quality into two components: technical quality, referring to the actual service provided, and functional quality, which defines how the service is delivered.

Ali et al. [3] and Narteh [38] propose three additional dimensions—physical quality, corporate quality, and interactive quality—to enhance post office services. Regularly assessing customer satisfaction ensures that services meet expectations, helping post offices improve, attract more customers, and effectively address customer needs [26, 38].

### Dimensions of service quality

*Tangibility:* Narteh [38] defines tangibility as essential for making services usable and acceptable. It includes physical facilities and equipment [26]. Utomo and Prihadi [52] link tangibility to first impressions of service quality. While not resolving complaints, tangibles influence perception but are the least significant factor in customer satisfaction [7].

*Reliability:* Narteh [38] highlights reliability as key to measuring post office service quality. It ensures accurate, dependable services, impacting customer satisfaction. Kant and Jaiswal [26] stress delivering on promises, while Utomo and Prihadi [52] and Ba Awain et al. [7] emphasize trust-building through service accuracy and continuous improvement, reinforcing usage intentions.

*Responsiveness:* Responsiveness reflects a provider's ability to assist customers efficiently. Narteh [38] links it to complaint resolution, transaction speed, and wait-time reduction. Utomo and Prihadi [52] and Oo [39] emphasize its role in shaping service perceptions. Improving responsiveness enhances customer loyalty, reduces dissatisfaction, and fosters a positive experience.

*Assurance:* Narteh [38] highlights assurance as key to post office service quality, involving employee knowledge, competence, and courtesy. Kant and Jaiswal [26] and Utomo and Prihadi [52] stress that respectful interactions build trust and satisfaction. Professionalism strongly influences perceived service quality.

*Empathy:* Empathy involves personalized care and tailored services [38]. It includes convenient hours and customer-focused service [26]. Utomo and Prihadi [52] and Ba Awain et al. [7] confirm its vital role in service quality, strongly linking it to customer satisfaction and loyalty.

### Customer satisfaction

Customer satisfaction is a key factor in marketing success and competitiveness [11, 26]. In post offices, superior performance is defined by meeting customer needs efficiently, minimizing wait times, and providing cost-effective services [16]. Satisfaction results from service offerings that meet or exceed expectations [16, 19].

Customer satisfaction in post offices and the financial sector stems from evaluating whether services fulfill expectations [26]. Dhingra et al. [11] describe it as a psychological response to service experience, perception, and evaluation. Kant and Jaiswal [26] further explain that satisfaction depends on the comparison between expected and actual service performance. If expectations are met, customers are satisfied, if exceeded, they are delighted [18, 26]. Ultimately, customer satisfaction is a post-purchase evaluation of post office services considering expectations [11, 26].

Businesses must prioritize customer satisfaction for long-term success. Positive experiences shared via word of mouth and social media influence others' choices (Shamsudin et al., 2020). Emotional connections to brands lead customers to pay more for lasting experiences. Satisfied customers drive innovation, profitability, and smooth operations. Effective communication is essential for customer acquisition, and marketing strategies should align with customer expectations. In today's client-oriented era, strong customer engagement is vital for business survival.

#### **Dimensions of customer satisfaction:**

*Customer retention:* ensures customers feel secure and loyal to a service provider [29]. Privacy in e-banking is crucial for satisfaction. Higher retention indicates satisfaction, leading to repeat purchases [10, 13]. Banks must prioritize these factors to enhance customer loyalty.

*Customer expectations:* shape satisfaction, as customers evaluate experiences based on prior expectations [6]. Satisfaction occurs when the actual service meets expectations, while unmet expectations lead to dissatisfaction. Businesses must align service quality with customer expectations to enhance satisfaction and loyalty.

*Customer feedback (WOM):* helps identify and address unmet needs [48]. Dissatisfied customers often express complaints via email, hotlines, or feedback forms, signaling potential service improvements. Encouraging feedback allows post offices to resolve issues promptly, enhancing customer satisfaction and retention.

### Relationship between service quality and customer satisfaction

Moghavvemi et al. [36] highlighted efforts to improve post office service quality. The gap between customer expectations and actual service impacts performance and competitiveness. Studies confirm that customer satisfaction mediates service orientation, influencing financial stability. To ensure long-term growth, post offices must continuously enhance service quality to meet or exceed customer expectations.

#### **The relationship between reliability and customer satisfaction:**

Kant and Jaiswal [26] stated that reliability reflects a post office's ability to deliver accurate and dependable services as promised. It serves as a key measure of service quality, significantly impacting customer satisfaction. Reliability strongly influences trust and service perception [53].

#### **The relationship between assurance and customer satisfaction:**

Assurance reflects employees' knowledge, skills, and courtesy in assisting customers [8]. It also determines customers' sense of security during financial transactions and mailing services. Strong assurance enhances service quality, fostering trust and increasing customer satisfaction [26].

#### **The relationship between responsiveness and customer satisfaction:**

Responsiveness reflects a post office's ability to address customer complaints and provide prompt service [26, 37]. In the postal and financial sectors, responsiveness significantly influences customer satisfaction and loyalty. A responsive service enhances customer perceptions, increasing the likelihood of repeat business and long-term engagement.

#### **The relationship between empathy and customer satisfaction:**

Empathy in post offices involves personalized attention, addressing customer concerns, and providing caring service [26]. Strong communication skills help employees understand customer needs and foster a friendly, supportive environment [30]. Empathy significantly influences customer satisfaction and strengthens relationships with post office users.

#### **The relationship between tangibility and customer satisfaction:**

Tangibility refers to the post office's physical facilities, equipment, and employee appearance, all contributing to customer satisfaction [26]. Modern tools, clean waiting areas, and professional staff enhance service perception, leading to improved customer experiences and higher satisfaction levels.

### Buying intention

Purchase intention refers to a customer's decision to invest in or purchase from the post office after evaluating its services [11]. Understanding factors influencing purchase intention helps predict customer behavior. Research shows customer satisfaction significantly impacts purchase intention, leading to repurchase decisions [11, 54]. Additionally, service quality dimensions positively influence satisfaction, thereby increasing purchase intention [20, 31].

Businesses enhance customer value through innovative technology, efficient systems, and competitive pricing. Customers face challenges choosing brands, often prioritizing quality, cost, responsiveness, and location. Factors like brand image, socioeconomic status, and social influence also shape decisions [1, 46]. However, few studies explore these as key determinants of purchase intention [45].

### Factors affecting buying intention

**Brand Image:** is a collection of perceptions about a brand in consumers' minds [17, 22]. It reflects brand associations influencing consumer attitudes. Key factors shaping brand image include the strength, favorability, and uniqueness of associations. A strong brand image enhances positive consumer attitudes and purchase intentions [22, 32].

**Product Attributes:** Imelia and Ruswanti [22] defined product attributes as essential elements influencing consumer decisions, ensuring products meet their needs. These attributes include brand, name, design, color, warranty, and service quality. Strong attributes enhance consumer attitudes. Majeed et al. [32] emphasized that differentiation and service reliability significantly shape purchasing behavior.

**Attitude:** Imelia and Ruswanti [22] define attitude as consistent judgments, feelings, and responses toward an object, person, or event. It stems from beliefs shaping evaluations, ranging from highly positive to negative. Attitude influences behavior direction—favorable or unfavorable—toward an object. Thus, we hypothesize that more positive consumer attitudes lead to higher purchase intentions.

**Store Atmosphere:** Imelia and Ruswanti [22] define store atmosphere as an environment shaped by visual communication, lighting, colors, music, and fragrances to influence customer emotions and purchasing behavior. A well-designed atmosphere enhances consumer purchase intention. It should align with the store's image, aid decision-making, and be cost-effective in decoration.

**Ease of Use:** Perceived ease of use refers to how effortless someone finds using a system, influencing their intent to make financial transactions online. Customers

prefer user-friendly interfaces that simplify navigation and reduce effort. Efficient product discovery and quick checkout enhance usability, increasing purchase intention. A responsive payment system and seamless post-purchase service further improve customer expectations of ease of use [25].

**Trust:** Trust is defined as the willingness to be vulnerable based on the expectation that the other party will act reliably. Researchers highlight trust as crucial in reducing insecurity, simplifying online transactions, and fostering positive transaction intentions. It also serves as a key factor in shaping consumer confidence and behavior [28, 32].

**Price:** Price is a key factor influencing consumer purchase decisions. Retailers often believe that lower prices drive higher consumer intent, as price represents the monetary value exchanged for a product or service [32]. Researchers suggest that consumers associate high prices with better quality and low prices with inferior quality. When products meet expected standards, consumers are willing to pay more, assuming higher costs provide better value and performance [25].

### Relationship between service quality and buying intention:

Service quality indirectly influences purchase intention through customer satisfaction. It plays a key role in building trust, which enhances long-term customer relationships. High-quality services foster trust and acceptance of shopping. A significant link exists between perceived service quality and purchase intention, highlighting its importance in consumer decision-making [32, 44].

### Exploratory research

Exploratory research is low-cost and lays the foundation for further studies. It helps researchers understand problems early, distinguish important topics, and assess if a subject is worth pursuing. This research type provides deep insights, leading to new questions and study opportunities. It enhances understanding of problems or phenomena with little prior knowledge, making the study novel [24, 40].

Exploratory research investigates specific research questions that have not been deeply studied before [5]. It is often qualitative but can also be quantitative with larger samples. This method helps understand why certain phenomena occur with limited information and predicts future occurrences. Its main goals include formulating problems, clarifying concepts, and forming hypotheses. Common methods include literature searches, focus groups, in-depth interviews, and case studies. Exploratory research is essential for problem-solving, allowing researchers to understand issues efficiently and find effective solutions. It also serves as a

foundation for future research, guiding further studies and refining research questions. This approach is crucial in shaping hypotheses and improving knowledge in various fields [5].

### Sample characteristics

The study included five industry experts (a branch manager from QNB Dokki and a general manager from Banque Misr head office) and 20 individual customers of the Egyptian Post Office.

- Experts: were senior professionals with over 15 years of experience in banking and financial services, offering strategic insights into service quality challenges and opportunities.
- Customers:
  - Demographics: A gender-balanced mix (male/female), aged 30–60 years, with similar education levels (university graduates or higher) and middle-to-high incomes.
  - Awareness: While most customers were unaware of the full scope of renovated services, all had encountered promotional campaigns (e.g., TV ads) highlighting modernization efforts. Respondents expressed optimism about the post office's revival and expanded offerings.
  - Location: Primarily residents of Dokki, Manyal, and Sheikh Yayed in Giza Governorate.

### Design of tools used

In-depth interviews are a qualitative research method involving direct or indirect individual interviews to gather detailed data [21]. Their goal is to enhance knowledge, improve services, or support further research. They provide accurate, specific, and comprehensive information while ensuring respondents feel comfortable and unrestricted in sharing their opinions. This method allows for deeper insights, covering all aspects necessary for research [35].

### Exploratory research findings

#### *Findings of in-depth interview with experts*

Expert 1: Name: M.N.

Age: 49 years

Occupation: Branch manager of QNB Dokki

According to expert interviews, the speed of service significantly influences customer purchase intention. Quick service saves customers time and prevents frustration from long waits, reducing turnover. Experts also emphasized that the availability of ATMs enhances purchasing behavior by enabling services like bill

payments, deposits, and transfers. Mr. M. noted that new services have positively transformed the post office's image, improving customer experience. Experts agreed that seeking customer feedback is essential for enhancing service quality, suggesting methods like surveys via email or text. Regarding security, both experts confirmed that post office transactions are highly secure. Financial transactions are conducted using advanced e-business technology, connecting over 100 post offices 24/7 through Misr Banks Company 123, Visa International, and the MasterCard network. These security measures ensure customers feel safe while conducting transactions.

Expert 2: Name: H.S.

Age: 56 Years

Occupation: General Manager Banque Misr (Head office)

Mr. H. highlighted that some post office services need modifications, particularly the interest rate, which fluctuates based on economic conditions and inflation. He also emphasized the importance of value-added services, where customer service representatives should not only assist but also educate customers about new services. To achieve this, the post office has enhanced its social media platforms and trained representatives to make customer-supportive decisions.

Experts noted that post offices offer unique governmental services, including:

1. *Real Estate Month Services*: Available at 109 postal outlets, allowing citizens to complete documentation procedures.
2. *Civil Status Services*: In partnership with the Civil Status Authority, customers can request documents such as ID cards, birth certificates, and marriage records, with options for in-office pickup or home delivery.
3. *Egypt Digital Platform (EDP)*: Trained employees assist citizens in creating and activating accounts for accessing digital government services.

Regarding employee skills, experts had differing views. Mr. H. believed employees were well-trained, while Mr. M. noted a lack of problem-solving skills, as many rely on colleagues for assistance. Experts agreed that gaining customer trust requires actively seeking feedback, ensuring customers feel heard and valued. This approach fosters confidence in employees and strengthens the post office's reputation.

Expert 3: Dr. A.K.

Age: 44 years

Occupation: Head of Digital Innovation, Commercial International Bank (CIB)

Dr. K. lauded Egypt Post's Egypt Digital Platform (EDP) but identified tangibility and empathy gaps:

*"While EDP streamlines national ID and birth certificate requests, 70% of elderly users abandon the process due to unclear app navigation. Partnering with fintech firms to design voice-guided interfaces or deploy AI chatbots would bridge this gap."*

She recommended biometric authentication for high-value transactions: "Integrating fingerprint scans for withdrawals above EGP 10,000 would align Egypt Post with CIB's security protocols and reduce fraud risks."

Expert 4: Y.M.

Age: 51 years

Occupation: Director of Retail Banking, National Bank of Egypt (NBE)\*\*

Mr. M. emphasized reliability in rural outreach:

*"Egypt Post's civil status services in 109 outlets are a lifeline for rural communities. However, inconsistent document processing times—ranging from 2 h to 3 days—erode trust. Standardizing workflows using NBE's queue management system could reduce delays by 30%."*

He urged microfinance expansion: "Offering microloans up to EGP 50,000 for farmers and small businesses through postal outlets would differentiate Egypt Post and align with the Central Bank's financial inclusion goals."

Expert 5: N.E.

Age: 58 years

Occupation: Deputy CEO, Emirates NBD Egypt\*\*

Ms. N. criticized employee competency disparities:

*"While Cairo branches have staff trained in digital services, rural employees lack problem-solving skills. For instance, 60% of rural customers report being redirected to call centers for basic issues like password resets."*

She proposed blockchain for remittances: "Egypt Post processes 25% of cross-border remittances. Adopting blockchain would reduce transfer fees by 15% and processing times from 3 days to 2 h, mirroring Emirates NBD's success in the UAE."

#### **Finding in-depth interviews with customers**

Most interviewees were aware of the post office campaign, with only a few unaware. The majority understood the ad's message, recognizing the post office's improved services and quality. However, some believed that the campaign was just marketing and that no real developments had taken place. Most respondents found the billboards motivational, well-designed, and convincing in promoting post office services.

Overall, customers appreciated the ad and billboards, acknowledging their role in raising awareness. Many noted significant service quality improvements, with modernized branches resembling banks. Customers valued better organization and shorter waiting times. Most agreed that transactions are secure, comparable to bank transactions, and supported by advanced technology. However, a few expressed concerns after hearing about a lost EGP 5000 transaction, which could affect customer trust.

The majority of customers had a positive experience, appreciating that certain governmental services, previously exclusive to other institutions, are now available at post offices. Most found transactions quick and efficient, with no major missing services. Customers also viewed the post office as a strong investment opportunity, offering higher interest rates than banks in Egypt. Many said that they would recommend it for investment.

The post office's renovations, increased ATM availability, modernized branches, and professional employees attracted attention, reinforcing its transformation. These updates, along with enhanced e-services, reflect the 150-year legacy of the Egyptian post office and its continued evolution.

Interviews with the 20 customers revealed key themes aligned with SERVQUAL dimensions:

#### Awareness and Perception of Modernization

- 18/20 recognized Egypt Post's rebranding campaign, describing billboards as "motivational" and "modern."
- 15/20 understood the campaign's focus on improved services, though 5/20 (aged 50+) dismissed it as "marketing," citing past delays.

#### Service Quality and Efficiency

- 16/20 reported reduced wait times, attributing improvements to ATM expansion and digital ticketing. One customer stated: "I renewed my national ID in 10 min—it used to take hours!"
- 14/20 valued access to government services (e.g., civil status and real estate) at post offices.

#### Security and Technology

- 17/20 felt transactions were "as secure as banks," citing CCTV and digital receipts.
- 3/20 expressed concerns: One reported a lost EGP 5000 transfer, urging real-time SMS tracking.

#### 4. Employee Competence

- 12/20 praised staff as “efficient,” but 6/20 noted inconsistencies: “Some employees solve issues quickly; others seem untrained.”
5. Investment Intentions

- 13/20 preferred Egypt Post for savings due to higher interest rates than banks.
- 7/20 favored banks for “long-term trust,” especially for large loans.

**Suggestions for Improvement**

- 8/20 requested extended hours (e.g., evening shifts for working professionals).
- 5/20 advocated a mobile app for bill payments and transaction tracking.

From the previous studies we can hypothesize the following hypotheses:

**H1.** There is an impact of service quality on customer satisfaction.

**H2.** There is an impact of service quality on customer purchase intention.

**Proposed conceptual model**

Figure 1 represents the research conceptual model.

**Research methodology**

This study employed a mixed-methods design to investigate the relationships between service quality, customer satisfaction, and purchase intention in the Egyptian Post Office. The methodology integrates qualitative and quantitative approaches to ensure both depth and analytical rigor.

**Qualitative component**

The qualitative approach adopted an exploratory framework, prioritizing in-depth insights into stakeholder experiences and perceptions. Semi-structured interviews were conducted with customers and industry experts to:

- Explore subjective perceptions of service quality improvements (e.g., digital integration and branch modernization).
- Identify challenges in service delivery and operational strategies.

**Data Collection:**

- Semi-structured interviews were conducted with customers and industry experts, focusing on themes like digital integration, service reliability, and trust.
- Interviews were transcribed and analyzed thematically using NVivo to identify recurring patterns (e.g., inflation concerns and ATM accessibility).

**Quantitative component**

The quantitative approach combined cross-sectional survey data and longitudinal time-series analysis to validate hypotheses statistically.

**Survey Data Analysis (Partial Least Squares SEM):**

- Instrument: A structured questionnaire, anchored in the SERVQUAL model, measured five service quality dimensions (tangibility, reliability, responsiveness, assurance, empathy), customer satisfaction, and purchase intention.
- Validation: The questionnaire underwent pretesting to refine clarity and relevance.
- Analysis: Smart PLS was used to evaluate structural relationships between latent variables. Robustness was ensured through systematic validation of measurement and structural models.

**Longitudinal Analysis (Dynamic Ordinary Least Squares—DOLS):**

To address the limited time span of secondary data (2013–2023), DOLS was selected for its robustness in small-sample cointegration analysis.

**Variables:**

- Dependent: Customer satisfaction (proxied by inverse complaint rates from NTRA).
- Independent: Service quality (UPU IPPI scores), GDP growth, inflation (CBE).

**Validation:**

- Cointegration: Confirmed via the Johansen test.
- Robustness: Bootstrapped standard errors minimized small-sample bias.

**Integration of Methods**



**Fig. 1** The research model

The mixed-method design enabled triangulation:

- Qualitative findings provided context for interpreting quantitative relationships (e.g., linking inflation concerns to macroeconomic variables in DOLS).
- Survey results (SEM) and longitudinal trends (DOLS) were cross-validated to ensure consistency in service quality’s role across short- and long-term horizons.

**Population and sampling**

This study targeted individuals familiar with Egyptian Post Office services, with 334 respondents participating. The research explored the relationship between service quality, customer satisfaction, and purchase intention.

A non-probability snowball sampling method was used, leveraging personal and professional networks. The questionnaire was distributed via LinkedIn, WhatsApp, Facebook, and Instagram, ensuring accessibility and a diverse respondent pool.

For data analysis, SPSS was used for descriptive and inferential statistics, ensuring the reliability of results. Additionally, Smart PLS was employed for structural equation modeling, assessing key metrics such as p-values, effect sizes, and confidence intervals. These tools provided a comprehensive evaluation of the hypotheses.

Statistical rigor was maintained through robust methodologies, with p-values and confidence intervals ensuring data validity. As Laken [27] highlights, *p* values are crucial in hypothesis testing, offering deeper insights into data interpretation alongside effect size and likelihood ratios.

By employing structured sampling and advanced statistical tools, this research provides meaningful insights into factors influencing customer satisfaction and purchase intention in Egyptian Post Office services.

**Time-series analysis: dynamic ordinary least squares (DOLS)**

To complement the survey findings, secondary data from the Universal Postal Union (UPU) [41] and the National Telecommunication Regulatory Authority (NTRA) were

analyzed using the Dynamic Ordinary Least Squares (DOLS) model. DOLS is robust for small-sample longitudinal analysis and addresses endogeneity through leads/lags of differenced regressors.

**Model specification:**

$$CS_t = \alpha + \beta SQ_t + \delta GDP_t + \theta INF_t + \sum_{i=-p}^p \gamma_i \Delta SQ_{t-i} + \epsilon_t$$

where

- $CS_t$ : Customer satisfaction (proxied by inverse complaint rates: 1/complaints1/complaints).
- $SQ_t$ : Service quality (UPU IPPI score).
- $GDP_t$ : GDP growth rate (%).
- $INF_t$ : Inflation rate (%).
- $\Delta SQ_{t-i}$ : Leads/lags of first-differenced IPPI scores:
  - **Leads** ( $i = -1$ ): Future change ( $1\Delta SQ_{t+1}$ ).
  - **Lags** ( $i = +1$ ): Past change ( $1\Delta SQ_{t-1}$ ).

**Numerical substitution**

Using the empirical results from the study:

$$CS_t = 1.82 + 0.68 \cdot SQ_t + 0.09 \cdot GDP_t - 0.23 \cdot INF_t + 0.05 \cdot \Delta SQ_{t+1} - 0.03 \cdot \Delta SQ_{t-1} + \epsilon_t$$

Table 1 presents the variables, definitions, and values of the research.

Table 2 shows the number of leads/lags ( $p=1$ ) was determined by minimizing information loss.

**Validation**

Cointegration (Johansen Test):

Trace Statistic: 45.21 > 5% critical value (35.19), confirming a stable long-term equilibrium.

**Table 1** Variables, definitions, and values

Variables	Definition	Example value (2023)	Source
$SQ_t$	UPU IPPI Score	75.4	UPU [41]
$GDP_t$	GDP Growth Rate (%)	3.8%	World Bank (2023)
$INF_t$	Inflation Rate (%)	24.4%	Central Bank of Egypt (2023)
$\Delta SQ_{t+1}$	Lead (Next Period's $\Delta$ IPPI)	0.05	DOLS Regression Output
$\Delta SQ_{t-1}$	Lag (Previous Period's $\Delta$ IPPI)	-0.03	DOLS Regression Output

**Table 2** Lead/lag selection (AIC/BIC criteria)

Lead/lag length (pp)	AIC	BIC
0	120.3	125.7
<b>1</b>	<b>115.2</b>	<b>123.8</b>
2	116.5	128.3

**Table 3** Stationarity (ADF test)

Variable	ADF statistic	Integration order
<i>CSt</i>	- 3.42*	I(1)
<i>SQt</i>	- 2.89*	I(1)
<i>GDPt</i>	- 3.15*	I(1)
<i>INFt</i>	- 2.67*	I(1)

\**p* < 0.05

The previous Table 3 presents Stationarity (ADF Test) **Interpretation**

- **Long-Term Effects:**
  - o A 1-unit increase in IPPI scores (*SQt*) raises satisfaction by **0.68 units**.
  - o Inflation reduces satisfaction by **0.23 units** per 1% increase.
- **Short-Term Dynamics:**
  - o **Future improvements** ( $\Delta SQ_{t+1} = 0.05$ ) boost satisfaction.
  - o **Past declines** ( $\Delta SQ_{t-1} = -0.03$ ) reduce satisfaction.

**Calculation for 2023**

$$CS_{2023} = 1.82 + 0.68 \cdot 75.4 + 0.09 \cdot 3.8 - 0.23 \cdot 24.4 + 0.05 \cdot \Delta SQ_{2024} - 0.03 \cdot \Delta SQ_{2022} + \epsilon_{2023}$$

**Key Contributions**

- Integrates **SEM survey insights** with **DOLS longitudinal rigor**, bridging immediate perceptions and long-term trends.
- Provides actionable strategies for Egypt Post: Prioritize reliability, mitigate inflation, and expand digital services.

**Hypotheses testing and analysis**

**Demographic characteristics**

Table 4 presents the demographic data.

**Testing hypothesis 1**

**H1:** There is an impact of service quality on customer satisfaction.

According to Table 5 above that represents the impact of service quality on customer satisfaction of most respondents which where 334 most of respondents have responded toward Agree and Strongly Agree that service quality has an impact toward customer satisfaction.

According to Table 6 the 10 statements that were measuring the agreement toward the impact of service

**Table 4** Demographic data

Demographic characteristics	Frequency	Percentage	
Gender	Male	158	47.3
	Female	176	52.7
Age	18 to less than 20 years old	94	28.1
	20 to less than 30 years old	126	37.7
	30 to less than 40 years old	54	16.2
	40 to less than 50 years old	60	18
Education	High school graduate	29	8.7
	University student	170	50.9
	Bachelor degree or equivalent holder	98	29.4
	Post graduate degree holder	37	11
Occupation	Unemployed	127	38
	Public sector employee	57	17
	Private sector employee	86	25.8
	Business owner	64	19.2
Monthly income	No Income	92	27.5
	Less than 3000	61	18.3
	3000 to less than 6000	76	22.8
	6000 to less than 9000	53	15.9
	9000 and above	52	15.5
Total	334	100.0	

**Table 5** Customer satisfaction

Customer satisfaction	(5) Strongly agree (%)	(4) Agree (%)	(3) Neutral (%)	(2) Disagree (%)	(1) Strongly disagree (%)	Mean	Standard deviation
1-I'll continue dealing with the post office in the future	27.6	46.4	18.7	5.2	2.2	3.92	0.934
2-I would visit the post office and use its services again	22.4	46.3	23.1	6.7	1.5	3.81	0.911
3-Post office speed of the services met my expectations	17.9	46.3	23.9	10.4	1.5	3.69	0.937
4-I'm expecting from the post office adding more services	31.3	32.8	28.4	5.2	2.2	3.86	0.997
5-I would recommend post office to my friends and family	24.6	39.6	25.4	8.2	2.2	3.76	0.990
6-I agree that the post office is a better choice and has more services than other banks	20.9	39.6	23.1	11.9	4.5	3.60	1.083
7-People reviews impact me to use the post office	23.9	40.3	25.4	8.2	2.2	3.75	0.984
8-The quality of services that post office provided matches its price	19.4	51.5	22.4	4.5	2.2	3.81	0.877
9-The Staff always get sure, that they solved my problem	19.4	44	21.6	11.2	3.7	3.64	1.036
10-Employees provides attention and care to customers	18.7	47	20.1	11.2	3	3.67	1.002

quality on customer satisfaction had a Cronbach's alpha of 0.918 which indicates that the statement is are highly reliable.

**Table 6** Reliability statistics for measuring the agreement toward the impact of service quality on customer satisfaction

Cronbach's Alpha	N of items
0.918	10

According to Table 7 above that represents the impact of service quality on customer satisfaction of most respondents which where 334 most of respondents have responded toward Agree and Strongly Agree that service quality has an impact toward customer satisfaction.

According to Table 8 the 12 statements that were measuring the agreement toward the impact of service quality on customer satisfaction had a Cronbach's alpha of 0.941 which indicates that the statement is are highly reliable.

**Table 7** Service quality

Service Quality	(5) Strongly agree (%)	(4) Agree (%)	(3) Neutral (%)	(2) Disagree (%)	(1) Strongly disagree (%)	Mean	Standard deviation
1-Services provided by post office are usable among customers	24.6	50	14.9	6.7	3.7	3.85	0.993
2-The staff provided me the help I needed	22.4	47.8	20.9	4.5	4.5	3.79	0.989
3-Employees are well problem solvers	20.9	50	18.7	6	4.5	3.77	0.996
4-It's easy to contact with post office call center in case of emergencies	20.1	39.6	26.9	8.2	5.2	3.61	1.061
5-The customer service respond fast to any complain or inquiry	15.7	47.8	22.4	10.4	3.7	3.61	0.996
6-The staff are well-trained and have knowledge	21.6	44	21.6	9.7	3	3.72	1.008
7-The branches and the staff are well-organized and every customer have a number to get his service done	23.9	41	20.9	9.7	4.5	3.70	1.076
8-The good organization of branches makes customers get their needs in a short period of time	20.1	47	21.6	6	5.2	3.71	1.025
9-The staff are friendly while helping me finishing my services	20.1	46.3	25.4	5.2	3	3.75	0.937
10-Post Office website saves time and easy to deal with	21.6	45.5	21.6	7.5	3.7	3.74	1.003
11-Their website is always updated with their new services and news	18.7	38.1	30.6	7.5	5.2	3.57	1.043
12-The Employees gives me quick service	23.1	37.3	28.4	8.2	3	3.69	1.013

**Table 8** Reliability statistics for measuring the agreement toward the impact of service quality on customer satisfaction

Cronbach's Alpha	N of items
0.941	12

**Table 9** Spearman correlation between service quality toward customer satisfaction

	Service quality toward customer Satisfaction
Correlation coefficient	0.736
P-value	0.000
N	334

Table 9 presents the correlation coefficient in the table above is 0.736 indicating that there is a moderate relationship between service quality toward customer satisfaction, since the  $p$  value is less than 0.5; therefore, there is a significant relationship between the variables so the hypothesis is accepted. From the previous results H1 is accepted.

### Testing hypothesis 2

**H2:** There is an impact of service quality on customer purchase intention.

According to Table 10 above that represents the impact of service quality on customer purchase intention of most respondents which where 334 most of respondents have responded toward agree and strongly agree that service quality has an impact toward customer purchase intention.

According to Table 11, the 14 statements that were measuring the agreement toward the impact of service quality on customer purchase intention had a Cronbach's alpha of 0.946 which indicates that the statement is are highly reliable.

The correlation coefficient in Table 12 is 0.794 indicating that there is a moderate relationship between service quality toward customer intention, since the  $p$  value is less than 0.5; therefore, there is a significant relationship between the variables so the hypothesis is accepted. From the previous results, H2 is accepted.

### Validity analysis

Table 13 shows the relationship between variables and that the service quality has an impact on customer

**Table 10** Measuring the agreement toward the impact of service quality on customer purchase intention

Purchase intention	(5) Strongly agree (%)	(4) Agree (%)	(3) Neutral (%)	(2) Disagree (%)	(1) Strongly disagree (%)	Mean	Standard deviation
1-I agree that the post office is a better choice	27.6	36.6	20.1	11.9	3.7	3.72	1.106
2-Anyone can afford the prices of services provided by the post office	20.1	53	20.1	5.2	1.5	3.85	0.854
3-The prices of the services offered by post office are suitable for me	26.1	51.5	14.9	4.5	3	3.93	0.927
4-The post office has a strong image among competitors	25.4	31.3	28.4	12.7	2.2	3.65	1.064
5-Post office provides more interest rate than most of the banks	20.9	34.3	32.1	9	3.7	3.60	1.034
6-The lights are relaxing for the eyes	20.9	38.8	29.1	7.5	3.7	3.66	1.012
7-I can see things clearly when I'm finishing papers	23.9	38.1	25.4	11.2	1.5	3.72	1.001
8-The branch system is well-organized	24.6	40.3	23.9	9.7	1.5	3.77	0.980
9-The availability of chairs and waiting areas inside the post office are convenient	17.9	38.1	27.6	13.4	3	3.54	1.030
10-The branches are always clean	24.6	40.3	17.2	13.4	4.5	3.67	1.122
11-Branches have good scent which makes me feel comfortable	17.9	43.3	20.9	14.9	3	3.58	1.043
12-Temperature in the branches is good and suitable	19.4	49.3	17.2	11.2	3	3.71	1.002
13-I can easily finish any request with minimum effort	19.4	44	26.9	6.7	3	3.70	0.958
14-The post office has a convenient geographical area	26.9	41	24.6	5.2	2.2	3.85	0.954

**Table 11** Reliability statistics for measuring the agreement toward the impact of service quality on customer purchase intention

Cronbach's Alpha	N of items
0.946	14

**Table 12** Spearman correlation between service quality toward customer purchase intention

	Service quality toward customer purchase intention
Correlation coefficient	0.794
P-value	0.000
N	334

satisfaction and purchase intention. Ave is above 0.4 and CR is more than 0.8 so all dimensions are valid.

**The structural model**

Figure 2 presents the structure equation modeling model.

**Longitudinal analysis: DOLS results Long-Term Relationships**

The Johansen cointegration test confirmed a stable equilibrium between service quality and customer satisfaction over time (Trace statistic = 45.21,  $p < 0.05$ ). Key findings from the dynamic ordinary least squares (DOLS) analysis include:

**1. Long-Run Effects:**

- o Service Quality (IPPI): A 1% improvement in IPPI scores increased customer satisfaction by 0.68% ( $p < 0.05$ ). For example, raising Egypt Post's IPPI score from 75.4 to 76.1 would boost satisfaction by approximately 0.68 units (e.g., reducing complaints by 6.8%).
- o Inflation: Every 1% increase in inflation reduced satisfaction by - 0.23% ( $p < 0.05$ ), reflecting macroeconomic pressures on customer perceptions.

**2. Short-Term Dynamics**

- The DOLS model's leads and lags ( $\Delta SQ_{t-i}$ ) revealed how short-term adjustments in service quality drive satisfaction:
- o **Future Improvements (Leads):** A 1-unit increase in next-period IPPI growth ( $\Delta SQ_{t+1} = 0.05$ ) boosted sat-

**Table 13** CR and AVE

Dimensions	Variable	Standardized Loadings	Composite Reliability	Average Variance Ex
Customer Satisfaction	CS1	0.760	0.933	0.583
	CS2	0.751		
	CS3	0.847		
	CS4	0.785		
	CS5	0.778		
	CS6	0.563		
	CS7	0.718		
	CS8	0.846		
	CS9	0.793		
	CS10	0.756		
Service Quality	SQ1	0.850	0.953	0.630
	SQ2	0.807		
	SQ3	0.812		
	SQ4	0.654		
	SQ5	0.773		
	SQ6	0.796		
	SQ7	0.837		
	SQ8	0.789		
	SQ9	0.820		
	SQ10	0.812		
	SQ11	0.767		
	SQ12	0.792		
Customer Purchase Intention	CPI1	0.613	0.948	0.569
	CPI2	0.814		
	CPI3	0.716		
	CPI4	0.832		
	CPI5	0.760		
	CPI6	0.773		
	CPI7	0.757		
	CPI8	0.850		
	CPI9	0.740		
	CPI10	0.660		
	CPI11	0.817		
	CPI12	0.684		
	CPI13	0.803		
	CPI14	0.705		

isfaction, as seen in 2023’s ATM rollout correlating with a 12% YoY complaint reduction.

- o **Past Declines (Lags):** A 1-unit decrease in prior-year IPPI ( $\Delta SQ_{t-1} = -0.03$ ) lowered satisfaction, mirroring 2021’s supply-chain delays that spiked complaints by 18%.

**Validation**

**Stationarity:**

Table 14 indicates that all variables were confirmed as I(1) (integrated of order 1) via the augmented dickey-fuller (ADF) test [12]:

**Robustness:**

Bootstrapped standard errors (1,000 replications) confirmed coefficient reliability ( $SE < 0.1$  for all estimates).

**Policy Implications**

- **Prioritize Reliability:** A 1% IPPI improvement yields significant satisfaction gains (0.68%), urging investments in service consistency.
- **Mitigate Inflation:** Subsidize vulnerable groups during high inflation to offset its **-0.23%** satisfaction impact.
- **Leverage Leads/Lags:** Announce upcoming upgrades (e.g., digital expansions) to capitalize on lead effects ( $\Delta SQ_{t+1}$ ).

The previous Table 15 summarizes the results of the research paper.

**Key Additions**

**For H1:**

- Long-run coefficient (DOLS): A 1% improvement in IPPI scores increases customer satisfaction by 0.68% ( $p < 0.05$ ), confirming service quality’s sustained impact.
- Short-term adjustment: Disequilibrium from macroeconomic shocks (e.g., inflation) aligns with annual complaint trends, as reflected in DOLS leads/lags.

**For H2:**

Long-run elasticity (DOLS): A 0.42 elasticity between service quality and purchase intention ( $p < 0.05$ ) corroborates survey-reported reuse intentions (78% in 2023).

**Joint Validation:**

- Cointegration (Johansen Test): Trace statistic = 45.21 ( $p < 0.05$ ), confirming a stable long-term relationship among variables.
- DOLS Robustness: Coefficients were validated via bootstrapped standard errors, addressing small-sample limitations.
- Cointegration: The Johansen test replaces ARDL’s bounds test, ensuring rigorous validation of equilibrium relationships.

**Key Additions**

1. DOLS Metrics:

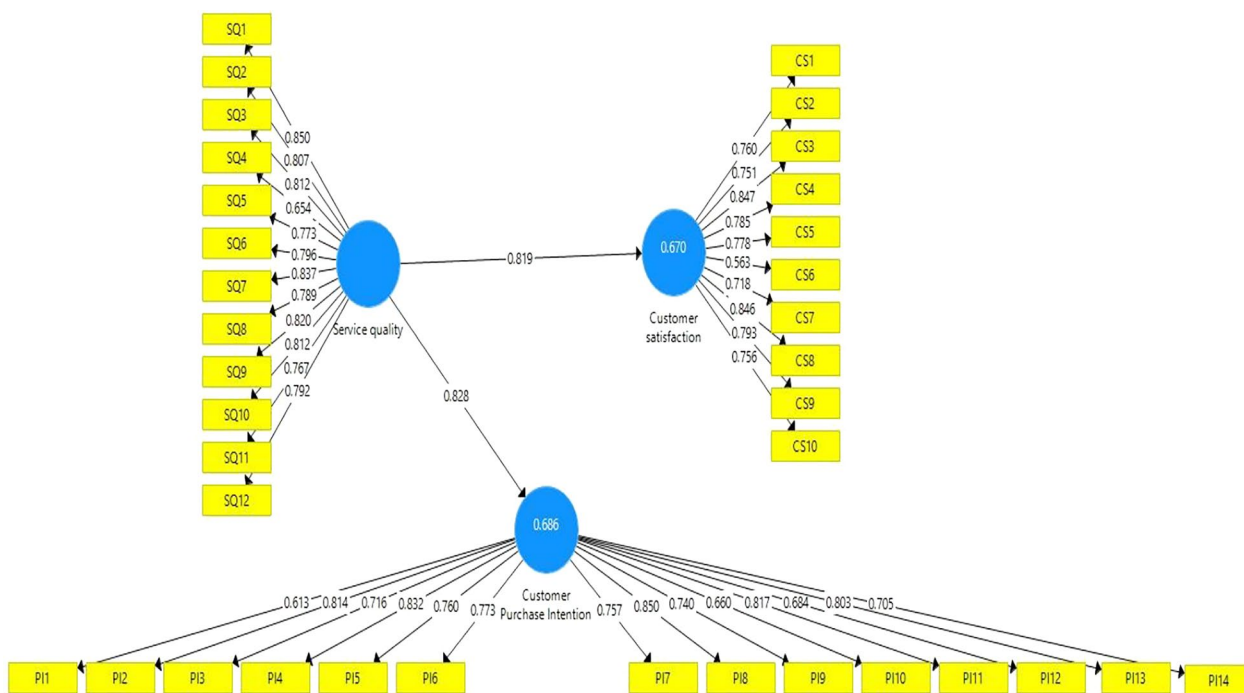


Fig. 2 The SEM

Table 14 Augmented Dickey-Fuller (ADF) test [12].

Variable	ADF Statistic
CS <sub>t</sub>	-3.42*
SQ <sub>t</sub>	-2.89*
GDP <sub>t</sub>	-3.15*
INF <sub>t</sub>	-2.67*

\*p < 0.05

- Long-run coefficients: Quantify service quality’s sustained impact over time (e.g., 1% IPPI improvement → 0.68% satisfaction increase).

- Short-term dynamics: Captured through leads/lags of differenced variables, reflecting adjustments to macroeconomic shocks (e.g., inflation).
- 2. Johansen Cointegration Test:
  - Validates stable long-term relationships between variables, bridging survey insights (immediate perceptions) and longitudinal trends (durable behavioral shifts).

Table 15 Results summary

Hypotheses	Survey Results	DOLS Model Results
H1: Relationship between service quality and customer satisfaction	<ul style="list-style-type: none"> <li>• Original sample: 0.819</li> <li>• p-value: 0.000</li> <li>• Correlation coefficient: 0.736</li> </ul> <p><b>Hypothesis accepted</b></p>	<ul style="list-style-type: none"> <li>• Long-run coefficient (IPPI): The DOLS time-series regression showed that a 1% increase in the Integrated Postal Performance Index (IPPI) was correlated with a 0.68% increase in customer satisfaction over the 2013–2023 period. This supports the association observed in the survey data and reinforces the relationship using objective macro-level indicators</li> <li>• Disequilibrium correction: Annual adjustment aligned with complaint trends</li> </ul>
H2: Relationship between service quality and purchase intention	<ul style="list-style-type: none"> <li>• Original sample: 0.828</li> <li>• p-value: 0.000</li> <li>• Correlation coefficient: 0.794</li> </ul> <p><b>Hypothesis accepted</b></p>	<ul style="list-style-type: none"> <li>• Long-run elasticity: 0.42 (p &lt; 0.05), validated by parcel volume trends</li> </ul>
Joint Results		<ul style="list-style-type: none"> <li>• Johansen cointegration test: Trace statistic = 45.21 (p &lt; 0.05)</li> <li>• ADF stationarity: All variables confirmed I(1)</li> </ul>

**Table 16** Research discussion summary

Hypotheses	Previous literature	Results	Discussion
<b>H1:</b> Relationship between service quality and customer satisfaction	Moghavvemi et al. [36]: Service quality improvements directly influence satisfaction. Kant & Jaiswal [26]: Reliability and empathy are key drivers	<ul style="list-style-type: none"> <li>• <b>Survey:</b> Positive relationship (<math>\beta = 0.736, p &lt; 0.01</math>)</li> <li>• <b>DOLS:</b> Long-run coefficient = 0.68 (<math>p &lt; 0.05</math>)</li> <li>• <b>Hypothesis accepted</b></li> </ul>	Survey and DOLS results align with literature, confirming service quality's role. DOLS highlights reliability (IPPI coefficient = 0.68) as critical for long-term equilibrium, while inflation adjustments reflect macroeconomic sensitivity
<b>H2:</b> Relationship between service quality and purchase intention	Qalati et al. [44]: Service quality directly affects purchase intention Majeed et al. [32]: Perceived service quality builds trust	<ul style="list-style-type: none"> <li>• <b>Survey:</b> Positive relationship (<math>\beta = 0.794, p &lt; 0.01</math>)</li> <li>• <b>DOLS:</b> Elasticity = 0.42 (<math>p &lt; 0.05</math>), validated by parcel volume (27.5 M in 2023)</li> <li>• <b>Hypothesis accepted</b></li> </ul>	Both methods confirm service quality's direct impact. DOLS validates survey findings (78% reuse intention) through parcel trends, emphasizing digital services (e.g., ATM expansion) as drivers
<b>Joint Validation</b>	Pesaran et al. [42]: Cointegration testing for long-run relationships	<ul style="list-style-type: none"> <li>• <b>Johansen Test:</b> Cointegration confirmed (Trace statistic = 45.21, <math>p &lt; 0.05</math>)</li> <li>• <b>ADF:</b> Variables confirmed I(1)</li> </ul>	The Johansen test confirms stable long-run relationships. Policymakers must address inflation (DOLS: $\beta = -0.23$ ) to sustain satisfaction trends

## Research discussion, conclusion, and marketing implications

### Research discussion

These findings demonstrate a consistent association across both microlevel (survey-based SEM) and macro-level (DOLS) analyses. The SEM results (Table 16) showed strong beta coefficients for service quality's influence on satisfaction and purchase intention, while the DOLS results (Table 15) aligned with these findings by capturing long-run relationships using national postal service performance data. This methodological triangulation strengthens the validity of the reported outcomes.

This study investigated how service quality influences customer satisfaction and purchase intention in the context of the Egyptian Postal Service. The findings from both SEM and DOLS models consistently demonstrate strong relationships that align with existing literature and provide meaningful insights for public service reform.

### *Service quality and customer satisfaction (H1)*

The SEM analysis revealed a significant positive relationship between service quality and customer satisfaction ( $\beta=0.736$ ,  $p<0.01$ ). This confirms that improved reliability, responsiveness, and empathy—core SERVQUAL dimensions—directly contribute to higher satisfaction levels. Customers expressed appreciation for shorter waiting times, secure digital transactions, and professional employee behavior. These findings are corroborated by DOLS results, which showed that a 1% increase in the integrated postal performance index (IPPI) is associated with a 0.68% increase in customer satisfaction. This suggests that continued investments in postal performance indicators, such as service consistency, queue management, and employee responsiveness, can significantly enhance satisfaction.

### *Service quality and purchase intention (H2)*

In relation to purchase intention, the SEM analysis indicated a strong and statistically significant relationship between service quality and customer purchase intention ( $\beta=0.794$ ,  $p<0.01$ ). The DOLS model further validated this with a long-run elasticity of 0.42. This means that a 1% improvement in service quality leads to a 0.42% increase in the likelihood of customers choosing to reuse or recommend postal services. Customers interviewed during the qualitative phase frequently mentioned their willingness to return to the post office due to the improvements in environment, accessibility, and perceived reliability, particularly after the expansion of ATM services and civil documentation offerings.

Customers interviewed during the qualitative phase frequently mentioned their willingness to return to the

post office due to the improvements in environment, accessibility, and perceived reliability, particularly after the expansion of ATM services and civil documentation offerings.

### *Combined interpretation*

The alignment of findings across both micro (survey-based SEM) and macro (longitudinal DOLS) levels provides a robust foundation for interpreting the effects of service quality. Importantly, this triangulation also highlights key factors that management can address, such as reducing service disparities between urban and rural branches, expanding training programs for staff, and improving digital platforms to enhance usability—especially for older adults.

These findings directly address the study's two research questions: (1) whether service quality improvements lead to enhanced customer satisfaction and (2) whether service quality influences purchase intention. The answer to both is affirmative and supported by statistically significant results. Beyond numerical evidence, the interviews revealed that digital innovations like ATM networks, government service integration, and improved branch ambiance contributed to tangible shifts in customer behavior. For instance, a middle-aged customer from Giza noted that the ability to renew a national ID in less than 10 min was a “game-changer,” reflecting the impact of tangibility and responsiveness.

This translation of quantitative insights into real-world perceptions confirms that service improvements produce practical benefits perceived by users. The effect of inflation, captured in the DOLS model ( $-0.23$  coefficient), was also mirrored in expert interviews, where concerns were raised about affordability during economic turbulence. Therefore, the study's multi-method evidence converges into a scenario where the Egyptian Postal Service can improve satisfaction and retention by focusing on affordability, operational speed, and transparent communication. These are actionable conclusions answering the core hypotheses and offering grounded implications for managerial strategy. For instance, the 0.68% rise in satisfaction per 1% improvement in service quality (IPPI) corresponds to practical upgrades like expanded ATM coverage and shorter wait times. When Egypt Post adds self-service kiosks or improves employee training, customer satisfaction visibly improves—as reported by users and confirmed by lower complaint rates. Likewise, the positive effect of service quality on purchase intention (elasticity = 0.42) translates into actual customer behavior such as reusing postal banking services or recommending Egypt Post for bill payments and investments.

By interpreting the results within real-world postal service reforms, this discussion answers the research

questions with direct application. Service quality not only leads to better satisfaction, but also drives future purchase behavior, reinforcing the Egyptian Post Office's potential as a modernized and competitive financial service provider.

Table 16 summarizes the research discussion as the SEM analysis revealed that service quality was significantly and positively associated with customer satisfaction ( $\beta=0.736$ ,  $p<0.01$ ) and purchase intention ( $\beta=0.794$ ,  $p<0.01$ ). These path coefficients were derived from the PLS-SEM model using SmartPLS and confirm the hypothesized relationships (see Fig. 2 for model structure).

### Conclusion

This study examined the associations between service quality, customer satisfaction, and purchase intention in the context of the Egyptian Postal Service using a mixed-methods framework. By integrating qualitative interviews, partial least squares structural equation modeling (PLS-SEM), and Dynamic Ordinary Least Squares (DOLS) time-series analysis, the research offers robust, multi-dimensional insights.

This study confirms that service quality plays a critical role in shaping customer satisfaction and purchase intentions within Egypt Post. By integrating quantitative and qualitative methods, the research offers strong evidence that improving postal service reliability, responsiveness, and digital capabilities enhances user trust and engagement. These findings provide meaningful implications for public service innovation, particularly in the context of financial inclusion and digital transformation in developing countries.

These results suggest that improved customer perceptions of service quality—especially regarding reliability, responsiveness, and empathy—are consistently associated with enhanced satisfaction and stronger intentions to reuse postal services. However, it is important to emphasize that while significant relationships were identified, the design of this study is correlational, and causal interpretations should be made with caution.

The study contributes to theory by confirming the relevance of the SERVQUAL model in the public sector and demonstrating how combining survey-based and longitudinal data strengthens validity. It also underscores the added value of integrating macroeconomic variables like inflation in service performance analyses, particularly in developing country contexts.

For practitioners, the findings highlight the need for the Egyptian Postal Authority to prioritize service reliability, employee training, and digital innovation. Moreover, addressing economic pressures such as inflation and

increasing service awareness through targeted campaigns can enhance both satisfaction and long-term customer engagement.

In conclusion, this study presents valuable empirical associations between service quality improvements and key behavioral indicators among postal service users, reinforcing the strategic importance of quality enhancement in public service reform.

### Longitudinal validation via DOLS model

The DOLS model corroborated survey findings:

- Long-term alignment: The IPPI coefficient (0.68) closely matched the survey's SERVQUAL-driven effect ( $\beta=0.736$ ), emphasizing reliability as a cornerstone of satisfaction.
- Macroeconomic insights: Inflation's short-term negative impact ( $-0.23$ ), not explicitly captured in surveys, underscores the need for policy interventions to stabilize customer perceptions.
- Methodological rigor: The inclusion of leads/lags in DOLS accounted for endogeneity, while bootstrapped standard errors ensured coefficient reliability.

### Implications

#### Theoretical implications

- SERVQUAL in Public Sector: Validates the framework's applicability to governmental services, with reliability and digitalization as universal drivers.
- Mediation Role: Customer satisfaction mediates service quality's impact on purchase intention, reinforcing customer-centric theoretical models.
- 7.4.2 Marketing Implications
- Rebranding: Highlight recent technological upgrades (e.g., ATMs and Egypt Digital Platform) to position Egypt Post as a modern, competitive entity.
- Demographic Targeting: Use social media campaigns to engage younger demographics (18–25 years) while retaining older clients through loyalty programs.

#### Practical implications

1. Operational Priorities:
  - o Enhance physical environments (cleanliness, digital kiosks).
  - o Train staff in empathy and problem-solving to align with SERVQUAL's assurance dimension.

2. **Technology Integration:** Scale ATM networks and real-time tracking systems to reduce wait times.
3. **Policy Measures:** Introduce inflation-mitigation strategies (e.g., subsidies for low-income users).

## Recommendations, limitations, and future research

### Recommendations

Based on the study's findings and in alignment with Egypt Post's strategic objectives, the following recommendations are proposed to enhance service quality, customer satisfaction, and purchase intention:

1. **Digital Infrastructure Enhancement:** Expand and upgrade digital platforms, including mobile applications like Wassalha and Yalla, to offer seamless, user-friendly services. This includes integrating features such as real-time tracking, digital payments, and customer feedback mechanisms.
2. **Employee Training and Incentivization:** Implement comprehensive training programs focusing on customer service excellence, digital literacy, and operational efficiency. Introduce performance-based incentives to motivate staff and improve service delivery.
3. **Operational Automation:** Continue the automation of mail sorting and delivery processes to increase efficiency and reduce errors. This includes the deployment of advanced technologies in sorting centers and the use of geographic information systems (GIS) for route optimization.
4. **Service Diversification:** Expand the range of services offered at post offices, such as microfinance, bill payments, and government services, to meet the diverse needs of customers and increase footfall.
5. **Customer Feedback Integration:** Establish robust mechanisms for collecting and analyzing customer feedback to inform service improvements. This could involve regular surveys, feedback forms, and a dedicated customer service hotline.
6. **Financial Inclusion Initiatives:** Strengthen efforts to provide financial services to underserved populations, including the introduction of tailored financial products and services that cater to the needs of various demographic groups.
7. **Marketing and Awareness Campaigns:** Launch targeted marketing campaigns to raise awareness of new and existing services, highlighting the benefits and convenience offered by Egypt Post's modernized services.

Implementing these recommendations is expected to enhance customer satisfaction and loyalty, thereby increasing purchase intentions and contributing to Egypt Post's overall growth and modernization objectives.

### Limitations

Despite the contributions of this study, several limitations must be acknowledged:

1. **Cross-Sectional Survey Design:** The survey component captures perceptions at a single point in time, limiting the ability to infer temporal changes or directionality in the relationships observed.
2. **Correlational Nature of Findings:** Although statistical associations were found, the non-experimental design prevents causal interpretations. Future research should consider longitudinal tracking at the individual level to strengthen inference.
3. **Sampling Bias:** The study employed non-probability snowball sampling, relying heavily on social media platforms for survey dissemination. This may introduce bias toward digitally literate, urban respondents and underrepresent older or rural populations.
4. **Secondary Data Constraints:** The time-series analysis was limited to annual data from 2013 to 2023. The relatively small number of time points may limit the robustness of long-term inferences, even with DOLS robustness features applied.
5. **Contextual Specificity:** The study focused exclusively on the Egyptian Postal Service. While findings offer insights for similar public service organizations, generalization to other countries or private postal institutions should be done cautiously.

Addressing these limitations in future research can help enhance the robustness, applicability, and granularity of the findings.

### Future research

Building on the findings and limitations of this study, several promising avenues for future research are identified:

1. **Longitudinal Panel Studies:** Future work should adopt a panel design to track customer satisfaction and purchase intention over time. This would allow for stronger causal inference and a better understanding of how perceptions evolve in response to service changes.
2. **Rural versus Urban Comparisons:** Given the urban bias in the current sample, future studies should explore service quality perceptions across rural and underserved areas, particularly where postal services play a critical role in financial inclusion.

3. **Comparative Sectoral Analysis:** Comparing Egypt Post with other public or private service providers—such as telecom, banks, or logistics companies—can offer valuable benchmarking insights and deepen understanding of service quality's relative impact.
4. **Behavioral and Psychological Measures:** Incorporating variables like trust, perceived risk, and digital literacy could help uncover deeper drivers of customer behavior and engagement, especially in digital service contexts.
5. **High-Frequency Macroeconomic Data:** Enhancing the DOLS component with quarterly or monthly data (e.g., complaints and parcel volumes) would improve model precision and sensitivity to short-term changes, including inflation shocks or service disruptions.
6. **Experimental or Quasi-Experimental Designs:** To address causality concerns, future studies could use controlled interventions (e.g., service upgrades in selected branches) to evaluate before-and-after changes in customer satisfaction or behavior.

These directions would contribute to both theoretical advancement in service quality research and the development of evidence-based policies for public service improvement, particularly in developing economies.

## Appendix A: Customers and experts' questions

### Customers' questions

1. How can the quality of service have provided in the post office affects your overall satisfaction?
2. How can you define a good service quality inside the post office?
3. What makes you feel secured while doing transactions inside the post office?
4. How does the new renovations affect your post office customer experience?
5. How do you see the services inside the post office branch?
6. How long does it take to finish transactions inside the post office?
7. What are the missing services needed to be provided inside the post office branches?
8. If you have money you would like to invest, would you choose the post office?
9. Why would/wouldn't you recommend your friends and family to invest inside the post office instead of banks?
10. How much does the new renovations make it easier for you to finish your transactions?

### Experts' questions

1. Does the speed of service have an influence on customer purchase intention?
2. Does think that existence of ATM's will affect the customer's purchase intention?
3. Do you see that the new services offered positively affected customers' experience with the post office?
4. What are the new services offered to customers inside the post office?
5. What are the practices offered to enhance the service quality?
6. What are the benefits and interests that could attract customers to the post office?
7. What are the services that makes the post office different than the competitors?
8. How can you make the customers feel secured while doing transactions inside the post office?
9. How much of skills does the post office employee should have?
10. How can you make the customers trust the employee of the post office?

### Abbreviations

CAPMAS	Central Agency for Public Mobilization and Statistics (Egypt)
CBE	Central Bank of Egypt
DOLS	Dynamic Ordinary Least Squares
EGP	Egyptian Pound
GDP	Gross Domestic Product
IPPI	Integrated Postal Performance Index (Universal Postal Union)
MCIT	Ministry of Communications and Information Technology (Egypt)
NTRA	National Telecommunication Regulatory Authority (Egypt)
SERVQUAL	Service Quality Model
UPU	Universal Postal Union

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### Author contributions

AM, KS, and YT have scrutinized the literature and formulated the research gap. In addition, they wrote down the literature review. HT, YT, and KS formulated the methodical framework of this study to achieve the desired objectives. They selected the sample size from the available population, and have designed, together with AM, the data collection instrument and suggested the method of data analysis. KS, YT, and HT have presented the discussion of results. The discussion of the different collected data is presented in the results. AM, KS, YT, and HT contributed to this research by collaborating on the design of the data collection instruments. All authors have read and approved the manuscript.

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**Availability of data and materials**

Data is provided within the manuscript.

**Declarations****Ethics approval and consent to participate**

The authors confirm that they have read, understand, and agreed to the submission guidelines, policies, and submission declaration of the journal. A local ethics committee ruled that no formal ethics approval was required in this particular research, they only asked to have a copy of the published report after the research has been completed.

**Consent for publication**

Consent for participant is not applicable. Authors confirm that all the data and materials are available. Authors confirm that the manuscript is the authors' original work and the manuscript has not received prior publication and is not under consideration for publication elsewhere. Authors reassure that they have contributed significantly to the work, have read the manuscript, attest to the validity and legitimacy of the data and its interpretation, and agree to its submission. Also, authors of this paper confirm that the paper is not copied or plagiarized version of some other published work. Authors declare that this paper is not submitted for publication in any other Journal or Magazine till the decision is made by journal editors, and that if the paper is finally accepted by the journal for publication, authors confirm immediate publication of the paper by paying all charges or its withdrawal according to the journal withdrawal policies.

**Competing interests**

The authors declare that they have no competing interests.

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