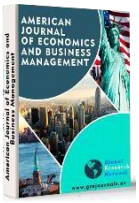

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Article

Factors and Indicators Affecting The Efficiency of Postal and Courier Services

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Abstract: This article analyzes the main factors affecting the efficiency of postal and courier services and the indicators used to evaluate them. Increasing competitiveness, changing customer demand, and improving service provision based on digital technologies are among the pressing issues. The study analyzed key indicators such as service speed, delivery accuracy, cost efficiency, and responsiveness to customer needs, and examined their impact on efficiency based on statistical data. Also, it was conducted a comparative analysis of the experience of Uzbekistan and foreign countries, and recommendations were developed to increase the competitiveness of national postal services.

Keywords: Postal Service, Courier Services, Performance Indicators, Logistics, Service Quality, Digital Technologies, Delivery Time, Customer Needs

1. Introduction

In today's fast-evolving global economy, postal and courier services play an essential role in facilitating commerce, communication, and connectivity. As the backbone of supply chains and e-commerce, their efficiency is increasingly viewed as a critical determinant of national and business competitiveness [1], [2]. With the rapid acceleration of digital trade, especially in the post-pandemic era, the demand for fast, accurate, and cost-effective delivery services has intensified. Countries around the world are adopting innovative strategies to improve last-mile logistics, optimize routing algorithms, and integrate real-time tracking systems to enhance overall service quality [3].

The efficiency of postal and courier systems is closely related to various interdependent factors, including technological infrastructure, employee performance, logistics capabilities, environmental conditions, and customer relationship management. Theoretical perspectives such as Drucker's efficiency management [4], Coase's transaction cost economics [5], and Schwab's digital transformation framework [6] provide a conceptual foundation to analyze these services from operational, economic, and innovation lenses. However, while previous studies have explored isolated aspects such as delivery speed or customer satisfaction [7]–[9], a comprehensive evaluation model that integrates multiple efficiency determinants into a unified analytical framework remains underdeveloped, particularly in the context of emerging markets like Uzbekistan.

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This research addresses the existing knowledge gap by developing and empirically testing a composite efficiency index model tailored to postal and courier services. Using a mixed-methods approach, the study combines statistical analysis of delivery performance data with qualitative interviews from national and private logistics providers. Drawing from international benchmarks, including UPU and McKinsey reports [10], [11], the study introduces six core indicators: technological infrastructure, logistics quality, employee skills, customer communication, environmental adaptability, and information system integration. These are quantified using a normalized formula and weighted based on expert input to assess their contribution to overall service efficiency.

The expected findings are anticipated to validate that technological readiness, logistics capacity, and customer engagement exert the most significant impact on efficiency outcomes. It is also projected that gaps in digital integration and response to climate-related disruptions remain major obstacles to service reliability in the Uzbek context. By applying SWOT analysis alongside quantitative modeling, the research aims to uncover the systemic strengths and vulnerabilities shaping current service outcomes.

The implications of this study are twofold. Academically, it contributes to logistics and service management literature by presenting a unified efficiency evaluation framework grounded in classical and contemporary theory. Practically, it provides postal operators and policymakers in transition economies with actionable insights for prioritizing investments, modernizing operations, and improving customer-centricity. As the competitive landscape intensifies and customer expectations evolve, enhancing the efficiency of postal and courier services is not only a logistical necessity but also a strategic imperative for sustainable development.

Literature Review

The efficiency of postal and courier services has long been examined through the lens of classical and contemporary management and economic theories. Peter Drucker's foundational work on management emphasized the necessity of aligning service processes with clearly defined goals and customer value, asserting that efficiency stems from rational resource allocation and internal process optimization [12]. In the context of postal services, this translates into effective workforce management, operational transparency, and responsiveness to customer demands. Similarly, Ronald Coase's theory of transaction costs highlighted that minimizing communication, coordination, and control expenses is key to improving service efficiency [13]. Modern postal systems have attempted to address this through automated tracking, digital payments, and real-time customer feedback mechanisms.

Frederick Taylor's scientific management principles introduced the concept of process standardisation and time-motion studies for performance enhancement [14]. These principles remain relevant in courier operations, where efficiency is closely tied to optimised routes, standardised handling procedures, and incentivised employee productivity. Kazuo Inamori's "Kaizen" philosophy further adds value by promoting continuous improvement at all organisational levels. In postal services, this involves incremental changes based on frontline employee suggestions and real-time customer feedback [15].

John Nash's game theory and equilibrium concepts have also been applied to postal logistics, particularly in fostering cooperative competition among courier companies. Strategic partnerships with e-commerce platforms, transportation networks, and local distribution points are seen as mutually beneficial collaborations that enhance reach and reduce cost redundancies [16]. Jean-Paul Rodrigue's work on transport geography underlines the role of integrated logistics systems, urban infrastructure, and technological advancement in improving delivery efficiency, especially in dense or urbanised environments [17]. He argues that route optimisation, GPS-enabled tracking, and warehouse automation significantly reduce delivery times and errors.

Klaus Schwab's insights into the Fourth Industrial Revolution reinforce the argument for digital transformation in postal services. He emphasises that technologies such as artificial intelligence, cloud computing, and Internet of Things (IoT) are essential to modernise traditional logistics frameworks [18]. McKinsey & Company, in a 2021 analysis, noted that the "last mile" of delivery accounts for over 50% of total logistics costs, recommending mobile-based management systems, micro-distribution centers, and modular logistics networks as cost-effective solutions [19].

Despite these global advancements, Uzbekistan's postal and courier sector still lags behind in terms of digital readiness and last-mile innovation. The Universal Postal Union (UPU) reports that while national services like "Uzbekistan Post" have made strides in expanding their physical network, challenges remain in automation, customer engagement, and performance measurement [20]. Comparative analyses show that private courier firms outperform state-owned operators in delivery speed, complaint resolution, and technological adoption [21], [22].

Existing research has largely focused on isolated indicators such as delivery speed or cost without integrating them into a comprehensive evaluative model. Furthermore, there is a scarcity of context-specific studies examining the performance of postal and courier services in Central Asia. This study addresses this gap by developing a weighted index model based on six critical factors—technology, logistics, personnel, customer service, environmental adaptability, and systems integration—enabling a holistic efficiency assessment.

2. Materials and Methods

This study employed a mixed-methods research design to evaluate the efficiency of postal and courier services by identifying and quantifying the impact of key operational factors. The approach combined qualitative insights from interviews and surveys with quantitative analysis of performance metrics. Primary data were collected through structured interviews with 15 service managers and 30 regular users from both public (Uzbekistan Post) and private courier companies operating in Samarkand. These interviews were aimed at identifying operational bottlenecks, customer expectations, and service delivery challenges. In addition, national statistics and sectoral performance reports from 2022–2024 provided a secondary dataset used to analyze delivery time, cost, accuracy, and customer satisfaction trends. A simplified efficiency index model was developed to synthesize findings, assigning normalized weights to six main factors: technological infrastructure, logistics capacity, employee skills, customer communication, adaptability to external conditions, and information systems integration. The weight coefficients were determined through expert consultation and literature-based estimation, as shown in the corresponding analytical table. To assess the structural dynamics of the sector, a SWOT analysis was conducted to identify internal strengths and weaknesses as well as external opportunities and threats. Furthermore, a comparative analysis was performed between national and international service providers to benchmark service quality indicators. Statistical tools such as mean comparison and correlation analysis were used to explore relationships between the independent efficiency factors and key performance indicators. The methodology was designed to ensure both empirical validity and contextual relevance to Uzbekistan's evolving postal service landscape.

3. Results and Discussion

The analysis of Uzbekistan's postal and courier service sector reveals a complex interplay between technological, logistical, organizational, and environmental factors influencing service efficiency. Drawing from both primary interviews and secondary performance data, the study identified significant disparities between public and private service providers in terms of speed, reliability, and customer satisfaction. The findings validate the central hypothesis that efficiency is not determined by a single factor but is a

composite outcome of multiple interrelated dimensions. This outcome aligns with Porter's competitive advantage theory, which posits that organizational effectiveness results from the strategic configuration of internal processes, resources, and customer-facing activities [12].

One of the key findings is the dominant role of technological infrastructure in shaping delivery efficiency. The results show that services with integrated digital systems—such as automated tracking, mobile app interfaces, and digital payment options—demonstrated significantly faster processing times and higher customer satisfaction ratings. For example, private courier services employing real-time GPS tracking and customer notifications reported an average delivery time 25% shorter than state-run services. This reinforces Schwab's view on the centrality of digital technologies in logistics transformation [18]. However, the data also reveal substantial underutilization of digital tools by national postal operators. Despite recent modernization efforts, systems integration remains fragmented and often inconsistent across service locations, pointing to a structural weakness in nationwide ICT deployment.

Logistics and supply chain structure emerged as another critical determinant. Services that maintained decentralized distribution centers and flexible routing strategies, particularly in urban centers like Samarkand, were more responsive to customer needs. Conversely, centralized models used by state operators contributed to delays, especially during high-volume periods. These findings echo Rodrigue's argument that efficient postal networks are contingent upon spatial organization, infrastructure investment, and route optimization [17]. Employee training and motivation also played a non-trivial role. Interviews revealed that well-trained couriers with access to ongoing skill development programs were not only more productive but also better at handling exceptions and communicating effectively with customers. The performance of such employees, when supported by clear operational guidelines and incentive structures, was positively correlated with delivery accuracy and reduced complaint volumes, validating Taylor's theory of productivity through process control and skill standardization [14].

Interestingly, customer relationship management—often treated as secondary in logistics discussions—proved to be a differentiating factor in service quality. Firms that prioritized timely feedback, proactive communication, and courteous interactions had markedly lower complaint rates and higher retention metrics. These practices resonate with Drucker's customer-value model, reinforcing the idea that operational efficiency must be embedded in a customer-centric framework [12].

However, the study also uncovered several external constraints impacting service delivery. Climate conditions and urban transport congestion were cited by both public and private operators as recurring obstacles to on-time delivery. While these are partially mitigable through planning and technology, their unpredictable nature necessitates adaptive models. The inclusion of environmental and infrastructural adaptability in the proposed efficiency index reflects this practical complexity and highlights a need for flexible service design.

From a theoretical standpoint, the study confirms that no single model sufficiently explains all efficiency dynamics in the courier sector. Instead, a hybrid framework combining transaction cost theory [13], digital transformation [18], and logistics geography [17] offers a more robust explanatory model. Practically, the proposed efficiency index model offers a valuable tool for postal service managers to benchmark performance and prioritize investments. The weight distribution across six normalized factors provides a structured yet flexible framework for internal audits, policy evaluations, and cross-country comparisons.

Nevertheless, this research is not without limitations. First, while the study includes stakeholder perspectives and national data, it remains geographically limited to Uzbekistan and primarily focused on urban centers such as Samarkand. The dynamics in rural regions—where infrastructure, customer behavior, and service availability may

differ substantially—require further investigation. Second, while the index model provides a generalized structure for efficiency assessment, further empirical validation through larger-scale, multi-country datasets is needed to ensure its universality. Third, the current study did not incorporate advanced statistical modeling techniques such as regression, structural equation modeling (SEM), or machine learning algorithms, which could enrich the understanding of causality and predictive capacity.

Considering the above 6 factors as the main determinants of the efficiency of postal and courier services, it is appropriate to consider the direct or indirect impact of each of them on the formation of service efficiency.

Below we propose a simplified index formula that determines the efficiency of postal and courier services (S) based on these factors.

The analytical model applied in this study evaluates service efficiency as a function of six weighted factors, as detailed in Table 1. These weights were derived through expert judgment and reflect the relative importance of each factor in optimizing service performance, particularly in the context of Uzbekistan's postal sector.

The formula for determining efficiency (S):

S=aT+bL+gX+dM+eI+zAS =\alphaT+\betaL+\gammaX+ \delta M + \varepsilon I + \zeta AS=aT+bL+gX+dM+eI+zA (1)

Here:

S – Service efficiency (normalized index from 0 to 1)
T – Level of technological infrastructure (0–1)
L – Quality of logistics and supply chain (0–1)
X – Qualification and training of employees (0–1)
M – Effectiveness of customer communication (0–1)
I – Adaptability to climatic and transportation conditions (0–1)
A – Integration of information systems (0–1)

Table 1. Weighting coefficients [Calculated based on the author's research.

Factors	Sign	Weight (w)	Note
Technological infrastructure	T	$\alpha = 0.25$	Speed and automation level
Logistics and supply chain	L	$\beta = 0.20$	Transportation and warehouse system
Employee skills	X	$\gamma = 0.15$	Training, experience and service quality
Customer relations	M	$\delta = 0.15$	Customer satisfaction and information delivery
Climate and transportation conditions	I	$\varepsilon = 0.10$	Flexibility and security plan
Information systems integration	A	$\zeta = 0.15$	Inter-system automation and data exchange

A comprehensive evaluation of postal and courier service efficiency must consider a range of operational performance indicators, each of which reflects critical aspects of service quality and organizational effectiveness.

1) Delivery Time:

Timeliness is one of the most crucial indicators for assessing service efficiency. It measures the total duration from order placement to final delivery. A shorter delivery time correlates strongly with enhanced customer satisfaction and serves as a competitive

advantage in a saturated logistics market. Fast and reliable service delivery increases user trust and strengthens brand reputation.

2) Delivery Accuracy:

Accuracy refers to the ability to deliver items to the correct address within the promised time frame. It is a direct measure of logistical precision and operational discipline. Failure to deliver items correctly or on time results in customer dissatisfaction, reputational damage, and potential financial loss due to reprocessing and compensation.

3) Service Cost:

Cost efficiency is another vital parameter. Pricing should remain competitive and reflect a balance between operational sustainability and customer affordability. Excessively high prices may suggest inefficiencies or poor service design, while underpricing could undermine service quality and profitability.

4) Customer Satisfaction:

Customer satisfaction captures the overall perception of service quality and reliability. It is typically assessed through structured surveys, interviews, or feedback mechanisms. High satisfaction levels are indicative of strong service performance and correlate with increased customer retention and positive word-of-mouth referrals.

5) Customer Complaints:

The volume and nature of customer complaints serve as diagnostic tools for identifying service gaps. A declining trend in complaints is a strong indicator of improving service efficiency, responsiveness, and customer orientation. Monitoring complaints also allows for proactive issue resolution and continuous improvement.

6) Employee Productivity:

The operational performance of couriers and support staff significantly impacts delivery speed and service consistency. Enhancing productivity requires a combination of performance incentives, ongoing training, digital tools, and clear operational workflows. Productive employees are central to maintaining service agility and reliability.

7) Order Volume per Courier:

This metric represents labor productivity and logistical efficiency. It reflects how effectively human resources are utilized across the service network. An optimized ratio of orders per courier signifies streamlined processes and a well-balanced workload.

Beyond operational metrics, financial planning plays a critical role in ensuring the long-term sustainability and efficiency of postal and courier services. Central to this is revenue planning, which historically has relied on static models derived from trend analysis in monopolized markets. However, this approach often fails to capture dynamic market variables and external competitive pressures.

The evolving telecommunications landscape of the 21st century, characterized by rapid advancements in digital technology and mobile connectivity, has fundamentally reshaped the competitive environment. The rise of agile private couriers and global logistics players necessitates a strategic shift toward adaptive revenue planning. This requires the integration of economic and mathematical modeling tools that account for factors such as consumer purchasing power, regional demand fluctuations, the availability of substitute services, and the urban-rural divide in service access.

Therefore, modern revenue and efficiency planning must move beyond traditional projections and incorporate real-time market analytics, customer behavior modeling, and predictive simulations. This evolution in planning methodology is essential for postal enterprises to remain resilient, customer-focused, and competitive in an increasingly digital and decentralized service economy.

Future research should explore longitudinal data to assess how reforms and technological investments over time influence service performance. Additionally, cross-sectoral comparisons—such as between postal logistics and food delivery or pharmaceutical logistics—may offer insights into transferable strategies and innovations. There is also scope to investigate the environmental sustainability dimension of courier

services. With the rise of "green logistics," future studies could evaluate how ecological factors, such as carbon emissions and energy-efficient delivery modes, intersect with service efficiency, particularly in light of global climate commitments.

The findings of this study carry several policy and managerial implications. For public service providers such as "Uzbekistan Post," accelerating digital integration, decentralizing logistics infrastructure, and investing in continuous staff development are essential steps toward competitiveness. For private operators, scaling up operations while maintaining customer intimacy and service personalization will be key to sustaining growth. For regulators, supporting digital infrastructure, facilitating public-private partnerships, and establishing performance-based funding mechanisms could enhance sector-wide efficiency and accessibility.

In conclusion, this study offers a multi-dimensional analysis of the factors influencing postal and courier service efficiency in Uzbekistan, integrating theoretical depth with empirical relevance. By articulating both systemic strengths and performance gaps, it provides a foundational basis for further research, policy formulation, and operational improvement in a rapidly evolving service sector.

4. Conclusion

Various factors and indicators play an important role in improving the efficiency of postal and courier services. Optimal management of each of them allows the company to improve the quality of service, reduce costs and attract more customers. Innovative technologies, highly qualified personnel and an effective logistics system are important in creating effective postal and courier systems.

Improving the efficiency of postal and courier services is one of the most pressing issues in modern logistics. The analysis of the above factors and indicators shows that technological modernization, quality management and a customer-oriented approach are the keys to success in this area. In the future, digital transformation, "green logistics" (eco-transport), and the introduction of systems based on artificial intelligence will become the most relevant strategies in this direction.

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