



UPU Think Tank Brief

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Enhancing e-commerce customer experience – exploring the hidden role of addressing

New econometric evidence from the Universal Postal Union (UPU) reveals the stark reality of address inaccuracy's impact on global postal delivery.

Drawing upon Insights from UPU's big data platform and based on checks performed with the *POST*CODE®* API¹, our analysis shows that *postal operators worldwide can increase their successful first delivery attempts by up to 23% by improving address accuracy*—with a median improvement of 5.4% across all operators.

Conversely, poor address quality reduces delivery success rates by as much as 14%.

As cross-border e-commerce continues its exponential growth the proliferation of non-standardized addressing threatens the very foundation of global e-commerce.

The solution is simple - an urgent standardization effort, under the aegis of the UPU, to prevent addressing chaos from undermining the postal sector's ability to serve the digital economy.

Quantifying the address accuracy crisis *Big data reveals the true impact*

For the first time, a comprehensive econometric analysis—using big data from postal operators worldwide and *POST*CODE®* I reference data—has quantified the link between address accuracy and successful delivery rates

The findings are striking: *address quality emerges as one of the most significant determinants of first delivery attempt success* rates across the global postal network.

Our data analysis reveals three distinct categories of impact, with high-performing operators achieving improvements of 2% or

more in successful delivery rates through address accuracy (shown as green bars in Figure 1, overleaf).

The best performers can expect increases of up to 23%.

This extraordinary range demonstrates that address quality is not a marginal operational concern but a fundamental driver of postal performance.

Moderate performers still, shown in yellow bars, see meaningful improvements of up to 2%. And a concerning number of operators experience negative impacts from poor address handling (shown as red bars) with delivery success rates declining by as much as 14%.

The median effect across all operators—a 5.4% improvement in successful first delivery attempts—represents millions of packages delivered successfully rather than requiring costly redelivery attempts or returns.

In the context of global e-commerce volumes, *even a single percentage point improvement translates to enormous economic value and customer satisfaction gains.*

Distribution tells a story

The distribution of postal operators across the impact spectrum reveals crucial insights about the global postal system's readiness for the digital age. The majority of operators cluster around moderate positive impacts, suggesting that basic address accuracy improvements yield consistent benefits.

However, the wide spread between top and bottom performers indicates that best practices in address management are not being systematically shared or implemented across the network.

¹ The *POST*CODE®* API is a service provided by the UPU that enables address verification based on

official postal reference data from member countries.

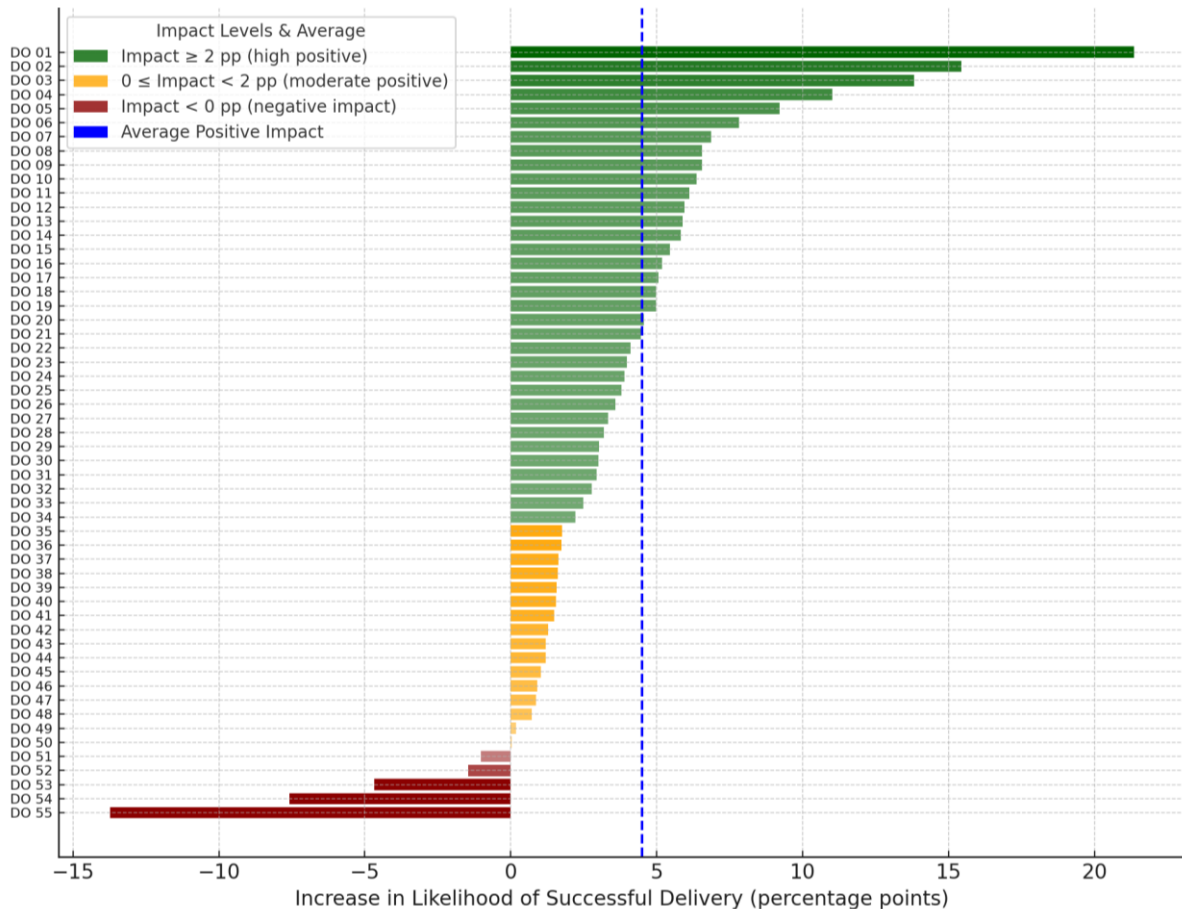


Figure 1: impact of address accuracy on postal delivery, by Postal Operator. (Source: UPU big data)

Most telling is the fact that the Posts *achieving the highest positive impacts are not necessarily those in developed markets with established addressing systems.*

This suggests that innovative approaches to address validation and standardization can leapfrog traditional limitations, offering hope for rapid improvement across all postal systems regardless of their current infrastructure.

From data to crisis: the e-commerce challenge

The exponential growth of cross-border e-commerce has fundamentally altered how addresses enter the postal system.

Unlike traditional mail where senders carefully format addresses according to established conventions, e-commerce transactions involve a chaotic mix of auto-populated fields, hasty mobile entries, machine translations, and supplementary digital elements that blur

² UPU SAVE (Secure Address Verification Environment) is a tool provided by the Universal Postal Union to help postal operators analyse delivery success by cross-checking it with the quality

traditional addressing boundaries.

Evidence from the UPU SAVE² corroborates the econometric findings, showing that address-related issues manifest as Reason Code 10 (Invalid address), Reason Code 11 (Address not found), and Reason Code 17 (Delivery not possible due to insufficient detail).

These codes represent not abstract data points but a real-world impact on customer retention, lost revenue, and damaged trust in the postal system's ability to serve modern commerce.

The State of the Postal Sector 2024 identifies rising last-mile costs even within high-performing countries. *Addressing quality was identified as a primary driver of this cost increase.*

When an address cannot be validated pre-dispatch, the cascade of consequences includes manual intervention, multiple delivery attempts, customer service contacts, and

of postal address data. It supports improving address accuracy and enhancing cross-border delivery efficiency. The tool is open to all UPU Member Countries.

potential returns—each adding cost and complexity that the econometric data now quantifies with precision.

The digital address element paradox

More data is not always good. Modern addressing faces a paradox: digital elements like phone numbers, GPS coordinates, user IDs, and app-based location pins promise greater precision but often deliver greater confusion.

Without standardization and interoperability across platforms, these elements become sources of ambiguity rather than clarity.

A phone number may not correspond to the delivery location, GPS coordinates from consumer devices lack necessary precision, and proprietary user IDs work only within specific platforms.

Our econometric evidence suggests that operators who successfully integrate and validate these digital elements achieve the highest positive impacts on delivery success.

Conversely, those who allow *unstructured digital elements to contaminate traditional address fields experience the severe negative impacts visible in the data.*

This stark difference underscores that the issue is not whether to embrace digital addressing elements but how to standardize and validate them effectively.

Standardization multiplies success: evidence-driven policy guidance

Our econometric findings *transform standardization from a technical nicety to an economic imperative.*

The 23% point spread between best and worst performers represents an enormous opportunity for systematic improvement through standardized approaches.

Even if all operators can achieve the median improvement of 5.4% in delivery success improvement, the *global impact on delivery efficiency, customer satisfaction, and operational costs would be transformative.*

To effectively modernize UPU addressing standards, a comprehensive standardization initiative is required to evaluate and define how emerging digital address elements can be

systematically integrated.

This effort must distinguish which components form the core address, which function as delivery aids, and to what extent these elements can be reliably pre-verified to ensure interoperability, accuracy, and enhanced delivery efficiency.

Standardization works because it enables pre-dispatch validation—the key factor separating high-performing operators from those struggling with address quality. When addresses conform to verifiable standards, automated systems can identify and correct errors before packages enter the delivery network.

The data shows this prevention is far more effective than any amount of last-mile problem-solving.

The network effect

The impact of standardization extends beyond individual postal operators. In cross-border e-commerce, packages traverse multiple postal systems, and address quality must be maintained at each handoff.

The econometric data likely understates the full benefit of standardization because it captures only single-operator effects.

When standardization enables seamless address validation across entire delivery chains, *the compounded benefits could exceed even the impressive gains shown in the current analysis.*

The financial sector's experience with ISO20022 demonstrates this network effect. Standardized address formats in financial messaging reduced errors and compliance costs not just for individual banks but across the entire payment ecosystem.

The postal sector stands to gain even more, given the physical complexity of delivery compared to electronic fund transfers.

The UPU's unique mandate - from crisis to leadership

Our econometric evidence provides the UPU with both a platform for change and a clear value proposition for leadership.

No single postal operator, regardless of their individual performance, can solve the addressing crisis alone. The very nature of

international mail requires collective action, and the data now quantifies the cost of inaction with unprecedented clarity.

The UPU's existing frameworks, including technical standards like [S42](#) and regulations such as [Article 20-001](#), provide the foundation for a comprehensive addressing standard.

The challenge is to *extend these frameworks to encompass digital elements while maintaining the verifiability that the data shows is crucial for delivery success.*

Building on success

The operators achieving the highest positive impacts in the econometric analysis offer a roadmap for global standards.

By studying their approaches to address validation, digital element integration, and pre-dispatch verification, the UPU can identify best practices that can be codified into universal standards. This evidence-based approach ensures that standardization efforts focus on interventions proven to improve delivery outcomes rather than theoretical ideals.

A framework for immediate action

The econometric findings dictate three clear priorities for immediate action:

1. Establish validation protocols that can identify and correct the address errors causing the negative impacts seen in struggling operators.

The data shows that even basic validation can move operators from negative to positive territory, making this the highest-return intervention.

2. Develop standards for integrating digital address elements that capture the practices of high-performing operators.

The 23% improvement achieved by top performers demonstrates that digital elements, when properly standardized and validated, can dramatically enhance rather than hinder delivery success.

3. Create mechanisms for rapid knowledge transfer from high-performing to struggling operators.

The wide distribution of impacts suggests that proven solutions exist but are not being

systematically shared across the network.

Blueprint for success

A *UPU Digital Address Reference Model* (DARM) must codify the elements that separate high performers from the rest.

This includes classification systems for different address components, validation hierarchies that prioritize verifiable location data, integration protocols for digital elements that maintain address integrity, and fallback procedures when primary addressing fails.

The model must be flexible enough to accommodate national variations while rigid enough to ensure interoperability.

The econometric data shows that standardization delivers results across diverse postal systems, suggesting that a well-designed framework can be both universal and locally relevant.

Validation as the Key Differentiator

The data makes clear that validation capabilities separate successful operators from those experiencing delivery failures.

Standardized validation must therefore be central to any solution, including real-time address verification APIs accessible to all operators, shared databases of validated address formats across countries, machine learning systems trained on successful delivery outcomes, and integration points with e-commerce platforms to validate addresses at source.

Investment in validation infrastructure offers the highest return on investment, as preventing address errors is exponentially more cost-effective than managing delivery failures.

The economic case for urgent action

Our econometric evidence allows precise calculation of standardization benefits.

With median improvements of 5.4% in first delivery success and global e-commerce volumes exceeding billions of packages annually, even *conservative estimates suggest potential savings in the hundreds of millions of dollars from reduced redelivery attempts alone.*

For individual postal operators, moving from negative to positive impact territory—achievable

through basic standardization—could mean the difference between profitable and loss-making operations in the competitive e-commerce logistics market.

For those already performing well, achieving top-tier status could provide decisive competitive advantage.

The cost of delay

Every day without standardization results in the widening of the gap between high and low performers.

E-commerce growth means more addresses entering the system in non-standard formats, more customer expectations being disappointed, and more operational costs accumulating. The negative impact operators in the data are likely falling further behind as address complexity increases.

Moreover, as proprietary addressing systems proliferate and major e-commerce platforms develop their own standards, the window for establishing universal postal standards narrows. The UPU must act while the postal sector still has sufficient market relevance to influence addressing practices.

The data demands action

The econometric evidence transforms address standardization from a technical discussion to an economic imperative.

With proven potential improvements in delivery success and clear evidence that poor address handling actively harms postal operations, the case for immediate action is overwhelming.

The data shows that success is achievable—high-performing operators demonstrate daily that address accuracy can be mastered even in the complex world of cross-border e-commerce. The challenge is not discovering what works but implementing proven solutions systematically across the global postal network.

The UPU stands at a crucial moment with an unique role to play.

Armed with unprecedented evidence of both the problem's scope and the solution's effectiveness, it must lead the postal sector from crisis to transformation.

The operators achieving improvements show what is possible. The question is whether the

global postal community will act on this evidence to ensure every operator, and every customer, benefits from the profound improvements that address standardization can deliver.

The data has spoken. The time for action is now.

Recommendations

For UPU member countries and policymakers

- Recognize address standardization as critical infrastructure for the digital economy.
- Prioritize address validation systems as digital infrastructure, recognizing that operators in challenging environments can achieve remarkable results with proper tools.
- Mandate address quality standards for all e-commerce transactions, similar to existing requirements in the financial sector.
- Establish an Address Standardization Task Force at the UPU that analyses the practices of high-performing operators who achieve improvements of over 20% in delivery success. This taskforce should codify proven methodologies into universal standards within six months.
- Further promote the usage of open-source validation tools like *POST*CODE® API* that make top-tier capabilities accessible to all operators, with priority given to those currently experiencing negative impacts from poor address quality.
- Support postal operators through targeted funding for validation systems. There are clear financial benefits, as even achieving the median improvement in delivery accuracy points generate substantial returns.

For Postal Operators

- Elevate address quality to a strategic priority that receives board-level attention, particularly given the evidence.
- Prioritize investment in pre-dispatch validation systems over delivery capacity expansion, as preventing address errors costs far less than managing delivery failures.

- Provide validation APIs to e-commerce platforms and create pricing incentives that reward pre-validated addresses.

For e-commerce platforms

- Implement mandatory real-time address validation at the point of capture, as the data demonstrates that poor addresses undermine even the best postal operators.
- Share delivery failure costs with merchants who provide non-validated addresses, thereby creating market incentives for address quality throughout the ecosystem.

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