

THEORETICAL FOUNDATIONS OF DIGITALIZATION OF COMMERCIAL SERVICES TO THE POPULATION

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Abstract. This paper examines the theoretical foundations underpinning the digitalization of commercial services directed at the general population. Drawing on established frameworks including the Technology Acceptance Model (TAM), Diffusion of Innovation Theory, Service-Dominant Logic (SDL), and Platform Economics Theory, the study systematically analyzes the multi-dimensional forces driving digital transformation in retail, financial, logistics, and government service sectors. Empirical evidence from global and regional statistics is synthesized to construct a comprehensive theoretical model of digital service evolution. Special attention is given to transition economies, with Uzbekistan presented as an emerging case study. The paper identifies key barriers and enablers, proposes a five-dimensional theoretical framework, and outlines strategic directions aligned with the Digital Uzbekistan 2030 program.

Keywords: digitalization, commercial services, e-commerce, digital transformation, platform economy, TAM, service innovation, Uzbekistan, transition economies.

Introduction. The digitalization of commercial services represents one of the most transformative economic phenomena of the early 21st century. The proliferation of internet connectivity, mobile technologies, and artificial intelligence has fundamentally restructured how goods and services are delivered to end consumers. In 2023, global e-commerce revenues surpassed \$4.1 trillion, accounting for approximately 19.4% of total global retail sales — a figure projected to reach 24.5% by 2027 (Statista, 2024).

Yet, despite widespread empirical documentation of this phenomenon, the theoretical foundations of commercial service digitalization remain fragmented across multiple academic disciplines — including economics, management science, information systems, and behavioral theory. This fragmentation impedes the development of coherent policy frameworks and limits strategic decision-making in both the private and public sectors.

This paper aims to systematize and integrate existing theoretical perspectives, offering a consolidated framework that explains the mechanisms,



drivers, and outcomes of digital transformation in consumer-facing commercial services.

Evolutionary Stages of Commercial Service Digitalization

The digitalization of commercial services has not occurred as a singular event but as a phased evolutionary process driven by successive waves of technological innovation. Table 1 presents a periodization of this evolution based on a synthesis of academic literature and industry reports.

Table 1. Evolutionary Stages of Commercial Service Digitalization

Stage	Period	Key Technologies	Service Coverage	User Adoption (%)
Pre-digital	Before 1995	Telephone, fax, paper	Physical stores only	—
Early digitalization	1995–2005	Internet, email, e-commerce	Banking, ticketing	~5–10%
Web 2.0 era	2005–2013	Social media, mobile web, cloud	Retail, travel, food delivery	~25–35%
Mobile-first era	2013–2019	Smartphones, apps, APIs, IoT	Finance, healthcare, government	~55–65%
AI-driven era	2019–present	AI/ML, big data, blockchain, 5G	Cross-sector integration	~80–90%

Source: compiled by the author based on Westerman et al. (2011), World Bank Digital Economy Reports (2020–2023), UNCTAD E-Commerce Reports.

As Table 1 illustrates, each evolutionary stage is characterized not merely by technological change but by a qualitative shift in the breadth of services digitalized, the depth of consumer engagement, and the organizational models that underpin service delivery. The current AI-driven era is distinguished by predictive personalization, autonomous service agents, and seamless omnichannel integration.



Theoretical Frameworks Underpinning Digital Service Transformation

The theoretical analysis of digitalization in commercial services draws from diverse academic traditions. Table 2 synthesizes the seven most pertinent theoretical frameworks, mapping each to its origin, core proposition, and specific application in digital service contexts.

Table 2. Core Theoretical Frameworks Applied to Digital Commercial Services

Theoretical Framework	Authors / Origin	Core Proposition	Application in Digital Services
Technology Acceptance Model (TAM)	Davis, 1989	Perceived usefulness & ease of use drive adoption	Predicts consumer readiness for digital platforms
Diffusion of Innovation Theory	Rogers, 1962	Innovations spread through social systems over time	Explains S-curve of digital service penetration
Resource-Based View (RBV)	Barney, 1991	Competitive advantage from unique resources	Digital capabilities as strategic assets
Platform Economics Theory	Rochet & Tirole, 2003	Multi-sided platforms create network externalities	Two-sided markets in e-commerce ecosystems
Service-Dominant Logic (SDL)	Vargo & Lusch, 2004	Value co-creation between firm and customer	Personalization & UX in digital retail
Digital Transformation Framework	Westerman et al., 2011	IT leverage for business model innovation	Omnichannel strategy & process re-engineering



Theoretical Framework	Authors / Origin	Core Proposition	Application in Digital Services
Transaction Cost Theory	Williamson, 1975	Digital channels reduce transaction costs	Online marketplaces lowering intermediary costs

Source: compiled by the author based on Davis (1989), Rogers (1962), Barney (1991), Rochet & Tirole (2003), Vargo & Lusch (2004), Westerman et al. (2011), Williamson (1975).

Three frameworks merit particular emphasis. First, the Technology Acceptance Model has been extended in the context of mobile commerce (m-TAM) and social commerce (s-TAM), accounting for hedonic motivation, social influence, and trust as additional determinants of adoption (Venkatesh et al., 2012). Second, Service - Dominant Logic reframes commercial digitalization not as the replacement of human interaction with technology, but as the augmentation of value co-creation capacity - wherein digital platforms become operant resources in service ecosystems. Third, Platform Economics Theory captures the structural economics of digital intermediation, explaining why winner-take-most dynamics emerge in digital service markets.

Global Empirical Landscape: Key Statistics

The theoretical arguments above are substantiated by robust empirical evidence at the global and regional levels. Table 3 presents comparative data on e-commerce penetration, growth rates, and digital payment infrastructure across world regions.

Table 3. Global Digital Commerce Statistics by Region (2023)

Region	E-Commerce Revenue (2023, USD bn)	YoY Growth (%)	Mobile Commerce Share (%)	Digital Payment Penetration (%)
Asia-Pacific	2,100	+14.2	72	78
North America	1,040	+8.7	51	65
Europe	755	+9.1	48	62





Region	E-Commerce Revenue (2023, USD bn)	YoY Growth (%)	Mobile Commerce Share (%)	Digital Payment Penetration (%)
Latin America	168	+21.5	60	44
Middle East & Africa	54	+18.9	65	38
Central Asia (incl. Uzbekistan)	12.4	+27.3	58	41
WORLD TOTAL	4,129	+11.8	60	63

Sources: Statista Global E-Commerce Outlook 2024; World Bank Financial Inclusion Database; UNCTAD Technology and Innovation Report 2023; Central Bank of Uzbekistan Annual Report 2023.

Notably, the Central Asia region — including Uzbekistan — demonstrates the highest year-on-year growth rate globally at +27.3%, reflecting the rapid leapfrogging effect whereby developing economies bypass intermediate technological stages and directly adopt mobile-first digital service models. This pattern aligns with Christensen's (1997) disruptive innovation theory, wherein incumbents in developed markets face innovative attack from digital-native operators in emerging economies.

Diagram: Annual E-Commerce Growth Rate by Selected Countries/Regions (2023)

Figure 1 below presents a comparative visualization of annual e-commerce growth rates, highlighting the elevated trajectory of emerging markets including Uzbekistan, Latin America, and South/Southeast Asia relative to mature digital economies.

Figure 1. Annual E-Commerce Revenue Growth Rate (%) — Selected Economies, 2023

Uzbekistan		+27.3%
Kazakhstan		+22.1%
Russia		+16.4%
India		+19.5%



China		+14.2%
USA		+8.7%
EU (avg)		+9.1%

Note: Bar lengths are proportional to YoY growth rate (%). Source: Statista 2024; World Bank; Central Bank of Uzbekistan.

A Five-Dimensional Theoretical Framework for Digital Service Transformation

Building on the analysis above, this paper proposes an original Five-Dimensional Theoretical Framework (5-DTF) for understanding digitalization of commercial services. The five dimensions are:

1. Technological Readiness Dimension (TRD): measures infrastructure availability (broadband, mobile coverage, cloud capacity) and organizational IT capability as prerequisites for service digitalization.

2. Consumer Behavioral Dimension (CBD): integrates TAM, SDL, and behavioral economics insights to model consumer adoption curves, trust formation, and habit persistence in digital service ecosystems.

3. Economic and Market Structure Dimension (EMSD): applies Platform Economics and Transaction Cost Theory to explain competitive dynamics, pricing mechanisms, and market concentration in digitalized service industries.

4. Institutional and Regulatory Dimension (IRD): examines how legal frameworks, data governance norms, and state digital strategies create enabling or constraining environments for commercial digitalization.

5. Value Co-Creation Dimension (VCD): drawing on SDL and co-innovation literature, this dimension captures how digital tools enable firms and consumers to jointly generate, personalize, and enhance service value.

The framework posits that sustainable digital transformation of commercial services requires simultaneous progress across all five dimensions. Deficiency in any single dimension creates systemic bottlenecks — as evidenced by markets where high smartphone penetration coexists with low e-commerce adoption due to inadequate regulatory frameworks (IRD gap) or insufficient consumer trust (CBD gap).

Barriers and Enablers: A Comparative Matrix

Operationalizing the 5-DTF requires mapping the primary barriers and enablers at each analytical level. Table 4 presents this mapping across five categorical domains.

Table 4. Barriers and Enablers of Commercial Service Digitalization



Category	Key Barriers	Key Enablers
Technological	Low broadband penetration; outdated legacy infrastructure; cybersecurity vulnerabilities	5G rollout; cloud computing; open API ecosystems; edge computing
Economic	High initial investment; digital divide between income groups; price sensitivity	Declining hardware costs; VC/PE funding growth; digital payment subsidies
Regulatory	Inconsistent data protection laws; cross-border transaction restrictions; slow regulatory adaptation	Regulatory sandboxes; e-signature legislation; digital identity frameworks
Behavioral / Social	Low digital literacy; trust deficit in online transactions; generational resistance	Youth demographics; COVID-accelerated adoption; digital education programs
Institutional	Bureaucratic inertia; lack of interoperability standards; fragmented government digital strategies	National digitalization programs; public-private partnerships; international best-practice transfer

Source: compiled by the author based on WEF Digital Economy Framework (2023), OECD Digital Economy Outlook (2023), World Bank Digital Development Partnership reports.

Case Study: Digital Commercial Services in Uzbekistan

Uzbekistan presents a compelling case for examining the theoretical frameworks in a transition economy context. The country's Digital Uzbekistan 2030 strategy (Presidential Decree No. UP-60, 2020) has catalyzed significant institutional change, generating measurable outcomes across all five dimensions of the 5-DTF. Table 5 summarizes key performance indicators.

Table 5. Digital Commercial Services Development Indicators — Uzbekistan (2023)



Indicator	Value	Source
Internet users	22.1 million (65.5% of population)	ITU, 2023
Mobile subscribers	25.8 million (76.6%)	UzCom / MinICT, 2023
E-government service users	8.4 million (registered)	Agency for Public Services, 2023
Online retail market size	\$1.47 billion	Euromonitor / MIFT, 2023
Digital payment transactions	812 million/year	Central Bank of Uzbekistan, 2023
Fintech startups registered	126 active companies	UzFintech, 2023
Digital Economy GDP share	~4.1%	Ministry of Digital Technologies, 2023
Target by Digital Uzbekistan 2030	≥30% GDP from digital economy	Presidential Decree No. UP-60, 2020

Sources: Ministry of Digital Technologies of Uzbekistan; Central Bank of Uzbekistan; ITU; Euromonitor International; UzFintech Association, 2023.

The data confirm a pattern consistent with the 5-DTF predictions: while TRD indicators (mobile penetration at 76.6%) and initial CBD gains are strong, IRD and VCD dimensions remain underdeveloped — evidenced by the relatively low digital payment penetration (41%) compared to mobile subscriber rates and the nascent state of co-creation-based digital service models. This asymmetry represents the primary theoretical and practical challenge for next-phase digitalization policy.

Conclusions and Policy Implications

This paper has synthesized diverse theoretical traditions into a coherent analytical framework for understanding the digitalization of commercial services. The principal conclusions are as follows:



1. No single theoretical framework is sufficient to explain the multi-dimensional nature of commercial service digitalization; an integrative approach is required.

2. The proposed 5-DTF framework provides a theoretically grounded and empirically applicable model for analyzing digitalization at the firm, sector, and national levels.

3. Emerging markets, including Uzbekistan, exhibit leapfrog potential but require targeted interventions in the institutional and value co-creation dimensions to sustain growth.

4. Policy design should be dimension-specific: regulatory sandboxes for IRD, digital literacy programs for CBD, and interoperability standards for TRD represent priority interventions.

Future research should empirically validate the 5-DTF through comparative multi-country panel data analysis, with particular attention to AI-driven service transformation in the post-2025 period.

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