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Development and integration of regional markets under digital and investment transformation of the economy

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CITATION

Turyan K, Sargsyan A. Development and integration of regional markets under digital and investment transformation of the economy. *Sustainable Social Development*. 2026; 4(5): 8846.
<https://doi.org/10.23812/ssd8846>

ARTICLE INFO

Received: 23 June 2026

Revised: 4 August 2026

Accepted: 14 August 2026

Available online: 28 October 2026

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Abstract: Research on digital trade, finance, investment, and regional integration remains fragmented, and cross-regional comparisons often rely on broad labels that obscure implementation differences and distributional risks. This conceptual study develops a testable five-pillar framework for regional market integration under digital and investment transformation. A structured narrative review was conducted using 57 full-text candidate documents identified through academic metadata searches and official repositories; 43 sources were retained after relevance and quality appraisal. Evidence was coded for mechanisms, complementarities, moderators, feedback effects, social outcomes, and risks. The European Union, ASEAN, the Eurasian Economic Union, and the African Continental Free Trade Area were then examined as most-different institutional cases using a common four-level implementation scale. The synthesis indicates that digital infrastructure is an enabling rather than sufficient condition. Human capital and institutional interoperability moderate its effects, while financial modernization and productive investment mediate the conversion of connectivity into cross-border exchange. Socially sustainable outcomes additionally depend on affordability, decent-work conditions, data rights, consumer protection, and territorial inclusion. The contribution is a framework that distinguishes enabling conditions, mechanisms, outcomes, risks, and feedback loops; states seven propositions; and specifies an empirical validation algorithm without presenting conceptual relationships as estimated effects. For policy, the framework supports sequenced diagnostics, interoperability pilots, safeguard design, and indicator-based scaling rather than isolated technology spending.

Keywords: digital regionalism; regional market integration; institutional interoperability; digital transformation; productive investment; financial modernization; social sustainability; digital inclusion

1. Introduction

Digital technologies have altered how firms search for partners, verify information, coordinate supply chains, make payments, and enter foreign markets. These changes can reduce economic distance, but they do not remove the institutional and financial frictions that shape regional integration. Digital platforms may expand market reach while also concentrating data and market power; digital infrastructure may connect territories without making services affordable or firms investable. The analytical problem is therefore not whether digitalization matters, but how it interacts with institutions, finance, productive investment, and human capabilities [1–4].

Digital transformation is no longer a peripheral technology issue; it affects whether firms can enter regional markets, whether payments and customs documents

work across borders, and whether peripheral territories can capture investment. The policy stakes are asymmetric. The EU combines an enforceable single-market architecture with persistent skills and territorial gaps, whereas ASEAN, the EAEU, and AfCFTA rely on different mixes of negotiated rules, common public infrastructure, and nationally mediated implementation [5–10]. The analytical challenge is why similar investments in connectivity generate different integration and distributional outcomes.

Recent evidence sharpens this puzzle. Digital-economy foreign direct investment remains concentrated, while infrastructure, skills, business adoption, and public-service readiness are uneven [3,5,11]. Digital finance can lower payment and access frictions, but it also creates operational, conduct, privacy, fraud, concentration, and cyber risks [12–14]. A technology-first explanation is therefore insufficient: The same connection can widen market access in one institutional setting and deepen exclusion in another.

Putting simply, regional market integration is the practical ability of firms and households to exchange goods, services, finance, data, and knowledge across neighboring economies without avoidable policy, information, payment, logistical, or capability barriers. Digital transformation means organizational and institutional change enabled by networks, data, platforms, and digital technologies, not merely converting analogue records into electronic form. Investment transformation means redirecting public and private capital toward infrastructure, innovation, interoperable services, and productive capability. Digital regionalism is the regional coordination of these rules and infrastructures. In this article, market connectivity is an intermediate mechanism; trade, investment, resilience, and social sustainability are outcomes.

Classical integration theory explains market creation through the removal of trade barriers, while institutional economics explains how rules and enforcement reduce uncertainty [15,16]. Financial-intermediation research adds that finance affects development by mobilizing savings, producing information, allocating capital, monitoring investment, and managing risk [17,18]. Yet these traditions are rarely joined in a framework that also treats digital exclusion, data rights, financial health, and territorial inequality as integral outcomes rather than late-stage policy concerns.

This study therefore asks three questions: (1) through which mechanisms do five enabling pillars—digital infrastructure, human capital, institutional harmonization, financial modernization, and productive and inclusive investment—shape regional market integration; (2) how do these mechanisms differ across regional arrangements with distinct governance models; and (3) under what safeguards and boundary conditions can market integration support sustainable social development?

Methodologically, the paper is a conceptual, comparative structured narrative review rather than an empirical impact evaluation. It assesses 57 full-text candidate documents, retains 43 after relevance and quality appraisal, codes their mechanisms and boundary conditions, and compares four regional arrangements through a common implementation-maturity matrix. It neither estimates causal effects nor presents illustrative scenarios as observed findings.

The contribution is threefold and differs from prior single-channel accounts. First, it assigns explicit roles to enabling conditions, mediators, moderators, feedback loops, and weakest-link complementarities instead of listing digital, institutional, financial,

and investment factors as parallel drivers. Second, it places affordability, decent work, territorial inclusion, consumer protection, data rights, and financial health inside the analytical architecture rather than treating them as residual policy concerns. Third, it compares distinct governance models with a dated, source-based implementation scale and derives seven propositions that can be falsified in later empirical work.

The EU, ASEAN, EAEU, and AfCFTA are used as analytically contrasting cases, not as a statistically representative sample. They correspond to four different governance configurations: A supranational single market, a consensus-based intergovernmental community, a treaty-based economic union with common digital projects, and a continent-wide free-trade area at an earlier implementation stage. This most-different design helps identify mechanisms that recur under contrasting institutional conditions while making the limits of generalization explicit.

The remainder of the paper develops the theoretical background and research gap, reports the review protocol, presents the comparative findings and framework, discusses the propositions and identification challenges, and concludes with phased policy implications, limitations, and future research priorities.

2. Theoretical background and research gap

2.1. From trade integration to digital regionalism

Traditional integration theory focuses on tariff removal, trade creation, factor mobility, and common-market institutions [16]. Digital exchange adds non-tariff frictions that are less visible but economically important: Incompatible data rules, identity systems, e-signatures, payment rails, cybersecurity requirements, platform standards, and consumer remedies. Digital regionalism therefore extends rather than replaces conventional integration. Physical and digital trade costs coexist, and institutional interoperability determines whether connectivity can be used across borders.

2.2. Institutions, finance, investment, and regional capabilities

Institutional economics predicts that stable and enforceable rules lower uncertainty and transaction costs [15]. Recent regional studies agree that technology does not operate independently: Investment, human capital, geography, and institutional quality condition both development and exclusion [19–21]. However, their units of analysis and implied mechanisms differ. ASEAN evidence relates digital indicators to trade openness [22], while multinational evidence associates digital transformation with socio-economic performance [23]. These average relationships are useful, but neither establishes that infrastructure is sufficient or that effects transfer unchanged across governance systems.

Finance and investment studies share the premise that digitalization can reduce information, payment, and search costs, but they disagree about direction and distribution. Firm-level evidence links digital transformation to cross-regional investment through information processing and organizational capability [24]. Cross-regional financial evidence reports positive average effects that vary with institutions, macroeconomic policy, and regional context [25]. Financial-intermediation theory

nevertheless warns that screening, monitoring, competition, risk allocation, and trust remain decisive [14,17,18,26]. The unresolved issue is therefore not whether finance matters, but when digital finance mobilizes productive capital rather than amplifying concentration, unsuitable credit, or operational risk.

Systems research adds dynamics that linear accounts miss. System-dynamics analysis of European regions shows that technology effects are delayed, place-dependent, and transmitted through innovation-system actors [27]. Work on the EU's green and digital transition similarly stresses the role of institutional capacity [20]. Koval et al. demonstrate how a verbal regional model can be translated into a structural algorithm with interacting components, a useful precedent for the operationalization developed below [28].

The social evidence is explicitly contradictory. European regional research associates ICT access, investment, and institutional quality with lower risks of poverty and exclusion [19], whereas causal evidence from Italian provinces finds that broadband expansion can increase income inequality where skills and local capabilities are weak [29]. Recent place-based research likewise evaluates well-being, institutional quality, and vulnerability alongside competitiveness [21]. These differences are not treated as errors to be averaged away: They imply moderation by skills, geography, affordability, implementation capacity, and safeguards.

Taken together, prior studies share a common core—digital technologies can reduce selected economic frictions—but differ in level of analysis, outcome, and causal claim. Trade studies estimate exchange effects [30]; firm studies examine investment responses [24]; finance studies focus on intermediation [14,25,26]; regional studies emphasize institutions and place [19,20,21,27,29]; and policy documents record legal implementation. Treating these findings as interchangeable would be misleading. The present review instead asks how their variables fit into one conditional mechanism and where their conclusions should diverge.

Table 1 demonstrates both continuity and departure. This study accepts the established transaction-cost, capability, institutional, financial, and investment mechanisms. It differs by assigning each construct a role, separating implementation from outcomes, integrating adverse and distributional pathways, and comparing the same dimensions across four governance models. The comparison therefore synthesizes prior findings without claiming that evidence from firms, countries, and regional organizations estimates one common effect.

Table 1. Literature clusters, established insights, and unresolved field-level gaps.

Literature cluster	Main finding	Identified gap
Regional integration [1,16,30]	Trade costs and common-market institutions shape exchange.	Digital data, identity, payment, and platform institutions are under-specified.
Digital economics and trade [2,22,23]	Digitalization can reduce search and coordination costs and is associated with trade and development.	Effects are frequently treated as direct; distribution and implementation conditions vary.
Institutions and regional development [15,19,20,21]	Institutional quality and place-based capabilities condition regional outcomes.	Few studies compare how these conditions operate across different regional governance models.
Finance [12–14,17,18,25,26]	Finance mobilizes and allocates capital; digital tools can lower access and payment frictions.	Financial inclusion is often conflated with financial health; conduct, concentration, and cyber risks are insufficiently integrated.

Table 1. (*Continued*).

Literature cluster	Main finding	Identified gap
Investment [3,24]	Digital capability can facilitate investment, and investment finances digital capacity.	The two-way feedback and conditions for productive, additional, and inclusive investment are under-modeled.
Systems and regional modelling [27,28]	Feedback, delays, and path dependence influence regional transformation.	Finance, distributional safeguards, and cross-bloc institutional comparison are not jointly specified.
Social sustainability [14,19,29]	Digitalization may reduce or deepen exclusion depending on context.	Affordability, decent work, data rights, consumer protection, and territorial inequality are often treated only as final benefits.
Regional policy evidence [5–10,31,32]	Regional organizations are building digital rules and shared infrastructures.	Comparisons often use unscored labels without common definitions, dates, sources, or heterogeneity caveats.

2.3. Variable architecture, research gap, and contribution

The five enabling constructs are digital infrastructure (DI), human capital (HC), institutional harmonization (IH), financial modernization (FM), and productive and inclusive investment (PI). Their effects are expected to pass through three mediating mechanisms: Lower information and transaction costs; interoperability and regulatory certainty; and capital mobilization, innovation, and diffusion. Affordability, state capacity, market size, geography, prior integration, and distributional safeguards are moderators or boundary conditions. Regional market integration—trade, investment, firm entry, and resilience—and social sustainability—affordability, decent work, financial health, rights, and territorial inclusion—are separate outcomes. Exclusion, concentration, cyber and data harm, and job polarization are adverse pathways.

These are conceptual variables, not observed regressors in the present review. The field-level gap is the absence of a common architecture that assigns them theoretical roles, explains complementarity and substitution, identifies adverse pathways, and remains comparable across regional governance contexts. The proposed framework addresses that gap and makes the relationships empirically testable without presenting propositions as estimated results.

3. Review method

The research design integrates a structured narrative review with theory-building and a most-different comparative case analysis. Its units of evidence are peer-reviewed studies and traceable official documents; its units of comparison are regional arrangements. Institutional economics explains rule credibility and transaction costs, financial-intermediation theory explains capital allocation and risk, and systems theory explains complementarity, feedback, and delay. The methodological novelty lies in connecting these theories through a common coding protocol and implementation scale, not in claiming a new econometric estimator.

3.1. Review design and period

A structured narrative review is appropriate because the evidence combines heterogeneous econometric designs, firm and regional studies, legal instruments, and policy implementation documents that do not share a common effect size. A meta-analysis would therefore impose false comparability. Reporting follows SANRA transparency principles [33]. The main publication window is 1 January 2016 to 21

July 2026; earlier works are retained only when necessary to define integration, institutions, financial intermediation, or internet-related trade costs [15–18,30].

3.2. Search, screening, and quality appraisal

Searches were completed on 20 July 2026 using Crossref metadata, Google Scholar, and official repositories of the WTO, OECD, UNCTAD, World Bank, European Commission and Eurostat, ASEAN Secretariat, African Union and AfCFTA Secretariat, and Eurasian Economic Commission. Keyword groups combined digital transformation, digital trade, FDI, productive investment, financial development, fintech, inclusion, inequality, and consumer protection with regional integration and the four bloc names. To ensure currency, 30 of the 43 retained sources (69.8 %) were published from 2023 through 2026; foundational sources were retained for theory rather than used as evidence of current implementation.

Eligible documents were peer-reviewed articles, scholarly books or chapters, and official legal, statistical, or policy documents in English; Russian-language EAEU documents were eligible when no English version existed. Opinion pieces, duplicate or superseded versions, consultancy claims without methods, documents with unverifiable statistics, and sources that did not address a mechanism or case were excluded. After duplicate removal, 57 full-text candidates were assessed and 43 were retained. Peer-reviewed studies had to state data and methods; institutional sources had to be issued by the responsible organization and provide a traceable title, date, and source. This is a transparent purposive review, not a claim of exhaustive systematic coverage.

3.3. Coding and synthesis

Each retained source was coded along seven fields: Enabling construct; proposed mechanism; mediator or moderator; regional-integration outcome; social-sustainability outcome; risk or adverse effect; and boundary condition. Evidence was labeled as (a) reported empirical association or causal estimate, (b) official legal or implementation evidence, or (c) author interpretation. Categories (a) and (b) inform the comparative matrix; category (c) is reported as a proposition. This separation prevents descriptive policy material from being presented as causal evidence.

3.4. Case selection and comparison scale

The regional-case sample is purposive and theoretical, not statistical. A case had to have (i) a formal cross-border economic-integration mandate, (ii) an active regional digital-economy or digital-trade instrument by the review cut-off, (iii) public documentation sufficient to assess the common dimensions, and (iv) theoretical leverage for comparison. The EU, ASEAN, EAEU, and AfCFTA maximize variation in delegated authority, legal enforceability, income and digital maturity, geographic scale, and integration stage. Additional blocs were reserved for external validation so that case breadth would not replace institutional depth.

An implementation-maturity scale is applied: 0 = no identifiable regional instrument; 1 = instrument adopted or pilot initiated; 2 = partially operational with incomplete or uneven member coverage; and 3 = region-wide operational

arrangements with regular monitoring or enforcement. Scores indicate institutional implementation, not causal impact or overall development. Every cell in **Table 2** is linked to a source or an explicitly identified regional instrument [5,32–37].

Table 2. Source-based implementation maturity of regional digital-integration arrangements (0–3 scale; status at 21 July 2026).

Dimension	EU	ASEAN	EAEU	AfCFTA
Regional digital policy	3 – monitored targets [5]	2 – regional agenda; national delivery [31,32]	2 – roadmap to 2030 [9]	2 – protocol adopted [6]
Regulatory interoperability	3 – common rules and rights [5,37]	2 – common disciplines; uneven readiness [31,32]	2 – partial common rules [9,40]	1 – principles adopted [6]
Digital trade and customs	3 – operational systems [5,35]	2 – partial interoperability [31]	2 – partial e-customs [9]	1 – early implementation [6,8]
Payment interoperability	3 – regional architecture [13]	2 – priority; uneven reach [31,32]	1 – limited region-wide links [6,40]	2 – PAPSS operational; incomplete reach [8]
Digital investment coordination	2 – funding with an investment gap [3,11,42]	2 – regional ambition; national delivery [31,32]	1 – mainly national policy [9,40]	1 – protocol direction; finance gap [3,6,34]
Skills and social safeguards	2 – monitored rights and skills gaps [37,39]	2 – inclusion goal; uneven capacity [31]	1 – limited common safeguards [9,40]	2 – participation and safety protocols [6,7]
Monitoring and enforcement	3 – annual and enforceable [5]	2 – coordinated; nationally differentiated [31,32]	2 – binding acts; uneven delivery [6,40]	1 – institutions developing [6,8]
Internal heterogeneity	High – territorial and skills gaps [5,19,39]	High – income and capacity gaps [31,32]	High – readiness and market-size gaps [6,40]	Very high – 55-member dispersion [6–8,10]

3.5. Analytical procedure

The analysis proceeded in four steps: Within-source coding; within-case mapping of rules and implementation; cross-case comparison on the common 0–3 scale; and abductive synthesis into mechanisms and propositions. Rival explanations—including income, geography, market size, political capacity, and prior integration—were retained as boundary conditions. A sensitivity reading then applied a stricter interpretation in which level 3 required both region-wide operation and regular monitoring or enforcement. This check did not convert qualitative judgments into statistical estimates; it tested whether the principal cross-case interpretation depended on permissive scoring.

3.6. Credibility and scope checks

Credibility rests on source guidance, explicit evidence-type labels, dated institutional assessments, and separation of maturity scores from welfare effects. Where peer-reviewed and official evidence addressed different levels of analysis, the article reports the difference rather than averaging it. The design supports analytical generalization of mechanisms; it does not support population inference, a league table of blocs, or causal attribution.

4. Comparative findings and proposed framework

4.1. Mechanism synthesis

Three comparative results emerge. First, none of the four arrangements combines maximum maturity across infrastructure-related coordination, regulatory interoperability, payments, investment coordination, skills, safeguards, and enforcement. Second, the binding constraint differs by governance model: The EU's challenge is uneven capability and territorial implementation; ASEAN's is nationally differentiated delivery; the EAEU's is limited region-wide finance and safeguards; and AfCFTA's is early, capacity-constrained implementation. Third, formal adoption is a weak proxy for usable integration. These results explain why technology alone cannot account for cross-regional differences.

Across the retained literature, the five pillars recur, but they do not perform equivalent roles. Digital infrastructure expands technical reach; human capital converts access into productive use; institutional harmonization enables cross-border recognition and trust; financial modernization mobilizes and allocates capital; and productive and inclusive investment expands capacity. The evidence therefore supports a system of conditional relationships rather than five independent drivers.

Figure 1 makes this distinction explicit. The five pillars are enabling conditions. Their effects pass through lower information and transaction costs, interoperability and regulatory certainty, and capital mobilization and innovation. Market integration and social sustainability are separate but interacting outcomes. Feedback from trade, learning, fiscal revenue, and reinvestment can strengthen the pillars, while exclusion, concentration, cyber and data harms, job polarization, weak state capacity, and geopolitical fragmentation can interrupt the process.

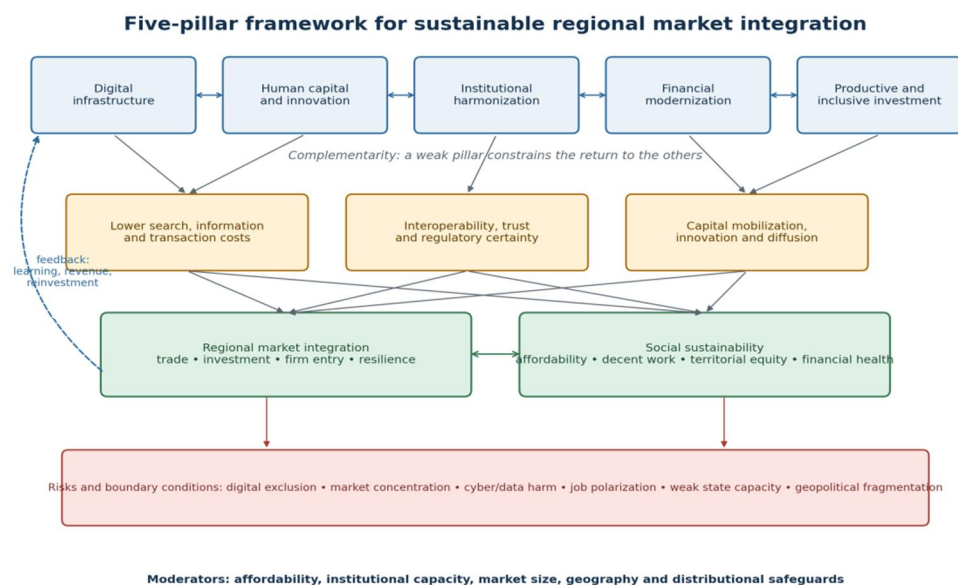


Figure 1. Five-pillar framework linking enabling conditions, mechanisms, regional market integration, social sustainability, feedback effects, risks, and boundary conditions.

The framework distinguishes evidence from propositions. The following five observations summarize the review; the directional and interaction claims are then formalized as propositions in Section 4.3.

Digital Infrastructure and Connectivity. Broadband, data infrastructure, digital public infrastructure, and interoperable platforms can reduce search and coordination costs [2,22,30]. Their contribution is conditional on affordability, reliability, and cross-border usability. Infrastructure is therefore necessary in many settings but is not a sufficient indicator of integration.

Human Capital and Innovation. Digital skills, managerial capability, research systems, and absorptive capacity mediate the conversion of infrastructure into productivity and firm participation. Evidence from European regions shows that identical technologies can produce different outcomes where skills, institutional capacity, and geography differ [19,20,27,29].

Institutional harmonization. Mutual recognition of digital identity and signatures, compatible data and consumer rules, cybersecurity cooperation, electronic customs, and predictable dispute resolution reduce legal uncertainty. The relevant variable is not formal adoption alone but implementation, interoperability, and redress [11,17,34–37].

Financial modernization. Cross-border payment infrastructure, digital accounts, credit information, fintech, and capital-market links can lower payment and financing frictions. Yet access does not guarantee financial health; competition, privacy, cyber resilience, suitability, complaint handling, and financial literacy condition distributional outcomes [18,19,22,25,26,38].

Productive and inclusive investment. Public and private capital finances networks, skills, firms, and interoperable services, while digital capability can in turn attract investment by reducing information asymmetry [3,24,34]. Incentives create sustainable capacity only when they are transparent, time-limited, linked to additional investment and skills transfer, and accompanied by access measures for peripheral territories and smaller firms.

4.2. Comparative regional analysis

The four cases exhibit different implementation sequences rather than a single development ladder. **Table 2** compares regional instruments, not average country performance. Its 0–3 scores are structured qualitative judgments of adoption, operation, coverage, and monitoring; they are not composite performance indices. Interpretation therefore centers on bottlenecks and institutional sequence rather than ordinal ranking.

The European Union has the deepest regional rulemaking and monitoring architecture. Annual Digital Decade reporting, common digital-market rules, and rights-based instruments create a comparatively dense institutional environment [5,37]. Nevertheless, implementation and capabilities remain uneven: In 2025, only 60 % of EU residents aged 16–74 had at least basic digital skills, with substantial cross-country and socio-demographic gaps [39]. The EU case therefore shows that formal integration does not eliminate territorial or capability divides.

ASEAN combines operational cooperation with a consensus-based governance model. The ASEAN Digital Masterplan 2030 and the concluded Digital Economy

Framework Agreement negotiations cover digital trade, payments, identity, cybersecurity, and emerging technologies [31,32]. Regional ambition is high, but implementation remains dependent on national capacity and regulatory convergence. ASEAN illustrates how networks and market-led adoption can move faster than a fully common rulebook.

The Eurasian Economic Union (EAEU) has advanced common customs and product-identification projects within a treaty-based union. Its roadmap to 2030 gives digital transformation a role in trade, customs, transport, technical regulation, and artificial-intelligence cooperation [9]. However, region-wide payment interoperability, investment coordination, and social safeguards are less developed, and member-state capabilities remain uneven [40,41].

The African Continental Free Trade Area (AfCFTA) has established a broad legal direction while implementation is still emerging. The 2024 Protocol on Digital Trade sets harmonized principles for inclusive digital trade, and PAPSS provides an operational cross-border payment infrastructure [6,8]. The Protocol on Women and Youth in Trade embeds participation and safety concerns [7]. The main constraints are coverage, affordability, infrastructure finance, regulatory capacity, and the substantial heterogeneity of 55 African Union member states [3,6–8,10].

Table 2 summarizes the implementation evidence. Data years range from 2024 to July 2026; the reference in each cell identifies the relevant instrument or assessment.

The comparison reveals a recurring institutional sequence: Common rules without delivery capacity remain nominal, while infrastructure without interoperable rules remains nationally bounded. Payment and customs interoperability can be practical entry points, but their social value depends on affordability, accessible redress, skills, and opportunities for smaller firms. Under the stricter sensitivity rule, the EU remains the only case with multiple level-3 dimensions, while ASEAN and the EAEU remain partially operational and AfCFTA remains predominantly at adoption or early-operation stages. The substantive interpretation is therefore stable, although individual cell scores remain contestable qualitative judgments.

4.3. Propositions and empirical operationalization

To make the conceptual contribution testable, let DI, HC, IH, FM, and PI denote normalized measures of digital infrastructure, human capital, institutional harmonization, financial modernization, and productive and inclusive investment. A diagnostic complementarity index can be written as a geometric mean:

$$C_{rt} = (DI_{rt} \times HC_{rt} \times IH_{rt} \times FM_{rt} \times PI_{rt})^{1/5} \quad (1)$$

The equal-weight form is a transparent starting identity rather than an estimated index. The geometric mean penalizes imbalance and represents a weakest-link hypothesis; empirical work should test alternative weights, functional forms, and measurement invariance.

Proposition 1. Digital infrastructure is positively associated with regional market connectivity only when services are affordable and technically interoperable; affordability and interoperability moderate the relationship.

Proposition 2. Human capital and firm-level absorptive capacity mediate the conversion of digital access into innovation, productivity, and cross-border participation.

Proposition 3. Institutional harmonization strengthens the effect of connectivity on regional exchange by reducing legal uncertainty, compliance duplication, and enforcement risk.

Proposition 4. Financial modernization mediates the relationship between digital capability and productive investment through payments, information, capital allocation, and risk sharing; weak consumer protection can offset these benefits.

Proposition 5. Productive investment and digital capability form a feedback loop: Investment expands digital capacity, while capability improves project information and market access and may attract further investment.

Proposition 6. Balanced progress across the five pillars produces complementary gains, whereas a severe shortfall in any pillar constrains the marginal return to advances in the others.

Proposition 7. Regional market integration does not automatically improve social sustainability. Distributional gains are larger where policy protects data and consumers, supports decent work and skills, and reduces affordability and territorial barriers; otherwise, digitalization may widen inequality [7,14,29,37].

4.3.1. Empirical specification and endogeneity

A future panel test can estimate:

$$RMI_{rt} = \alpha_r + \tau_t + \sum \delta_{kl}(P_k \times P_l)_{rt-1} + \theta S_{rt-1} - \gamma R_{rt-1} + \varepsilon_{rt} \quad (2)$$

Where RMI is a regional-market-integration outcome, P denotes the five pillars, S denotes social safeguards, and R denotes risks or exclusions. A second equation should model social outcomes separately rather than assume them from trade or FDI.

Endogeneity can arise from reverse causality (integrated markets attract digital investment), omitted institutional capacity and geography, simultaneous policy adoption, selection into regional initiatives, and measurement error. Credible designs should combine region and time fixed effects with lag structures, event studies around specific interoperability reforms, difference-in-differences where adoption timing is plausibly exogenous, synthetic controls for major regional initiatives, or carefully justified instruments. Dynamic-panel GMM may address persistence but requires instrument-count and validity checks; structural equation models are useful for mediation but do not by themselves establish causality.

5. Discussion

The findings support a multidimensional institutional interpretation of regional integration rather than a technology-only account. Their contribution is not a new average treatment effect; it is an explanation of why reported effects vary across firms, countries, territories, and governance systems. The discussion therefore evaluates each finding against convergent and conflicting literature and identifies the conditions under which it may travel to other regions.

5.1. Interpretation against prior research

Finding 1. Conditional connectivity. The review agrees with trade and digital-economy studies that digitalization can reduce search, information, and coordination costs [2,22,23,30]. It qualifies their broad interpretation: Connectivity is an input, and its conversion into cross-border exchange depends on affordability, skills, interoperability, and enforcement. This conditional claim is consistent with European evidence on institutional and territorial capability [19,20,27] and explains why similar infrastructure can yield different results.

Finding 2. Finance as a conditional mediator. Edo reports positive but regionally varying effects of digital transformation on financial development [17], while mainstream finance emphasizes information production, monitoring, capital allocation, payment, and risk sharing [17,18]. The present framework reconciles these views: Digital finance may strengthen intermediation, yet concentration, opaque scoring, fraud, privacy loss, and unsuitable credit can weaken financial health even when access expands [12–14,26,38,43].

Finding 3. A reciprocal investment channel. Firm-level evidence shows that digital transformation can facilitate cross-regional investment [24], and UNCTAD documents both growth and concentration in digital-economy investment [3,34]. This study extends the one-way investment result by identifying feedback: Productive investment finances infrastructure and capability, while capability reduces information frictions and may attract additional investment. The mechanism should be strongest where incentives produce additional capital, skills transfer, and access for smaller firms.

Finding 4. Distributional effects are conditional. Evidence associating ICT, investment, and institutional quality with lower exclusion [19] coexists with causal evidence that broadband expansion can raise inequality in weak-capability territories [28]. The framework does not choose one result as universally correct. It predicts that affordability, education, geography, consumer and data protection, and decent-work conditions determine whether integration narrows or widens social and territorial gaps.

The seven propositions do not convert heterogeneous studies into causal proof. They specify observable disagreement: Results should vary with affordability, regulatory capacity, safeguards, human capital, market size, and accessibility. The cross-source convergence on conditionality supports the mechanism, while contradictory signs in the social literature define its boundary conditions. This is rather interpretive and not statistical robustness, and the distinction is maintained throughout.

Generalization requires three conditions: A formal cross-border coordination problem, measurable frictions in rules, payments, customs, information, or capability, and sufficiently comparable implementation evidence. Under these conditions, the mechanisms may inform MERCOSUR, the Gulf Cooperation Council, or subnational cross-border regions. The maturity scores themselves should not be transferred because sovereignty arrangements, security constraints, geography, fiscal capacity, and starting levels differ.

5.2. Current regional context and boundary conditions

The EU combines the strongest common rulebook with persistent skills,

investment, and territorial gaps [5,37,39,42]. ASEAN's current trajectory places considerable weight on negotiated interoperability and flexible implementation [31,32]. The EAEU relies more heavily on common public and customs projects within a smaller treaty-based union [9,40]. AfCFTA has embedded inclusive objectives in new protocols but faces the widest infrastructure and capacity dispersion [6–8,10]. These differences confirm that the pillars cannot be implemented in an identical order.

Analytical generalization is therefore strongest for mechanisms and weakest for maturity scores or timelines. Small and landlocked economies may depend more heavily on external infrastructure and standards; fragile or low-capacity states may face a longer implementation chain; and geopolitical fragmentation may turn interoperability into a security trade-off. These cases do not invalidate the framework, but they can alter pillar weights, sequencing, and feasible safeguards.

Alternative methods can deepen the analysis. Network analysis can measure changes in trade, investment, payment, and knowledge links; system dynamics can model delays and feedback [27,28]; qualitative comparative analysis can identify multiple sufficient configurations; and matched case studies can trace how rules become operational. These methods are complementary to panel econometrics because the framework contains both measurable outcomes and institutional processes.

The critical implication is that balance, not maximal digitization, is the relevant policy objective. An expensive infrastructure project can underperform without skills and interoperability; a common rule can remain symbolic without implementation capacity; and rapid digital finance can expand access while weakening consumer welfare. The framework should therefore be read as a sequencing and diagnostic tool, not a universal recipe or forecast.

6. Policy implications and implementation feasibility

The comparative evidence supports a phased portfolio with named accountability. A regional secretariat or commission should coordinate the roadmap and publish the dashboard; national line ministries and customs agencies should implement legal and operational changes; central banks and financial regulators should oversee payment and conduct risks; competition and data-protection authorities should enforce market and rights safeguards; and representatives of firms, workers, consumers, and peripheral territories should participate in evaluation. Financing, milestones, complaint routes, and responsible owners should be agreed before procurement or scaling.

Phase 1 – diagnose and align (0–12 months). Establish a regional implementation unit; map legal incompatibilities, payment and customs bottlenecks, affordability, skills, cyber readiness, and territorial gaps; publish a baseline dashboard; and prioritize two or three corridors or services. This phase is administratively feasible even in lower-capacity settings and prevents capital-intensive projects from preceding rule and capability alignment.

Phase 2 – pilot interoperability (12–36 months). Test mutual recognition of e-signatures or digital identity, interoperable customs documents, and cross-border payment links in bounded corridors. Use regulatory sandboxes, common technical

standards, complaint and incident protocols, independent cybersecurity testing, and procurement rules that prevent vendor lock-in. Development banks can finance shared infrastructure, while national budgets fund legal and supervisory capacity.

Phase 3 – scale with inclusion conditions (36–60 months). Expand successful pilots only after independent performance and distributional evaluation. Tie investment incentives to additional capital expenditure, local skills transfer, open-access obligations, SME participation, and time-limited sunset clauses. Use targeted vouchers or service obligations where affordability, disability, language, gender, age, or remoteness constrains use. Scaling should be corridor-by-corridor or service-by-service, not automatic across the entire bloc.

Safeguards and accountability. Require privacy-by-design, clear consent and data-portability rules, algorithmic auditability for high-impact financial decisions, accessible redress, fraud-loss allocation, cyber-resilience testing, competition review, and decent-work standards for platform-mediated activity. An independent annual review should report implementation failures as well as successes.

Monitoring. Track broadband and device affordability; effective use and digital skills by income, sex, age, disability, and location; customs time and document re-use; cross-border payment cost, speed, and failure rates; SME finance approval, pricing, complaints, and portfolio performance; digital and productive FDI; firm entry and survival; formal employment, earnings quality, and platform-work protections; data breaches, fraud, and consumer redress. B-READY and OECD trade-facilitation indicators can complement, but not replace, regional and distributional measures [35,36].

Decision rule for scaling. Advance a pilot only when it improves the relevant integration measure – such as customs-processing time, document reuse, payment cost, speed, or failure rates – without material deterioration in fraud, complaints, data breaches, exclusion, market concentration, or service affordability. If benefits are concentrated, safeguards fail, or incident-response capacity is inadequate, pause expansion, redesign the instrument, and repeat the evaluation. Region-specific baselines should determine numerical thresholds rather than importing a universal target.

7. Limitations and future research

Methodological limitations are especially important. The review is subject to database coverage, English-language, publication, and author-selection bias; Russian was used only for selected EAEU material. The retained sources differ in units, periods, variables, and identification strategies, so their estimates cannot be pooled. The purposive four-case sample improves institutional contrast but cannot represent all regional arrangements, and unequal documentation may make mature institutions easier to score than emerging ones.

The framework is conceptual and the comparative matrix measures institutional implementation, not welfare effects. It cannot establish causal ordering, estimate complementarity magnitudes, determine optimal pillar weights, or rule out reverse causality, policy simultaneity, omitted capacity, and measurement error. The 0–3 scale also compresses legal and administrative detail and is sensitive to the review cut-off.

Consequently, neither the matrix nor its timelines should be used as a league table or direct forecast for other regions.

Future research should publish the coding log, build a transparent region-year dataset, and test the propositions with panel, spatial, and network methods. Event studies of e-signature recognition, cross-border payment links, digital-trade protocols, or customs interoperability would provide more credible identification than broad digitalization indices. Mediation models should separate finance and investment channels, while distributional analysis should test heterogeneous effects by income, gender, age, firm size, and territory.

Further comparative work should add MERCOSUR, the Gulf Cooperation Council, and selected cross-border subnational regions; use process tracing to examine implementation failures; test alternative geometric and data-driven weights; and assess environmental costs, platform concentration, artificial-intelligence governance, and strategic dependence. The central external-validity question is whether the mechanism architecture remains informative under new governance models and lower-documentation settings.

8. Conclusion

The review answers its three questions conditionally. Digital and investment transformation supports regional market integration through lower information and transaction costs, interoperable rules and services, and improved capital mobilization and innovation. These mechanisms differ across governance models because delegated authority, enforcement, capability, and starting conditions differ. Integration supports social sustainability only when affordability, skills, rights, consumer protection, decent work, and territorial inclusion constrain adverse pathways.

The regional comparison shows different sequences. The EU has the deepest monitoring and common rule architecture but retains skills and territorial gaps. ASEAN combines ambitious interoperability with nationally mediated implementation. The EAEU emphasizes common customs and public digital projects, while AfCFTA is building a legal and payment architecture across exceptionally heterogeneous economies. None provides evidence that technology alone produces convergence.

The demonstrated novelty lies in what prior streams do not provide separately. Trade studies identify exchange-cost effects, finance studies identify intermediation, investment studies identify firm responses, regional studies identify place-based capability, and policy documents identify formal instruments. This study co-specifies those elements as five enabling constructs, three mediating mechanisms, explicit moderators and risks, two distinct outcome families, feedback loops, seven testable propositions, and one common cross-bloc implementation protocol.

For policymakers, the practical implication is a decision sequence rather than a general call for digitalization: Diagnose the binding institutional and capability constraint; pilot a bounded interoperability reform; measure integration and distributional outcomes together; scale only when safeguards and incident-response capacity work; and pause or redesign when harms rise or benefits remain concentrated. Regional digital integration is sustainable only when its institutional and social

foundations develop with its technical capacity.

Author contributions: Conceptualization, KT; methodology, KT; software, KT; validation, KT and AS; formal analysis, KT; investigation, KT; resources, KT; data curation, AS; writing—original draft preparation, KT and AS; writing—review and editing, AS; visualization, AS; supervision, KT; project administration, KT; funding acquisition, AS. Both authors have read and agreed to the published version of the manuscript.

Funding: None.

Ethical approval: Not applicable.

Informed consent statement: Not applicable.

Artificial intelligence disclosure: In preparing the revised manuscript, the authors used OpenAI ChatGPT to assist with language editing, reorganization, drafting alternatives for the conceptual framework, and reference organization. The authors independently selected and verified the sources, evaluated the arguments, reviewed and edited the AI-assisted text, approved the analysis and conclusions, and take full responsibility for the content of the publication. The AI tool was not used to generate hypotheses, analyze data, or derive conclusions. All conceptual development, analysis, and final responsibility for the content remain with the authors.

Conflict of interest: The authors declare no conflict of interest.

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