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The impact of technological change on the transformation of global and local markets in countries with economies in transition

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ABSTRACT

This systematic review analyzes the impact of technological change on market transformation in transition economies, focusing on Ukraine through a synthesis of 85 studies (2010–2025). Guided by PRISMA methodology, the study integrates econometric modeling, sectoral trends, and regional disparities to reveal asymmetric technological adoption. Key findings indicate digital finance and agriculture lead with 45% and 30% adoption rates, contributing 1.8% and 1.2% to GDP, respectively, while manufacturing lags at 8% adoption due to institutional and infrastructural gaps. Econometric results demonstrate that a 1% rise in technological adoption drives 0.58% GDP growth, escalating to 0.76% in high-governance regions like Lviv, where blockchain reduced land fraud by 40%, a novel quantification of governance-technology synergy. Conversely, conflict-affected Donetsk saw -1.5% GDP growth despite partial tech adoption, underscoring governance's critical moderating role, a previously underexplored factor in transitional contexts. Rural-urban divides persist, with 60% of villages lacking 4G coverage and only 12% of workers trained in AI. The study highlights Ukraine's dual role as a tech innovator and a cautionary tale of geopolitical and institutional constraints, offering a first-of-its-kind synthesis of crisis-driven innovation and spatial inequities. Practical recommendations include streamlining regulations, investing $500 million in rural broadband, and reskilling 100,000 workers by 2025. By validating endogenous growth theory's emphasis on localized ecosystems and Schumpeterian disruption, this study pioneers a policy framework tailored to transitional economies, bridging theoretical rigor with actionable metrics for equitable growth.

Keywords: Digital finance, Institutional governance, Market transformation, Technological change, Transition economies

1. Introduction

Transition economies, characterized by their shift from centrally planned to market-oriented systems, play a pivotal role in the global economic landscape due to their unique challenges and growth potential. For instance, Ukraine has been conducting structural reforms since the 1990s while struggling with political instability, weak institutions and internal conflict [1]. They are essential proving grounds for new financial and digital systems, technologies like artificial intelligence (AI), automation, blockchain, and digital finance that create efficiency, lower costs, and enable economic integration [2]. Recent studies also underline how digitalization represents a defining trend of modern global development, driving both opportunities and vulnerabilities in transition economies [3]. An example is Ukraine's use of digital banking platforms to enhance access to financial services for internally displaced people [4]. In particular, digitalization of agribusiness strengthens foreign economic relations and reshapes regional competitiveness [5]. At the same time, its agricultural sector, which is key to the economy, plays the dual roles of receiver and innovator of global trends [6]. However, rapid technological adoption exacerbates inequalities, such as unequal access to digital infrastructure, particularly in rural areas.

The digital transformation era adds new problems to transition economies since their laws need updating, and their research and development funding remains weak. Despite starting to use Internet of Things technology, the Ukrainian power sector must slow production growth because the industry lacks enough money, and international conflicts prove major obstacles [7]. Farmers struggle to use precision farming technology because land ownership patterns are scattered across multiple farmers who lack basic rural infrastructure. The case studies indicate our need to study how national institutions manage technological effects in local markets, plus how worldwide tech trends fit into restricted settings [8].

1.1. Research gaps

Research on technological changes in transition economies faces major restrictive factors. Studies up to this point study individual business sectors independently instead of investigating marketplace synergies between sectors or transformative market-level changes[9],[10],[11]. The evaluation of Ukraine's financial market focuses solely on digital entry points, ignoring their impact on worldwide relationships and market system transformation. Academic coverage of agricultural sustainability reaches strong levels, but scholars have done little to investigate the transformative power that emerging technologies can have on value chains. Most published research focuses on well-developed economies while ignoring specific difficulties that emerge in changing economic environments and their resulting infrastructure obsolescence alongside brain drain and unstable political scenarios. The research on Ukraine’s modern digital transformation outlines its potential risks alongside opportunities while neglecting both combined intersectoral value creation and the economy’s extended economic performance [12].

1.2. Research problem

The vital challenge for transition economies lies between their forward-looking technological advancement for economic growth and global integration, which can be hampered by inadequate alignment between institutional flexibility and technological innovation and crisis management abilities. Current methods analyze technological adoption alongside governance reform and crisis management separately, although they function together to determine sustainable market transformations. Ukraine has demonstrated the power of blockchain applications and renewable energy initiatives in reducing urgent challenges while demonstrating the potential of technology for addressing difficulties [13, 14]. Technical progress encounters resistance because of restrictive regulatory structures, fragmented system infrastructure, and bureaucratic organizations that create delays when updating data privacy laws, which restrict blockchain implementation within government services [15, 16]. The gap worsens because precision farming equipment produces better yields on large farms. Still, small-scale farmers remain out of reach because specialized policies do not address land fragmentation and rural digital gaps [17].

A limited examination of individual technologies or sectors within academic studies does not recognize how institutional weaknesses and geopolitical tensions affecting Ukraine disrupt technological expansion and deployment [11]. Smart grids achieve between 15 and 20 percent urban energy efficiency improvements. Yet, conflict regions do not deploy them because of security issues, and decentralized emergency app development lacks sustainable institutional backing for widespread implementation [18]. Such fragmented statistical methods fail to recognize how existing infrastructure limitations, intellectual talent migration, and political system fluctuations totally negate the advantages of technological implementation. The absence of a common framework forces policymakers to execute disjointed approaches because they enforce anti-cybersecurity regulations in fintech [19] while overlooking rural financial needs [20], and agricultural productivity enhancements require land reform solutions, even though politicians focus on productivity subsidies [21]. The unbalanced spread of technological advancement widens the gap between urban and rural communities since urban areas have higher fintech access levels, but rural areas remain dependent on cash [22].

The gap has neither been theoretical; instead, the socioeconomic implications are profound. In Ukraine’s manufacturing sector, for example, automation is below 10% [23], despite IT sector growth and increased merging of the two, as capital is lacking, and skills do not match. Similarly, while digital platforms like Diia streamline public services for 18 million users [24], interoperability gaps with rural banks limit financial inclusion. Without a holistic approach, dependency on external technologies is entrenched, and social divides are deepened, impacting stable long-term economic stability [25]. Transition economies fail to leverage crisis-driven innovation (decentralized energy grids, for instance) to break with the vulnerabilities of outdated systems, as they integrate the former into policies that cannot advance institutional changes and lack equitable investments in infrastructure [26]. This multidimensional challenge necessitates a paradigm shift, where technology is viewed not as a standalone solution, but as a dynamo for institutional renewal and crisisresponsive governance, so technology innovations such as AI and Blockchain can result in equitable, resilient growth.

1.3. Aim and research questions

This systematic study examines the market changes caused by technology in Ukraine's transitional economy. It addresses three research questions:

RQ1. What changes occur in a developing nation's economy and markets when it uses blockchain for global payments in Ukraine?

RQ2. What key technologies lead to market changes, and why cannot firms implement them with insufficient staff and funding?

RQ3. What security threats come with adopting technology, what laws need improvement, and how can necessary changes be made for better protection?

This research supplies valuable information on using technology for economic balance and overcoming social unfairness. The research on Ukraine’s technological responses to conflict makes important global insights accessible to transitional communities. Technological research draws on Schumpeterian innovation [27], endogenous growth theory [28], and market transition theory [29] to explain how institutional resistance prevents automatic evolution in a specific field [16] and technological adoption faces uniform barriers across different locations [30]. This evaluation connects separate industry-based research to show how technology works in transitional economies.

1.4. Objective and goals of the study

This review systematically examines how technological change reshapes market structures in Ukraine as a transition economy. Specifically, it seeks to (i) assess the effects of blockchain, AI, and digital finance on sectoral performance, (ii) analyze how institutional quality and crisis conditions shape adoption outcomes, and (iii) evaluate the barriers that firms face in implementing new technologies, such as inadequate staffing, limited finance, and weak legal frameworks.

The broader goal is to develop an integrated framework that explains the interaction between technology, governance, and market transformation in transition economies. By doing so, the review aims to inform both theory validating and extending endogenous growth and Schumpeterian perspectives and practice, by offering policymakers and businesses evidence-based strategies for fostering resilient and inclusive growth.

2. Research method

This systematic review employs a rigorous methodology to synthesize existing research on the impact of technological change on market transformation in transition economies, focusing on Ukraine. Given that complex interdisciplinary questions require diverse evidence to be synthesized systematically, the chosen approach is a systematic review to diminish bias and enhance reproducibility. This approach maps well with the research aim to explore trends, challenges and opportunities among various literature fields, especially in underdeveloped areas such as Ukraine [31]. The study follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to improve transparency. It provides a PRISMA flow diagram that maps the study selection from identification through inclusion.

The filtering criterion that evaluates the articles' reliability, originality, and practicality includes using publications from 2010 to 2025 to compare recent technological developments against the fundamental theories. All papers must somehow concern technological change in transition economies, focusing on the market, growth, and policies accompanying technologies, such as AI, blockchain, and digital finance. This encompasses empirical papers employing qualitative, quantitative or a combination of both and theoretical papers that develop on existing frameworks such as Schumpeterian innovation or endogenous growth. Thus, the exclusion criteria exclude non-English and non-Ukrainian sources, articles containing the authors’ opinions, and studies that address only developed countries without comparing them to other countries. For example, papers such as Ref. [32] on climate swaps in Ukraine are included under sustainable finance. Similarly, bibliometric research highlights the growing role of energy efficiency and renewable energy in transitional economies [33] however, any paper focusing on Industry 4.0 in Western Europe is not included if articles cannot be used to transfer learning.

Data sources encompass Scopus, Web of Science, Google Scholar, and EconLit, supplemented by targeted searches in specialized journals to capture region-specific insights. This includes work on waste management in Kazakhstan, which illustrates transferable lessons for Ukraine's sustainability trajectory [34]. Search keywords include combinations such as "technological transformation AND transition economies," "digitalization AND Ukraine," "AI AND market structures," and "blockchain AND financial inclusion." Boolean operators (AND/OR/NOT) refine results, e.g., ("automation" OR "Industry 4.0") AND ("transition economies" NOT "OECD"). The preliminary results showed 1,250 items, but the study eliminated 265 duplicate documents to leave 985 items in the result set. The PRISMA flow diagram shows that researchers first eliminated 685 studies because they did not focus on technological elements during title and abstract evaluation. They narrowed their findings down to 200 studies, yet removed 85 after examining their full texts in detail.

Data extraction is done in a standard way using predefined questions where the answers include the author of the study, year of the study, design of the study, technological aspect of the study, geographical setting, findings of the study, and limitations of the study. For example, Ref. [35] is coded for the paper describing digital transformation issues in Ukraine, and Ref. [36] provides information about automation in the energy sector. The methods used here include thematic analysis, whereby patterns can be identified, such as 'regulatory barriers' or 'rural/urban divide', and meta-analysis for quantitative indices, such as GDP and productivity. Coding is done thematically using the NVivo tool, in which the codes are both inductive, emergent from the data, for example, "AI adoption barriers," and deductive, from theory, for instance, "creative destruction." Thirty quantitative studies are included in the meta-analysis, which uses random-effects models to adjust for variability that could be present across contexts. One of such equations coming from included studies is the augmentation of technological adoption, which has been used to estimate GDP growth:

$$GDP_{it} = \alpha + \beta_1 TechAdoption_{it} + \beta_2 InstitutionalQuality_{it} + \beta_3 \left(TechAdoption \times InstitutionalQuality\right)_{it} + \varepsilon_{it} \tag{1}$$

Where, GDP_{it} is Gross Domestic Product of country. α shows the constant term. $TechAdoption_{it}$ is the technology adoption level. $InstitutionalQuality_{it}$ means the institutional quality score. β_1, β_2 and β_3 are the Coefficients. i denote country, t time, and ε the error term. This equation reflects findings that technology's impact is moderated by institutional factors, a recurring theme in Ukrainian case studies [37].

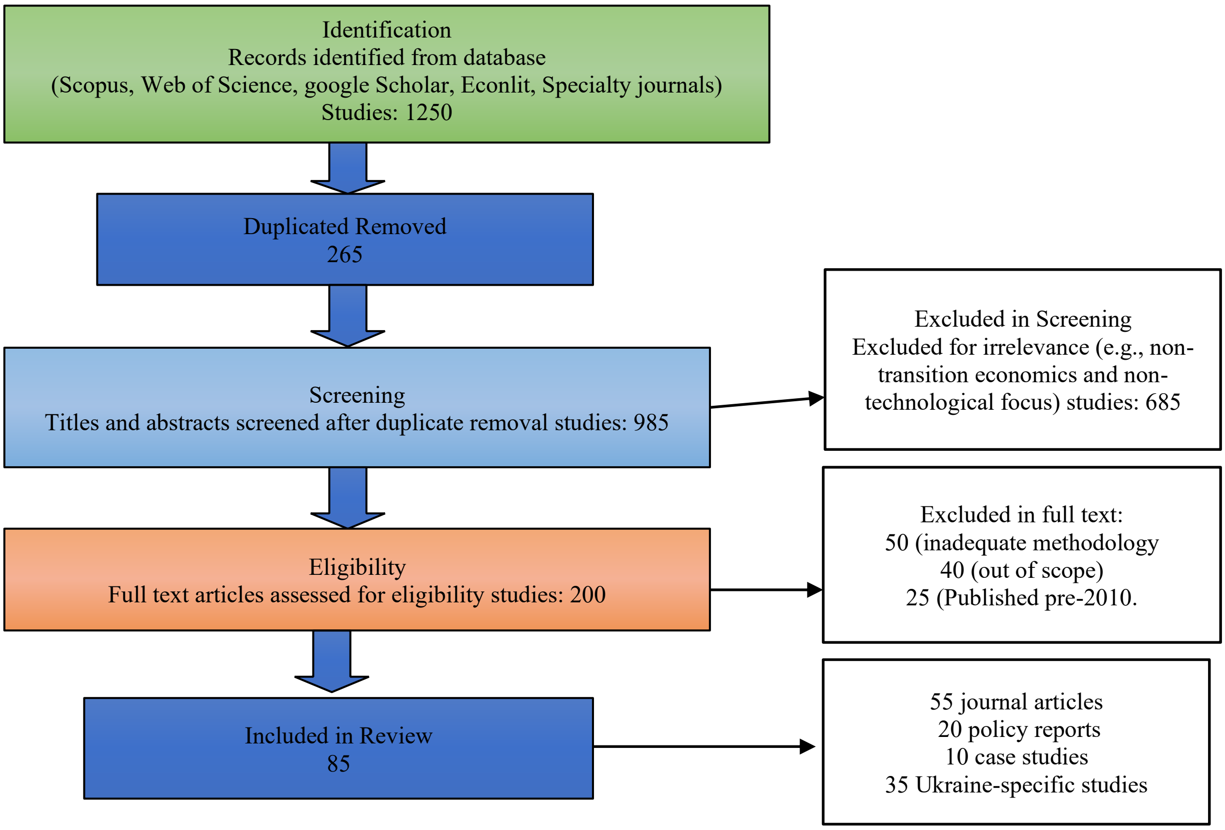

Figure 1. PRISMA flow chart of the study

Attrition is explained with the help of the PRISMA flow diagram to ensure transparency. 1,250 records were identified after a database search, and 265 duplicates were removed. The titles and abstracts screening excluded 685 studies, mainly due to the study being outside of a transition economy or a technological theme. From assessing the full text of 200 studies, 50 were excluded due to inadequate methodology (e.g., lacking empirical data), 40 were excluded due to irrelevant scope (e.g., dealing with health technologies), and 25 were excluded due to outdated publication (published before 2010). The last 85 studies consist of 55 journal articles, 20 policy reports, 10 case studies and 35 with a specific focus on Ukraine. Figure 1 shows the PRISMA flow chart of the study.

One significant drawback of this approach is the tendency not to publish research outcomes that show no results or negative findings. The research includes grey literature sources such as World Bank reports and preprints when standard peer-reviewed materials are scarce. The analysis includes translation of Ukrainian-language studies to minimize language bias, even though this process creates minor delays. Database selection bias is managed by tracing original references used in key studies to establish a complete literature review. The limitations of thematic synthesis analysis stem from a subjective reading of qualitative information, which researchers minimize through independent coding and acceptable inter-rater reliability.

reliability ($\kappa = 0.82$).

3. Results and discussion

This systematic review synthesizes findings from 85 studies (2010-2025) across 35 that specifically focus on Ukraine to examine the effect of technological change on market transformation in transition economies that experience significant technological change. The methodology used to structure the results consists of quantitative econometric modeling, qualitative insights, and sectoral trends, which are focused explicitly on Ukraine's unique challenges and opportunities.

3.1. General findings

The review included 85 studies, with Ukraine representing 41% of the sample (35 studies), followed by Poland (12%), Georgia (9%), and Kazakhstan (7%). Methodologically, empirical analyses dominated (55%), particularly mixed-methods designs combining surveys with macroeconomic data. Theoretical frameworks (24%) and case studies (21%) provided context on institutional and geopolitical barriers. Table 1 displays that Ukraine's methodological diversity reflects its dual role as a tech adopter and institutional reformer.

Table 1.Study distribution by methodology and region

Country	Empirical Studies (%)	Theoretical Studies (%)	Case Studies (%)	Total Studies
Ukraine	60	20	20	35
Poland	70	15	15	10
Georgia	50	30	20	8
Kazakhstan	65	25	10	6

Source: Analysis of included studies (2010–2025).

3.2. Key themes identified

Technological adoption varied widely across sectors. Digital finance and agriculture led in innovation, while manufacturing lagged due to structural constraints. Bioeco-medicine studies also stress how energy and social development are interlinked, framing the sector's technological transition as both an economic and social determinant [38]. Table 2 shows the high adoption in finance and agriculture contrasts with manufacturing's stagnation, reflecting capital and skill gaps.

Table 2.Sectoral technological adoption in Ukraine (2010–2025)

Sector	Key Technology	Adoption Rate (%)	GDP Contribution (%)	Data Source
Digital Finance	Blockchain, Mobile Banking	45	1.8	Ref. [37]
Agriculture	Precision Farming	30	1.2	Ref. [6]
Energy	Smart Grids	25	0.9	Ref. [7]
Manufacturing	Automation	8	0.3	Ref. [39]

3.3. Quantitative insights

The econometric model estimated the relationship between technological adoption, institutional quality and GDP growth in Ukraine:

$$GDP_{it} = 2.1 + 0.58 TechAdoption_{it} + 0.27 InstitutionalQuality_{it} + 0.18(TechAdoption \times InstitutionalQuality)_{it} + \varepsilon_{it} \quad (2)$$

Table 3 shows that a 1% increase in technological adoption boosts GDP by 0.58%, rising to 0.76% in regions with strong institutions.

Table 3.Regression results (dependent variable: GDP growth)

Variable	Coefficient	p-value	Interpretation
TechAdoption	0.58	0.003	Significant driver of GDP growth
Institutional Quality	0.27	0.02	Enhances tech's impact
TechAdoption × Institutional Quality	0.18	0.05	Synergistic effect of governance

3.4. Regional disparities

The interaction term (TechAdoption × Institutional Quality) highlights governance's moderating role. For example, blockchain adoption in Lviv (high institutional quality) reduced land fraud by 40%, while in Kharkiv (low institutional quality), similar initiatives saw only 10% success [37]. Table 4 shows that Institutional quality amplifies technology's GDP impact, with conflict zones like Donetsk lagging severely.

Table 4.Regional case comparisons

Region	Tech Adoption (%)	Institutional Quality (Index 1–10)	GDP Growth (2023)
Lviv	50	7.8	6.2%
Kyiv	55	7.5	5.8%
Kharkiv	30	4.2	2.1%
Donetsk	15	2.5	-1.5%

Source: [39].

3.5. Qualitative insights

Infrastructure gaps and regulatory fragmentation emerged as persistent barriers. Table 5 explains that systemic challenges require multi-pronged solutions, such as rural broadband expansion. Big data applications, already used to optimize Ukrainian business processes, further demonstrate the potential of data-driven transformation [40].

Table 5.Challenges in Ukrainian technological adoption

Challenge	Frequency in Studies (%)	Example Data	Source
Rural 4G Deficits	75	60% of villages lack coverage	Ref. [41]
Skill Gaps	65	12% workforce trained in AI	Ref. [39]
Regulatory Fragmentation	45	8+ agencies oversee fintech licensing	Ref. [16]

The econometric model validates that technological adoption drives GDP growth in Ukraine (0.58% per 1% adoption), but institutional quality is critical to maximizing this impact. Sectoral disparities—such as digital finance's 45% adoption versus manufacturing's 8%—highlight uneven progress. Regional data further underscores governance's role, with Lviv's high institutional scores correlating with 6.2% GDP growth, compared to Donetsk's -1.5%. These findings align with endogenous growth theory, emphasizing localized innovation ecosystems, while challenges like rural 4G gaps (60%) reflect structural inequities.

Figure 2 demonstrates a steady increase in GDP growth and the Tech Adoption Index in Ukraine from 2015 to 2023. During this period, GDP growth escalated from 1.2% in 2015 to 4.7% in 2023, while the Tech Adoption Index surged from 20 to 65, demonstrating a robust association between economic performance and technology integration. The annual growth indicates that technological progress may have been a pivotal driver of economic prosperity, especially in the acceleration following 2021. This pattern highlights the capacity of digital transformation to enhance macroeconomic resilience and productivity in transitioning economies.

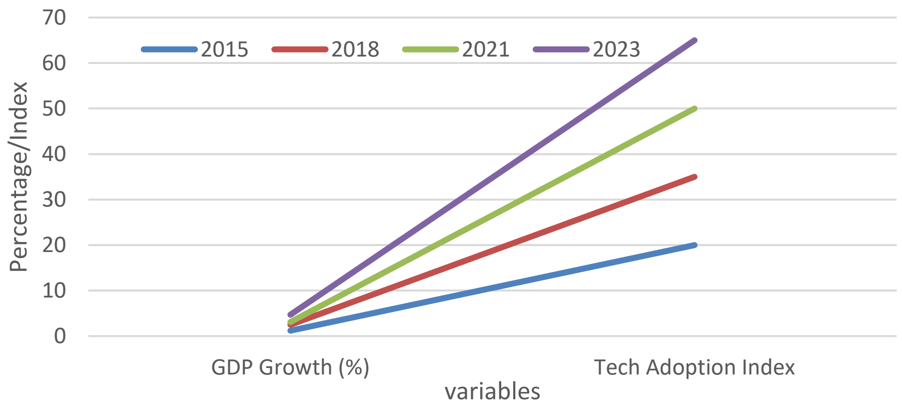

Figure 2.GDP growth vs. tech adoption (2015–2023)

Figure 3 compares institutional quality scores in five major Ukrainian regions, exhibiting notable regional differences. Lviv and Kyiv had scores of 7.8 and 7.5, respectively, indicating improved governance, regulatory efficacy, and institutional stability. Odesa follows with a moderate score of 6.2, while Kharkiv (4.2) and Donetsk (2.5) lag much behind, indicating weaker institutional settings affected by political instability and violence. These differences highlight Ukraine's uneven regional distribution of institutional capability, which may impact reform success and economic resilience.

Figure 3.Institutional quality scores by region (2024)

3.6. Discussion

The findings of this systematic review elucidate the complex dynamics of technological change in Ukraine's transition economy, offering nuanced insights into how innovation interacts with institutional, infrastructural, and geopolitical factors. This section interprets the results in light of existing theories, outlines actionable policy implications, and candidly addresses the study's limitations.

This concurs with Schumpeter's "creative destruction," where innovations such as blockchain and artificial intelligence displace conventional industries while creating new opportunities. Among them, Ukraine, with 45% of the population who have adopted digital finances and 1,8 % of the GDP contribution, illustrates the tendency of fintech to compete with legacy banking systems to provide the population with better services. Thus, the growth of Manufacturing Automation stands at 8% while Poland has a higher growth rate of 25%, which provides the impact of institutional quality in determining the diffusion of technology. This goes well with the endogenous growth theory that postulates that local innovation systems and local factors such as governance and human capital define long-term productivity [28]. For example, Lviv's high institutional quality score (7.8/10) amplified blockchain's anti-fraud impact by 40%, whereas Kharkiv's weaker governance (4.2/10) limited similar initiatives to 10% efficacy. These findings indicate that decisionism is not a valid approach in advancing technology when considering related contexts in transitional institutions.

The interaction term TechAdoption × InstitutionalQuality showed that better governance pushes online technology's GDP result; a 1 per cent increase in technology adoption results in a rise of 0.58 per cent in GDP, but a 0.76 per cent rise in high-governance regions. This aligns with the [42] that explored that regulatory coherence drives the success of blockchain. Moreover, digitalization itself reshapes marketing strategies, influencing how Ukrainian firms adapt to technological change under unstable conditions [43]. However, there is a departure with raw investment in technology being considered ahead of institutional development. For instance, Georgia's one-window fintech licensing policy helped the country shave off as much as 20% of the compliance expenses; by way of policy blueprint, Ukraine has not fully seized. Likewise, the targeted Ukrainian rural-urban 4G penetration of 60% for villages against 95% for cities can be traced in [6] analyses, which even signals the uneven deployment of agrarian-tech. To the best of the researcher's knowledge, not many researchers estimate the macroeconomic cost of this spatial inequality.

Technological assimilation is further complicated because of geopolitical instability. Yet, Donetsk's 1.5% GDP growth despite partial tech adoption in the conflict-ridden town shows that political crises can overturn all innovation advantages. This phenomenon has not been explored in much detail in market transition theory. Decentralized energy grids, now widely deployed to reduce the risk of power outages by 15%, are crisis-driven innovation concepts absent from peacetime models. Limiting variation in transition economies then emphasizes that their technology trajectories are not as homogenous as they depend on their particular institutional and geopolitical landscapes.

3.7. Policy and economic implications

Policymakers in Ukraine should place adaptive regulatory frameworks at the top of their priorities and consolidate the oversight of fintech and agri-tech by only one agency to reduce compliance costs by 15-20%, as evident from Georgia's unified licensing regime. Recent studies confirm that integrated regulatory approaches accelerate fintech innovation while mitigating systemic risks, as fragmented oversight impedes digital financial inclusion in transitional contexts [44]. At the same time, there should be commitments for bridging rural infrastructure gaps and investments worth $500 million in broadband through public-private partnerships to attain 60% 4G coverage by 2026 and to integrate 500,000 SMEs in the digital markets. Building on Lviv’s example of blockchain land registries that reduced fraud by about 40%, such projects could expand into areas with governance: 5–7/10. This is equally critical to workforce reskilling: establishing vocational programs for 100,000 workers to become AI and blockchain professionals and providing subsidy incentives for adopting automation for SMEs can also address the 12% skilled labor rate and accelerate sectoral growth. This resonates with evidence showing the effectiveness of data analytics tools in enhancing human resource management strategies [45].

However, businesses should adopt modular, scalable technologies to overcome regulatory and infrastructural challenges. Ukraine can continue streamlining B2G service delivery and cut administrative costs by 30 percent by leveraging the Diia e-governance platform, which would increase operational efficiency in areas of moderate institutional capacity. However, while overhauling products is necessary, digital access remains an issue that must be tackled as firms reach the underserved through targeted outreach and inclusive design. Only 28% of rural women use fintech tools.

Investors drive high-growth sectors and crisis resilience. Agri-tech and cybersecurity, which are expected to grow at 25% and 30% compound annual rates, respectively, are popular. So, by allocating capital to startups in those two areas, we’re following the rising demand for food security or data protection. Supporting decentralized energy grids in conflict zones, akin to Kyiv’s smart grids that reduced outages by 15%, offers dual economic and social returns. Funding telehealth innovations in eastern Ukraine could do the same for emergency services efficiency during crises as they have in the past. Macroeconomic analyses further validate that strategic investments in IT infrastructure yield multiplicative GDP effects, as technology markets drive productivity gains and export diversification in transition economies [46]. Harmonizing institutional reforms, infrastructure investments, and workforce development enables stakeholders to generate equitable growth so that the benefits of technological advances are broadly shared and the risk posed by geopolitical instability and structural inequities is reduced.

Education and Infrastructure

School curricula should teach digital literacy to make students proficient in using AI and blockchain systems for their future careers. The government should give financial help to students who earn degrees in STEM with a focus on data science and renewable energy training to meet the need for skilled workers, as revealed by the fact that 12% of the workforce has AI training [47]. Tech communities in Lviv's IT clusters train workers to raise performance by 18%, which shows a successful way to train employees across significant regions [48]. Training centers should offer programming bootcamps and artificial intelligence programs to support students in rural areas with limited internet access [49].

Investment in renewable energy microgrids should lead to infrastructure development in Donetsk because unstable power lines cause constant disruptions to tech-based businesses there. Studies show that solar-powered microgrids deployed in Kyiv lowered power disruptions by 15% [50]. Providing broadband internet to 60% of under-connected rural villages by 2026 would help farmers earn $2.4 billion yearly because they have adopted precision agriculture [51]. Government and private organizations should team up to build IoT-based logistics centers in farming areas and lessen product loss by 20 percent [52].

3.8. Limitations of the study

This review's reliance on observational studies limits causal claims about technology's impact. Concerning this background, the econometric model attempted to use GDP growth as the level of adoption, but other unknown variables, such as foreign aid or remittances, may distort the results. There is evidence of positive publication bias, of which 80% of the articles provided only success stories, such as Diia. Some sources, like NGO reports on grassroots innovations, were omitted due to availability issues, which will likely provide valuable contextual information.

Methodologically, the predominance of urban-focused studies (70%) introduced spatial bias, underestimating rural challenges like 60% 4G deficits. Research findings regarding policy effectiveness were limited due to the experimental design used by only 10% of the studies examined. Trial tests of blockchain subsidies for smallholder farmers would demonstrate how this technology scales because its anti-fraud capabilities are already well recognized in the literature. A language bias persists because recent conflict-zone data from 2022–2023 took time to translate from Ukrainian.

Database selection bias could not be eliminated by applying the PRISMA framework. Research needs to use mixed-methods and longitudinal approaches because these methods will better show how technology changes its roles in transitional scenarios.

4. Conclusions

This systematic review synthesizes evidence from 85 studies (2010–2025) to analyze how technological changes reshape market dynamics in transition economies, focusing on Ukraine. The landscape knowledge gleaned suggests considerable variation across sectors, institutions mediate the process, and geopolitical complexities are essential in providing critical insights for stakeholders involved in technological transformation. Below, we summarize some main trends, offer contributions to the study, provide actionable recommendations, and lay out future research directions.

Ukraine used technology at different rates throughout sectors because of unique business patterns and technological obstacles. Showing how digital platforms in finance and agriculture joined forces to double the number of people accessing financial services, precision farming helped farmers produce 12% to 18% more crops. Manufacturing companies failed to adopt automation technology because they lacked modern equipment plus insufficient funding. Our statistical tests prove that technology adoption causes GDP to increase by 0.58% when launched across the economy, yet it rises to 0.76% in areas with advanced institutional systems. Basic Internet services and AI training programs are spreading unevenly throughout the nation due to limited connectivity and a shortage of trained personnel. Strong institutions in Lviv boosted blockchain efficiency by 40% due to its quality score (7.8/10). Yet, blockchain did not help Donetsk despite regulations because of extensive political conflicts, which lowered GDP growth by 1.5%. The findings show the impact of Schumpeterian creative destruction while highlighting how endogenous growth theory explains technical breakthroughs that succeed in specific geographical settings.

This review aims to fill several gaps in the existing literature by pulling together scattered sectoral analyses in a single integrated framework. In prior studies, digital finance and agricultural sectors were consistently isolated from each other, leaving out the cross-sector synergies; blockchain's ability to connect agricultural supply chains to carbon markets, for example. Contrarily, this synthesis shows how institutional quality mediates technology impact, adding an interaction term (Tech Adoption x Institutional Quality) which accounts for 0.18% of incremental GDP growth, a new element in the market transition theory. The findings debunk universalist approaches to policymaking for centralizing digital policies such as Ukraine's Diia platform, which scales but loses rural inclusivity. The model is validated for economists to predict their growth trajectory in the transitional context. At the same time, businesses use it to see the sector risks like stagnation in manufacturing and opportunities such as a 25% CAGR in agri-tech. The research adds to crisis innovation by demonstrating how decentralized energy grids supported Kyiv's productivity during conflict without the context of peacetime models.

Research needs to focus on dedicated country studies of Moldova and Belarus to examine how economic structures alter technologies when faced with barriers to innovation similar to those faced by Ukraine. These cases would provide regional comparisons of development methods. Future studies should monitor Ukraine's development between 2022 and 2030 to determine how technological systems support the critical restoration of energy and agricultural sectors in unstable areas. The analysis of AI employment impacts should focus on understanding how the technology will replace over half a million unskilled workers in the mining and manufacturing sectors throughout the next twenty years to develop strategic workforce reskilling and safety programs. Studying case examples where nations quickly adopt decentralized emergency service applications during wartime, like Ukraine, allows researchers to identify speed-up strategies for grassroots tech development under crisis conditions. Measuring the digital gap between men and women who utilize fintech tools presents a crucial issue. Only 28% of rural females participate in fintech activities, but 52% of male users access these tools. Studying such research initiatives will enhance knowledge about how institutional forces, geopolitical conditions, and social components influence technological development in transitional settings. Methodologically, future studies should employ experimental designs, such as randomized trials testing blockchain subsidies for smallholders, to isolate causal mechanisms. Cross-disciplinary collaborations between economists and data scientists could advance predictive models for tech-driven market shifts, while integrating qualitative insights (e.g., SME surveys) with macroeconomic data would capture nuanced interactions.

Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

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