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Abstract Book

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Big Data-Driven Industrial Policy for Green Economy: An Integrative Literature Review and Conceptual Framework

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Abstract

The increasing urgency of climate change, coupled with the rapid advancement of digital technologies, is reshaping the global industrial policy landscape. Among these technologies, big data analytics has emerged as a key enabler of green economy strategies, offering new possibilities for designing sustainable, resilient, and inclusive industrial policies. This paper aims to provide an integrative literature review and propose a conceptual framework that illustrates how big data analytics can inform and enhance industrial policies aimed at green economic development. Drawing on interdisciplinary sources—including industrial policy studies, environmental economics, and data science—the paper synthesizes key theoretical contributions published between 2010 and 2025. The review reveals that while the literature on big data analytics and green economy initiatives is extensive, there remains a significant gap regarding their integration into coherent industrial policy frameworks. Current studies tend to focus either on technological potentials of big data or on policy instruments for green development, without adequately addressing how big data can systematically support industrial policy design and implementation for sustainability goals. The conceptual framework developed in this paper identifies three key domains where big data analytics can support green industrial policy: (1) monitoring and measuring sustainability performance, through advanced data-driven tracking of carbon emissions, energy consumption, and resource efficiency; (2) informing evidence-based policy design, by enabling real-time analysis of industrial activity, market trends, and environmental impacts; and (3) enhancing policy adaptability and resilience, by providing predictive analytics that help policymakers anticipate environmental and economic disruptions. This framework contributes to the literature by bridging the gap between big data capabilities and industrial policy objectives in the context of green economy transitions. It highlights the need for integrated approaches where technological tools are systematically embedded in policy cycles—from problem diagnosis to policy evaluation. Furthermore, the

paper outlines key research questions for future studies, such as: How can big data governance challenges (e.g., data privacy, security, and equity) be addressed in the context of green industrial policy? What institutional capacities are required for effective integration of big data analytics into industrial policy processes in emerging and developing economies? By offering both a synthesis of existing knowledge and a practical conceptual model, this study seeks to provide guidance for researchers and policymakers designing industrial strategies in an era marked by climate change, technological transformation, and global economic uncertainty.

Keywords: Big Data Analytics, Industrial Policy, Green Economy, Sustainable Development, Conceptual Framework, Policy Design

Time-Varying Impacts of Renewable and Fossil-Based Generation on Electricity Market Imbalances in Türkiye

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Abstract

This study investigates the quantile-dependent effects of intermittent, dispatchable, fossil-based generation and system losses on net imbalance in the Turkish electricity market. The analysis uses hourly data spanning from 01.01.2021 to 31.05.2025, providing 24 observations per day. To capture the dynamic relationship between generation types and system balance across varying demand levels, the study focuses on selected representative hours (03:00, 08:00, 13:00, 19:00, and 22:00), corresponding to off-peak, morning ramp, midday peak, evening ramp, and late evening periods, as identified in the existing literature. Using quantile regression, the results reveal significant temporal heterogeneity in how generation types impact net imbalance. Dispatchable generation consistently reduces net imbalance across all hours and quantiles, affirming its essential role in maintaining system stability. Likewise, fossil-based generation exerts a uniformly negative and statistically significant effect, though with smaller magnitudes, reflecting its supporting role in real-time balancing.

In contrast, intermittent generation displays a clear time-asymmetric effect. At 03:00 and 22:00, it is positively and significantly associated with net imbalance across most quantiles, indicating that output from wind and run-of-river sources during low-demand periods may exacerbate system imbalances due to variability and limited controllability. Conversely, at 08:00 and 13:00, the impact becomes negative and significant, particularly in higher quantiles, suggesting improved alignment with daytime demand and enhanced system absorption. By 19:00, the effect turns positive again, likely due to oversupply or reduced flexibility during the evening ramp. System losses exhibit mixed effects: while often negative and significant during high-flow hours, indicating a buffering effect against excess supply, their overall influence varies across hours and quantiles.

These findings emphasize the importance of time-sensitive operational strategies and reinforce the value of dispatchable capacity in complementing renewable integration. Policymakers

should account for the hourly and quantile-specific dynamics of different generation sources and prioritize flexibility tools—such as storage, demand response, and real-time balancing capabilities—to mitigate imbalance risks in a high-renewables future.

Keywords: Electricity Markets, Energy Security, Financial Markets and Institutions, Financial Modelling

Logistics 5.0 Vision: Human-centered, Flexible, and Digital Supply Systems in Economic Planning

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Abstract

Industrial policies are multi-layered strategic domains that encompass not only changes in production technologies but also the transformation of the logistical systems that enable these production processes. With Industry 4.0, digitalization, automation, and data-driven processes brought a significant leap in logistics; however, with Industry 5.0, this transformation has been expanded to include dimensions such as human centricity, flexibility, and societal benefit. This new phase necessitates a fundamental rethinking of logistics systems. In this context, the Logistics 5.0 approach presents a strategic framework centered on enhancing technological capacity alongside promoting human–artificial intelligence collaboration, system resilience, and sustainability in logistics processes. This study examines the vision of Logistics 5.0 from an economic planning perspective, aiming to establish a strategic link between macro-level decision-making mechanisms and micro-level logistics practices. Still in the conceptualization phase within the literature, Logistics 5.0 is explored in this study along three principal axes: human-centered digitalization, flexible and resilient supply chains, and sustainability with societal benefit.

The research first reviews the Industry 5.0 literature and the logistics approaches emerging within this vision. National policies of countries with strong industrial strategies—particularly the European Union, Japan, South Korea, and China—are scanned to analyze direct or indirect initiatives related to Logistics 5.0. Subsequently, Turkish policy documents such as the 11th Development Plan, the Industry and Technology Strategy Document, and the Logistics Master Plan are evaluated through content analysis; direct and implicit references to the Logistics 5.0 approach are classified. In addition, semi-structured interviews were conducted with logistics managers and planning experts in the sector to assess their awareness of Logistics 5.0, their

prioritized areas of transformation, and the structural/institutional barriers they face. Based on these data, foundational building blocks are proposed for establishing a “human-centered, digitally flexible logistics system” in Türkiye.

The study’s key findings indicate that realizing the vision of Logistics 5.0 requires a comprehensive reconfiguration in terms of technology and economic and societal planning processes. While progress has been made in digitalizing Türkiye’s logistics infrastructure, strategic gaps remain in human-centric flexibility and sustainability. As a result, this paper clarifies the conceptual framework of the Logistics 5.0 vision and offers a policy-oriented roadmap for its integration into Türkiye’s economic planning systems. This study, which directly aligns with SEPIP 2025’s sub-theme “Industry 5.0 and Economic Planning,” offers a multidisciplinary contribution to the logistics literature and policy-making processes.

Keywords: Logistics 5.0, Industry 5.0, Economic Planning, Flexible Supply Chain, Human-Centered Digitalization, Artificial Intelligence–Logistics Integration, Sustainable Logistics Systems, International Logistics

AI-Based Innovation Policies in Creative Industries: Stimulating Economic Growth and Development

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Abstract

Among creative industries such as crafts, architecture, marketing, advertising, publishing etc. fashion which innovation-driven industry, with AI, has the widespread impact on economic growth. As Articial Intellegence (AI), widely concieved as a revolutionary development impacting on various aspects of economic relations ans social life, has created advance of AI and its interconnections with the creative industries such as fashion have reconstrracted the global fashion industry at all levels ranging from product desing and branding to manifacturing, from marketing and distribution to waste management. Major players of the industry were forced to adapt to ongoing radical changes in fast-fashion trends and tried to reduce the negative environmental and social impact of the accelerated production processes. Brand managers, designers, retailers, consultants and trend forcasters in the fashion world resorted to the use of AI for efficiency puposes such as cost-saving, streamlining operations, reducing demand fluctuations and rationalizing market sizes. Moreover, the adoption of sophisticated credits, financial investment and hedging strategies also played important roles in achieving sustainable corporate growth and maintaining international competitiveness in the modern fashion industry. Therefore, both advanced forms of creative strategies and intense use of AI-driven technologies acquired importance to reduce systemic risks and uncertainties in a tensely competitive and rapidly changing global ecosystem for developed countires. This chapter will explore the critical interconnections between the use of vaious AI based technologies and creative industries specifically fashion in the context of textile and fashion industries. To this end, the respective realsm of fashion AI regarding creative industry will be defined at the outset with special reference to algorithsm, machine learning (ML), deep learning models and AI-powered industrial tools in the context of designing, branding and retailing of MNCs. The research is going to underline the link between growth and AI-based, innovation driven creative industry and its effects on economic competitiveness as stimulator of economic growth and development.

Keywords: Artificial Innovation (AI), Creative Industries, Fashion, Growth&Development, MNCs

Trade Wars and International Security: Securitization and the Order of International Trade

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Abstract

Since the first term of Donald Trump, tariffs and trade wars have been among the key words in international affairs. In spite of the fact that all economic precautions seem to aim China, they affect the global economy and especially after the second term, other countries and trade blocs have begun to appear new targets taken by the United States. Embargoes or sanctions have been "conventional" coercive instruments using economy and trade in terms of hard power. Now tariffs also take a place to provide "national security".

These steps challenge the established order of international trade and many of its written and unwritten rules. However, using the terms of 'national security' or 'war' makes the arguments stronger to ignore the rule-based system. Now, the free trade-based Bretton Woods system is open for discussion despite being an American model pushed all over the world especially during the Cold War era. Moreover, the concept of trade shall not remain as a simple matter of profit for the private sector but also a policy apparatus for the states within the framework of power relations and international competition.

This paper will discuss how international trade can be securitised and become a matter of national security or even a concept about war. Institutional structure of international trade affairs will be defined and the current outlook will be given. Then, focusing more on second term Trump administration's tariff policy will be evaluated within the international trade order. Lastly, it will come all the discussion end by some policy recommendations on the possibility of securitization of international trade.

Keywords: Trade Wars, Multilateralism, Protectionism, Inter/national Security, World Trade Organization

Smart Economic Planning in Post-Conflict States: Lessons from Somalia's Industrial and Trade Policy for Resilient Growth

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Abstract

Post-conflict states face a complex set of challenges in pursuing industrial and trade-led development: fragile governance, security risks, inadequate infrastructure, and limited integration into global value chains. Yet these states also hold untapped potential for strategic economic transformation if planning frameworks are adapted to their realities. This paper examines Somalia's evolving industrial and trade policy as a case study for "smart economic planning" in fragile contexts, drawing on field experience in governance, conflict resolution, and economic recovery initiatives. The study situates Somalia's policy trajectory within broader global shifts identified by SEPiP 2025 -climate change, digitalization, geopolitical realignments, and post-pandemic supply chain disruptions - and explores how these forces intersect with domestic constraints. Using a mixed-methods approach combining policy analysis, field-based insights, and comparative cases from Rwanda, Ethiopia, and Afghanistan, the paper identifies practical strategies for fostering inclusive industrialization, promoting sustainable value addition, and leveraging technology for economic resilience.

Key findings suggest that targeted industrial clusters, green economy principles, and hybrid governance models can accelerate growth while reducing vulnerability to external shocks. The paper concludes with a policy framework adaptable to other fragile and conflict-affected states, offering concrete recommendations for national governments, international partners, and development finance institutions seeking to align industrial policy with both local needs and global competitiveness.

Keywords: Post-conflict development, industrial policy, trade, Somalia, economic resilience, green economy, digitalization, fragile states

State Policy on International Study Migration in Georgia and Its Harmonization with EU Standards in 2013-2023

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Abstract

This paper examines the evolution and characteristics of Georgia's state policy on international educational migration between 2013 and 2023, with particular emphasis on the degree to which these policies align with European Union (EU) standards. The study addresses two core research questions: (1) What are the defining features of Georgia's educational migration policies during the specified period? and (2) How do these policies compare, in both similarities and differences, to those implemented within the EU? The research adopts a comparative approach, situating Georgia's policy framework within a broader European context.

The theoretical foundation for the analysis is Everett Lee's (1966) Push–Pull Theory of migration, which is employed to interpret the dynamics of educational migration in Georgia. This framework allows for the identification and assessment of internal factors (such as national economic conditions, legislative environment, and institutional capacity) and external factors (such as geopolitical relations, regional stability, and global educational market trends) that influence both the formulation of state policies and the decision-making processes of individual migrants. By integrating this model into the analysis, the study explains how various push and pull factors interact to shape both the direction and intensity of student flows, as well as the strategic policy responses of the Georgian government.

The research methodology is qualitative, using purposive, non-probability sampling conducted in a semi-random manner to ensure representation from relevant stakeholder groups. Data collection involved two primary instruments: structured, in-depth expert interviews with policymakers, educational administrators, and migration specialists; and focus group discussions with international students. The international student cohort—the largest group of educational migrants in Georgia—was represented by 27 participants from a diverse range of countries. The inclusion of these student perspectives was essential for capturing on-the-ground

experiences and perceptions of Georgia's educational environment, administrative processes, and legal frameworks.

Findings reveal that Georgia's international educational migration policies have undergone significant transformation over the past decade, driven largely by the country's strategic aspiration for closer political, economic, and institutional integration with the European Union. Policy reforms have addressed visa facilitation, accreditation and quality assurance mechanisms in higher education, recognition of qualifications, and the diversification of programs taught in English. However, while certain areas demonstrate substantial convergence with EU standards—particularly in transparency of admissions, academic quality controls, and student rights protections—other domains lag behind. Persistent challenges include limited alignment in social integration policies for foreign students, gaps in post-graduation employment opportunities, and incomplete harmonization in areas related to data protection and anti-discrimination frameworks.

The comparative analysis highlights notable similarities between Georgia's evolving policy framework and EU practices, especially in the realm of higher education quality assurance and mobility facilitation. At the same time, differences remain in the comprehensiveness and enforcement of support mechanisms for international students. For instance, while EU member states often integrate student migration policy into broader talent attraction and retention strategies, Georgia's approach remains primarily oriented toward increasing student inflows rather than developing long-term retention pathways.The study contributes to the academic literature by providing the first systematic evaluation of Georgia's international educational migration policies in the context of EU harmonization goals. It offers empirical evidence on both the efficiency and limitations of the current policy environment and underscores the importance of adopting a holistic migration strategy that balances short-term educational recruitment objectives with long-term integration and labor market considerations. Moreover, the application of Everett Lee's Push–Pull Theory to the Georgian context enriches the theoretical discourse on educational migration by demonstrating its utility for assessing policy development in transitional states seeking regional integration.

The research carries practical implications for policymakers, higher education institutions, and international partners engaged in migration and education governance. Recommendations include strengthening institutional capacities to provide comprehensive student support services, improving coordination between educational and labor market policies, enhancing cultural integration initiatives, and developing monitoring frameworks to track policy

outcomes. These measures would not only improve the attractiveness of Georgia as a destination for international students but also enhance the country's ability to align more fully with EU standards, thereby advancing its broader integration agenda.

Keywords: International educational migration; Georgia; European Union policy harmonization; Push–Pull Theory; higher education policy; migration governance

Agile Statecraft in High-VUCA Trade Environments: A Complexity-Theory Framework for Industrial Policy

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Abstract

Global trade has shifted into a high-VUCA (volatility, uncertainty, complexity, and ambiguity) regime characterized by rapid tariff announcements and reversals, technology controls, sanctions, climate-related shocks, and shifting security alliances. In such conditions, investment timing, supplier selection, and market entry become highly sensitive to policy volatility. A salient illustration is the Trump-era tariff cycle: between 2018 and 2020 the United States imposed, escalated, paused, and partially rolled back measures—covering steel and aluminum (Section 232) and hundreds of Chinese tariff lines (Section 301)—with exemptions and revisions sometimes arriving within weeks to a few months. These quick policy shifts and reversals threw supply chains into turmoil, and companies are still struggling to adapt. Evidence from firm behavior shows that uncertainty in trade rules depresses capital formation and delays hiring, which implies that governance must do more than promise stability ex ante; it must sense disruption early and adapt policy in flight. This study advances an actionable framework for agile statecraft—an industrial-policy approach that treats the economy as a complex adaptive system and learns iteratively under uncertainty.

Complexity theory highlights nonlinearity, feedback, emergence, and path-dependence; these properties undermine long, static plans and rigid rulemaking. It is argued that governments should pair clear missions with short decision cycles, exploratory probes, and structured learning loops. The question is not only how to reduce uncertainty but how to perform.

The framework organizes policy into three nested feedback loop; Sense, Decide, and Act-and-Learn:

Sense: build continuous situational awareness by integrating (i) trade-policy-uncertainty indicators and market-implied risk measures; (ii) customs and logistics telemetry; (iii) firm-

level exposure maps that reveal network concentrations and chokepoints; and (iv) a scenario library tied to explicit trigger points. Early-warning routines identify when a disturbance.

Decide: translate national missions into option-based policy portfolios. Programs are stage-gated with budgeted real options, time-bound sunset clauses, and pre-agreed pivot criteria. Budgeting and state-aid rules include small exploration tranches that can be reallocated as evidence accumulates.

Act-and-Learn: expand safe-to-fail trials through regulatory sandboxes, outcome-based procurement, and challenge prizes. Trials run with telemetry for performance and risk, and rolling reviews update rules on a fixed cadence. Independent red-team assessments stress-test unintended interactions across sectors and borders.

Implementation occurs at three levels. At the institutional level, create cross-ministerial policy sprint units with limited derogation powers, time-boxed mandates, and transparent decision logs; stand up inter-agency data rooms and public dashboards reporting cycle times, pivots, and learning outcomes. At the regulatory level, adopt experimentation protocols, supervision-by-design, and graduated enforcement consistent with international good practice, so compliance improves through learning without compromising consumer protection or competition. At the trade–firm interface, mainstream tariff-robust industrial strategy: diversify and modularize supplier networks; include contractual clauses that share and hedge policy risk; tie export-credit and guarantees to resilience metrics; and deploy digital rules-of-origin and traceability so shipments can be re-routed as preferences shift.

To keep policy accountable, it is proposed an Agility Scorecard tracked at program and portfolio levels: (1) time from signal to decision and from decision to deployment; (2) share of programs with stage gates, options, and sunset reviews; (3) coverage and throughput of sandboxes and pilots; (4) volatility-adjusted productivity and investment responsiveness; (5) correlation of interventions with trade-uncertainty shocks; and (6) rate of rule updates resolved without legal challenge. These indicators allow ministries to compare agility across portfolios and to negotiate credible international commitments amid trade wars and technological realignments.

The study aims to contribute a diagnostic toolkit and an implementation roadmap that agencies can adapt to sectoral contexts. The toolkit includes: (a) an exposure-and-readiness index that inventories agentic-AI opportunities against data availability, process volatility, and safety criticality; (b) a template for sandbox charters that specifies scope, safeguards, and evaluation criteria; and (c) a “minimum viable interoperability” profile covering data formats, audit

logging, identity, and human escalation protocols. The roadmap phases investments to begin with low-risk, high-impact use cases, couples financing with capability-building, and embeds independent evaluation to prevent path-dependence on single vendors or closed ecosystems.

Implications for trade and development are twofold. Properly governed agentic AI can raise productivity, support cleaner growth through precision resource use, and increase domestic value capture in global supply chains. Poorly governed diffusion risks lock-in to foreign platforms, amplified cyber-physical vulnerabilities, and widening inequality. The framework therefore emphasizes international interoperability—especially for testing and assurance—so that countries can cooperate on safety while competing on innovation. The analysis concludes that agentic AI, if embedded in mission-oriented industrial policy with credible safeguards, can help emerging economies navigate technological, geopolitical, and environmental change while advancing inclusive and sustainable development.

Keywords: Complexity theory; Complex adaptive systems, VUCA, AI

Corporate Governance, Sustainability, and Financial Performance: Evidence from Borsa Istanbul

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Abstract

Corporate governance (CG) and corporate sustainability (CS) have increasingly become critical issues for corporations and policymakers, particularly in emerging markets where regulatory environments and institutional frameworks are still developing. The effectiveness of corporate governance structures and the implementation of sustainability practices are no longer viewed merely as ethical or compliance-oriented requirements. Instead, they are recognized as strategic levers that enhance firms' long-term financial performance and competitiveness. This study focuses on firms listed on Borsa Istanbul (BIST) and empirically examines how corporate governance and sustainability interact to influence financial outcomes.

The dataset covers 39 non-financial firms over the period 2015–2024, yielding 386 firm-year observations after excluding missing data. The dependent variables are return on assets (ROA), return on equity (ROE), and Tobin's Q (TOBINQ), representing both accounting-based and market-based performance indicators. The key explanatory variables are the corporate governance score (KY), the sustainability score (KS), and their interaction term (KY × KS). Control variables include firm size (SIZE, measured as the natural logarithm of total assets) and leverage (LEV, calculated as total debt divided by total assets).

Panel regression models were estimated using OLS with heteroskedasticity-robust standard errors (HC3). The results show that the interaction between governance and sustainability is consistently positive, although modest in magnitude, across ROA, ROE, and Tobin's Q. Firm size has a negative and statistically significant effect, suggesting potential inefficiencies in larger Turkish firms. Leverage exerts a strong negative effect on profitability measures (ROA and ROE), while its effect on Tobin's Q is slightly positive but weakly significant.

These findings highlight that governance and sustainability are complementary drivers of firm performance but their impact is moderated by firm size and financial structure. The study contributes by providing robust empirical evidence from an emerging market context where both governance and sustainability practices are evolving.

Keywords: Corporate Governance; Sustainability; Financial Performance; ROA; ROE; Tobin's Q

Examining the different dimensions of globalization on environmental sustainability: Evidence from MINT economies

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Abstract

Diverse arguments have been put forward about the impact of globalization on our present world. Some scholars argue that globalization is beneficial for economies and the environment at large, while others opine that even though globalization could bring monetary gains to economies, it could harm the environment. In developmental economics, the dependency theory emphasized that the global interaction between developed and developing economies favours developed countries more because of the movement or flow of resources from developing into developed economies at very low costs. The depletion of these natural resources could harm the environment. Furthermore, some further argued that we are in an era of deglobalization. This is because of the political tensions and individualistic economic policies that nations are adopting. More specifically, some economies are adopting policies that benefit their country, without thoroughly accessing the impact on other economies. As a result, the timeliness of this topic has led us to investigate the impact of various dimensions of globalization, such as political, economic, and social globalization on environmental sustainability in Mexico, India, Nigeria, and Turkey (MINT) economies using the Wavelet method. These economies are seen as the most powerful emerging markets in the world. The outcome of this research will be

relevant to individual economies to help them ascertain if their interaction with the rest of the world is contributing to a sustainable environment.

Keywords: Political Globalization, Economic Globalization, Social Globalization, Environmental Sustainability

The Impact of Green Bond Adoption on Sustainable Economic Development in Albania: A Regression-Based Empirical Analysis (2010–2024)

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Abstract

This study explores the potential of green bond adoption as a driver of sustainable economic development in Albania during the period 2010–2024. As Albania seeks to align its environmental and financial sectors with the European Union's Green Agenda, green bonds have emerged as a promising, yet underutilized, financial instrument. Through a regression-based empirical analysis, we investigate the impact of green bond activity—measured using a constructed index that captures the evolution from no activity to full policy adoption—on two key dimensions: GDP growth and CO_2 emissions reduction. Using simulated data grounded in regional economic trends and policy developments, our analysis reveals that increased green bond activity is positively and significantly associated with GDP growth, and inversely correlated with CO_2 emissions, indicating environmental benefit. These findings suggest that even early-stage development of green finance mechanisms in emerging economies like Albania can produce measurable economic and environmental outcomes. The study concludes with policy recommendations focused on developing a robust green bond framework, building investor confidence, and leveraging international financial support to accelerate Albania's green transition.

Keywords: Albania, Green Bonds, Economic Development, Regression Model

Green Policies, Greener Future: How Environmental Stringency Shapes Climate Mitigation in Europe

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Abstract

Climate change, resource depletion, and environmental degradation have spurred a global push toward transitioning to a green economy, driven by the urgent need to mitigate the harmful effects of human activity on the environment. This transition calls for robust, well-enforced environmental policies that are both effective and sustainable. At the heart of these efforts lies the stringency of environmental policies, commonly quantified by the Environmental Policy Stringency Index (EPSI). EPSI is a comprehensive measure that reflects the rigor and enforcement of environmental regulations, particularly in areas such as carbon emissions reduction, promotion of sustainable practices, and the adoption of green technologies. As the world faces unprecedented environmental challenges, understanding the role of EPSI in climate change mitigation is critical for formulating policy frameworks that foster environmental sustainability.

This study investigates how EPSI influences climate change mitigation efforts across European Union (EU) countries over the period from 2000 to 2021. The European Union has long been at the forefront of implementing environmental policies that aim to reduce greenhouse gas emissions and promote green economic practices. By examining the relationship between EPSI and climate change mitigation, this paper seeks to understand how policy stringency can effectively drive mitigation efforts and how its impact varies across different EU member states.

To rigorously assess the role of EPSI, this study employs a combination of advanced econometric techniques. First, a panel quantile regression approach is applied, which allows for a detailed exploration of how the impact of EPSI on climate change mitigation outcomes varies across the distribution of the data. Unlike traditional models that focus on mean effects, panel

quantile regression enables an understanding of the relationship at different quantiles of mitigation outcomes. This approach is essential for capturing the varying effects of policy stringency in countries with differing baseline environmental and economic conditions.

Additionally, the study utilizes the Autoregressive Distributed Lag (ARDL) model, which captures both the short- and long-run dynamics between EPSI and climate mitigation. This model is well-suited for exploring the temporal relationship between policy stringency and climate action, as it accounts for potential lags in the effects of policies on mitigation outcomes.

The empirical findings suggest that stronger and more stringent environmental policies are positively correlated with more effective climate change mitigation. Countries with well-enforced, high-stringency policies experience significant reductions in carbon emissions and see greater adoption of green technologies. These results underscore the effectiveness of rigorous environmental regulations in achieving climate goals. However, the study also highlights the counterproductive effect of high CO2 emissions on mitigation efforts. Elevated emissions levels can undermine the effectiveness of policy measures, suggesting that higher emissions hinder the capacity of policies to drive meaningful reductions in environmental harm.

Moreover, the impact of EPSI on climate mitigation is not uniform across all EU countries. The benefits of stringent policies vary depending on each country's economic, political, and environmental context. Some countries, particularly those with already advanced green technologies and lower emissions, experience more pronounced gains from policy stringency. However, others face challenges due to higher baseline emissions or weaker policy enforcement mechanisms. This variation underscores the need for tailored approaches to climate change mitigation that considers each country's unique circumstances.

The findings highlight the importance of sustained and long-term policy measures to tackle climate change. Policymakers are encouraged to implement robust and coherent environmental regulations that not only promote energy efficiency but also incentivize innovation in renewable energy and green technologies. Strengthening policy stringency across the EU can accelerate the transition to a green economy, reduce reliance on fossil fuels, and drive the global effort to mitigate climate change. The study provides valuable insights for policymakers looking to refine and enhance their environmental strategies, contributing to the broader goal of sustainable development.

Keywords: Climate Change Mitigation, Environmental Policy Stringency Index (EPSI), Green Economy, Panel Quantile Regression, ARDL Approach

Global Leadership's Critical Role in the Responsible Implementation of Technological Development While Building the Next Generation of Society

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Abstract

The 21st century's unprecedented pace of technological innovation—driven by artificial intelligence (AI), automation, and interconnected digital platforms—is transforming economies, labor markets, and social systems worldwide. These advancements promise enhanced productivity, improved quality of life, and solutions to complex global challenges. However, they also pose significant ethical, economic, and societal dilemmas, especially regarding equitable access to benefits and the distribution of risks. This paper explores the critical role of global leadership, particularly in the technology sector, in ensuring responsible and inclusive implementation of technological change.

The central problem addressed is the widening disparity between developed and developing economies in leveraging technological gains. Using U.S. (United States) data from 1980 to 2025—including GDP growth, employment distribution by sector, and productivity metrics—this study illustrates how sustained economic growth (averaging 2–4% annually) has coincided with steep declines in manufacturing employment (over 35%) and stagnating wages for the bottom 50% of earners. The U.S. experience serves as a cautionary case study, revealing how technological adoption without inclusive strategies can exacerbate inequality and social fragmentation.

Global leaders in technology exert substantial influence over market structures, policy directions, and workforce dynamics. When these leaders prioritize rapid scaling and short-term profitability over long-term societal well-being, they risk deepening socio-economic divides—especially in countries with weaker institutional capacity and labor protections. In emerging

markets, such imbalances can manifest as dependency on imported technologies, limited skill development, and vulnerability to global economic shocks.

Various models for human-centered innovation exist such as Japan's Society 5.0 and it's referenced in this paper only as an illustrative example of integrating advanced technology into societal frameworks. Society 5.0 envisions a "super-smart" society that uses AI, IoT (Internet of Things), and robotics to address pressing social issues—such as demographic aging, regional inequality, and sustainability—while prioritizing human well-being. Its relevance lies in demonstrating how strategic alignment of technology and ethics can serve as a counterbalance to purely market-driven approaches. While select Japanese industries have seen progress in applying Society 5.0 ideals, implementation challenges persist—such as data privacy tensions, the risk of workforce automation, and inequitable access to digital infrastructure. ASEF's 2023 Youth Report reveals that among 8,500 youth across Asia and Europe, there is strong support for harnessing technology to solve societal challenges. However, the report also cautions that current engagement with technology is more "exploitative than explorative," demanding more thoughtful leadership in shaping Society 5.0 and their experiences underscore that leadership must incorporate ethical foresight and stakeholder engagement for meaningful impact.

Furthermore, Society 5.0's applicability varies by national context. Therefore, the report also emphasizes the need for adaptable, context-sensitive leadership frameworks that build on its principles without assuming universal fit. Without deliberate interventions grounded in ethical governance and global equity considerations, technological acceleration risks reinforcing systemic inequalities and undermining efforts toward the United Nations Sustainable Development Goals (SDGs).

Our findings underscore that global leadership must evolve from reactive to proactive governance, embedding employment impact assessments, equitable value distribution mechanisms, and cross-border capacity building into their strategies. Platforms like the G20, World Economic Forum, and United Nations are pivotal in fostering coordinated responses, yet gaps persist between rhetorical commitments and tangible outcomes. Addressing these requires aligning technological innovation with inclusive, sustainable visions for society.

The challenge is clear: decisions made by today's global leaders will define not only the workforce and economic systems of the future but also the social cohesion and equity of the next generation. By integrating responsible leadership principles, leaders can ensure that technological transformation becomes a tool for building resilient, equitable, and future-ready societies.

Keywords: Global Leadership, Technological Development, Responsible Leadership, Future of Work, Economic Inequality, Technology Policy

Friendshoring and Nearshoring Opportunities for APEC Economies in the Context of the Trade War

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Abstract

This study investigates the impact of the ongoing trade war between China and the United States on the export performance of economies within the APEC group. The research aims to identify which economies benefit most from nearshoring—the relocation of production to geographically closer countries—and friendshoring—shifting trade toward countries with friendly diplomatic and economic relations. All APEC economies are analyzed, and a random-effects panel data model is employed to account for heterogeneity across countries and time periods. Heteroscedasticity in the regressions is also addressed to ensure robustness and reliability of the results.

The analysis reveals significant differences across economies in response to trade tensions. Mexico, Vietnam, and Taiwan emerge as the countries most positively impacted by nearshoring and friendshoring processes. These findings suggest that geographic proximity and political alignment with major powers can be key determinants of trade resilience during periods of international tension. Furthermore, the results indicate that economies deeply integrated into Global Value Chains (GVCs) are better positioned to leverage new trade opportunities created by shifts in supply chains.

Policy implications are clear: governments of APEC economies should develop targeted strategies to attract investment, strengthen regional cooperation, and facilitate integration into GVCs. Nearshoring and friendshoring offer pathways not only for increasing export volumes but also for enhancing economic stability and competitiveness in the face of geopolitical uncertainties. Additionally, firms and policymakers should consider diversifying their trading partners to reduce vulnerability to bilateral trade disputes.

In conclusion, this study highlights the importance of strategic positioning in global trade networks. By understanding the dynamics of nearshoring and friendshoring, APEC economies can proactively adjust their economic and industrial policies to maximize benefits and mitigate

risks associated with trade conflicts. This research contributes to a broader understanding of how geopolitical factors shape international trade patterns and offers actionable insights for policymakers aiming to strengthen economic resilience in the Asia-Pacific region.

Keywords: nearshoring, friendshoring, trade war, APEC, global value chains, economic resilience

Circular Economy Entrepreneurship as A Pillar of Circular Supply Chain Sustainability: The Roles of Circular Economy Capability and Net Eero Policy

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Abstract

The rising global environmental challenges and resource depletion have intensified the need for the reevaluation of traditional supply chain practices. The circular economy (CE) has emerged as a transformative approach that provides a framework for sustainable value creation through recycling, reuse, and regeneration. The adoption of circular business practices by entrepreneurial firms can be instrumental in driving systemic change across the supply chains towards sustainability. Moreover, the growing emphasis on sustainability has made circular economy entrepreneurship and circular supply chain sustainability hot topics to study. Although much research attention has been given to the circular economy, not much is known about how circular economy entrepreneurship impacts circular supply chain sustainability. Specifically, the roles of circular economy capability and net zero policy have not been explored in this context.

Drawing on the natural resource-based view (NRBV) and the dynamic capabilities theory, this study aims to investigate how circular economy entrepreneurship influences circular economy capability to achieve circular supply chain sustainability using data obtained from senior-level managers of manufacturing small and medium-sized enterprises (SMEs) in an emerging economy (i.e., Nigeria). The study also examines whether net-zero policy moderates the aforementioned relationships.

Cross-sectional data collected through a questionnaire survey from manufacturing SMEs listed on the Nigerian stock exchange. Several procedural remedies were implemented to ensure that common method bias did not distort the data collected. Consistent with similar studies in the literature, data were collected in two waves to circumvent common method bias. Moreover,

statistical control (i.e., post hoc analysis) was conducted to further check for potential bias in the data collected. Confirmatory factor analysis was conducted to assess the reliability and validity of the adopted measure before hypothesis testing. The data collected were analyzed using SPSS and AMOS. The proposed hypotheses were tested using the Hayes PROCESS macro.

Circular economy entrepreneurship positively impacts circular supply chain sustainability. Circular economy entrepreneurship positively impacts circular economy capability. Circular economy capability positively impacts circular supply chain sustainability. The relationship between circular economy entrepreneurship and circular supply chain sustainability is mediated by circular economy capability. Further, net-zero policy moderates the mediated relationship between circular economy entrepreneurship and circular supply chain sustainability through circular economy capability, such that the mediated relationship is strengthened at a higher level of net-zero policy.

This study offers new insights into how circular economy entrepreneurship influences circular economic capability to achieve circular supply chain sustainability for SMEs in an emerging economy. This study also provides empirical evidence regarding the mechanism that underlies the relationship between circular economy entrepreneurship and circular supply chain sustainability. Moreover, the study also provides new insight into the conditions under which the mediated relationship between circular economy entrepreneurship and circular supply chain sustainability is further strengthened. These contributions advance the literature underlying this research and could serve as a potential reference for academics and business practitioners. Specifically, the new insights demonstrated in this study can serve as a reliable reference and provide practical guidance for decision-makers in creating a sustainable circular supply chain, particularly in the context of an emerging economy.

Keywords: nearshoring, friendshoring, trade war, APEC, global value chains, economic resilience

Strategic Cost Management For Small And Medium Enterprises In Inflationary Environment: The Role Of Certified Public Accountants In Turkiye

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Abstract

This study investigates the strategic cost management practices of small and medium-sized enterprises (SMEs) in Türkiye operating under persistent inflationary conditions, with a particular emphasis on the evolving role of Certified Public Accountants (CPAs). SMEs play a pivotal role in the Turkish economy, as evidenced by their substantial presence in the business sector. These enterprises account for over 99 percent of all commercial entities in Türkiye and contribute approximately 70 percent of the overall employment. However, the rapid escalation of inflation in recent years, rising from 12.28 percent in 2020 to over 72 percent in 2022, has significantly reshaped their cost structures, decision-making patterns, and long-term sustainability. In light of these challenges, the present study aims to explore how SMEs adapt to inflation-induced challenges, how CPAs contribute to these adaptation processes, and what policy measures can be proposed to strengthen the resilience of SMEs in inflation-affected economies. The research employs a qualitative methodology, integrating direct field observations conducted over the course of a fourteen-week internship in a financial consultancy office in Ankara with systematic document analysis and thematic content evaluation. The data sources encompass consultancy records, inflation accounting guidelines, policy documents issued by the Ministry of Finance and the Union of Chambers of Certified Public Accountants Türkiye, macroeconomic statistics from Turkish Statistical Institute, and academic and sectoral reports. The observations yielded valuable insights into the daily practices of SMEs, their cost management strategies, and the advisory processes led by CPAs. The qualitative approach facilitated a nuanced understanding of the discrepancies between theoretical frameworks of cost management and their practical implementation under inflationary stress. The findings indicate

that SMEs encounter a multitude of interrelated challenges, including unpredictable cost escalations in raw materials, energy, and logistics; imbalanced cash flow; difficulties in pricing and contract negotiations; and disruptions in investment and growth plans. In response, SMEs frequently adopt short-term profit-maximization tactics, bulk inventory purchasing, and flexible pricing mechanisms. Nevertheless, the implementation of these strategies frequently gives rise to novel challenges, including liquidity constraints and the deterioration of customer confidence. Moreover, a considerable number of SMEs are not well-versed in the principles of inflation accounting, resulting in discrepancies between financial reports and economic realities. In this context, CPAs assume a critical role by providing services to adjust for inflation, conducting financial analyses, and guiding firms in areas such as tax planning, budgeting, and compliance with regulatory frameworks. However, the quality and scope of advisory services vary significantly across offices. In some cases, CPAs limit their services to mandatory documentation rather than offering strategic guidance.

The study's findings indicate that SMEs that receive ongoing consultancy support exhibit enhanced resilience in financial planning, cost control, and profitability. For instance, firms that have received proactive CPA advice have exhibited higher increases in employment, production, and sales compared to those relying solely on transactional accounting services. However, a considerable number of SMEs do not fully leverage advisory opportunities, either due to limited awareness or resource constraints. This finding underscores the necessity of expanding the advisory capacity of CPAs and fostering closer collaboration between financial consultants and SMEs.

In summary, the research underscores the challenges faced by SMEs in maintaining financial stability in the face of inflation. It also emphasizes the need for a paradigm shift in their cost management approaches. CPAs assume a pivotal role in this transformation, serving as a conduit between the domains of compliance-focused accounting and strategic financial management. The policy recommendations put forth include the following: first, the continuous education of CPAs must be strengthened; second, inflation accounting practices for SMEs must be simplified; third, digital financial solutions must be incentivized; and fourth, consultancy contracts must be institutionalized to ensure sustained SME–CPA collaboration. By taking these measures, SMEs can more effectively navigate inflationary pressures, improve their decision-making processes, and enhance their long-term competitiveness. The findings of this study contribute to the broader literature on cost management under macroeconomic instability and provide actionable insights for policymakers, practitioners, and academic researchers.

Keywords: Inflation, Cost Management, Small and Medium Sized Enterprises, Public Accountants, Inflation Accounting

Digital Leadership for Corporate Sustainability: Toward A Triple-Bottom-Line Framework

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Abstract

Global companies face increasing challenges from technological disruptions, climate change, and geopolitical issues that require new leadership approaches. Traditional sustainability efforts, often limited to compliance or corporate social responsibility, are no longer sufficient amidst systemic risks and evolving stakeholder expectations. Meanwhile, the digital economy is transforming competitive advantages through artificial intelligence (AI), blockchain, advanced analytics, and platform-based models. This paper posits that the overlap of digital leadership and sustainability offers a vital yet underexplored path for organisational change.

A conceptual framework is proposed, placing digital leadership as a driver for triple- bottom-line outcomes, balancing economic, environmental, and social value. It identifies five interconnected leadership elements: (1) a triple- bottom- line vision aligning strategy with ecological and social goals; (2) digital transformation skills utilising AI, Internet of Things (IoT), and analytics for efficiency and resource optimisation; (3) business model innovation and resilience involving servitization, circularity, and adaptive systems to generate lasting value; (4) stakeholder engagement and long- term planning to incorporate diverse perspectives and embed sustainability into governance; and (5) ethics and empathy, highlighting principled leadership guiding digital and sustainability efforts amid societal debates.

This paper adopts a conceptual approach, synthesising recent scholarly literature (2020–2025) and secondary data from corporate reports, practitioner insights, and industry publications. Five global corporations: Patagonia, Maersk, IKEA, Unilever, and Microsoft, are used as illustrative case examples. These cases, selected for their documented sustainability practices and

leadership strategies, provide practical validation of the proposed dimensions and generate managerial lessons that inform the theoretical propositions.

Digital leadership enhances sustainability performance by enabling green innovation, promoting organizational resilience, aligning environmental, social, and governance (ESG) principles with digital strategies, and embedding ethics in decision-making. Using illustrative case examples, the paper highlights how global corporations operationalise these dimensions. Patagonia institutionalised environmental stewardship by embedding ecological responsibility into ownership structures, ensuring profits serve planetary goals. Maersk leveraged AI-driven route optimisation and blockchain-enabled platforms to reduce emissions and create transparent supply chains. IKEA pioneered circular business models and AI-enhanced demand forecasting to minimise waste and achieve climate-positive targets. Unilever, under Paul Polman, reframed corporate governance by abandoning short-term financial reporting and embedding sustainability into its strategic plan. Microsoft, under Satya Nadella, exemplified the fusion of ethics, accountability, and digital innovation by linking executive pay to environmental progress and committing to carbon negativity.

This paper enhances management and sustainability scholarship by integrating digital leadership research with sustainability frameworks, filling a notable gap in existing literature. Additionally, it emphasises that the impact of digital leadership varies across industries and regions, highlighting the need for empirical validation and comparative studies.

The implications are threefold: First, for theory, it deepens understanding of leadership at the intersection of digital transformation and sustainability, a growing but underexplored field. Second, for practice, it offers corporate managers practical strategies to integrate sustainability into digital strategies and governance. Third, for policy, it provides insights for regulators and planners aiming to align industrial competitiveness with sustainable development goals.

Digital leadership is not just about adopting new technologies but about integrating ethics, vision, and innovation to achieve triple-bottom-line outcomes. As economies face technological, geopolitical, and environmental challenges, leadership that connects digital capabilities with sustainability goals will be vital for industrial resilience and competitiveness.

Keywords: Digital leadership, Corporate sustainability, Triple-bottom-line, Business model innovation, Stakeholder engagement, Organizational resilience

Sectoral modernization tools

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Abstract

Sectoral modernization means upgrading an economic branch through advanced technologies, infrastructure, innovation, skilled labor, and sustainability to boost efficiency and competitiveness. The global agri-food sector is vital: it provides essentials of life, drives growth, connects with industry and services, and addresses environmental and social challenges. In many developing countries it employs 26% of the workforce, contributes about 4% to global GDP, directly employs over 1 billion people, and supports billions more through related industries (https://www.fao.org/faostat/en/#data/MK)

Key modernization tools

Competitiveness (tool 1) In today's world, competition extends beyond state systems to national economies and sectoral management models. Countries' success depends on their unique historical, geographical, and climatic conditions. Three main geopolitical and economic centers have emerged: America (1.05 billion people), Europe (0.74 billion), Asia (4.82 billion). Most of countries modernized their economies through anti-corruption measures, democratic development, skilled work, traditions, foreign investment, innovative technologies, state support, infrastructure, education. Georgia's attractiveness in global competition lies in its agrobiodiversity, rich history, culture, strategic location for developing transport and communication networks and potential as a financial hub. It is also shaped by the skills and entrepreneurial capacity of its population, sophisticated hospitality and traditional dining practices, diverse landscapes bordered by the Black Sea and the Caucasus Mountains, and

favorable bio-geoclimatic conditions that influence food composition, nutritional characteristics, and culinary traditions.

Industrialization (tool 2). Developed economies have progressed from Industry 1.0 to 5.0 while the agri-food sector is moving toward "Agriculture 5.0," integrating science, technology, social equity, and sustainability. The Georgian economy (agri-food sector) is currently between Industry 3.0 and 4.0. The main obstacle to modernization is the dominance of small enterprises (≤49 employees or ≤4.4 million USD turnover), which account for 95% of all sizes of enterprises in primary production and 83% of processing enterprises. The number of small enterprises among all sizes of primary enterprises in grain production is 93%, in perennial crops 95%, in livestock 94%, in fisheries/aquaculture 95%, and in post-harvest activities 96%. The number of small processing enterprises share is 91% in meat/milk production, 91% of fruits/vegetables, 71% of fish products, 96% of oil/fats, 86% of milled grain products and 95% of other food products accordingly (https://www.geostat.ge/en). A key challenge in modernizing Georgia's agri-food sector is low industrialization. Dependence on small producers limits technology adoption, scaling, and market development, affecting competitiveness, food security, and sustainable growth.

Innovative technologies (tool 3). Industrializing Georgia's agri-food sector is key to economic strength and public well-being. Modernization can follow two paths: expanding enterprises to profitable sizes, and broadly introducing innovative technologies. This abstract focuses on the second, technology-driven path, relevant globally. Feeding 10 billion people will require a 70% rise in agri-food production, achievable only with innovative technologies. Key tools include advanced greenhouses, vertical farms, agrobiotechnologies, drones, autonomous stations, satellite imaging, ICT services, and blockchain for land registration, traceability, and transparent transactions. Georgia is among the first countries to use blockchain for land registration. The National Agency of Public Registry operates a live blockchain system that secures real estate and business data with digital signatures, allowing anyone to verify its authenticity.

Foreign investment and joint companies (tool 4). Foreign investment and joint ventures (FI and FJVs) play an important role in the modernization of agri-food sector by combining international expertise, capital, and technology with local resources and knowledge, driven agribusiness and act as catalysts of modernization, bridging the gap between traditional agriculture and globally competitive. Unfortunately, their number in Georgia is very small and cannot ensure the modernization of the sector for the entire country. Foreign joint ventures and

international partnerships in Georgia are accelerating the modernization of agri-food sector by introducing modern infrastructure, sustainable practices, governance reforms, and technical training.

Modernization process management (tool 5). To modernize Georgia's economy by 2030, a state-led mega-project is needed, including: creating a Specialized/Agrarian Investment Fund with state and international participation; orienting banks toward agri-food development; establishing joint Georgian-foreign companies with simplified registration; offering preferential regimes for these companies; creating specialized Agri-innovation, tourism, education, and industrial zones with tax incentives; and setting up an international arbitration body to protect export-oriented investments.

Despite a population of only 3.75 million, Georgia's bio-geoclimatic potential can feed over 10 million people. With strong state support, effective macroeconomic management, strategic location, and modernization tool-such as infrastructure, digitalization, technology, and human capital—the country can improve food security, move toward trade balance by 2030, and strengthen its competitiveness regionally and globally.

Keywords: economic (agri-food) sector, tools, competitiveness, industrialization, innovative technologies, modernization, foreign investment and joint companies

The Role of Agriculture in Somalia Economic Growth: A Comparative Analysis with Türkiye

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Abstract

Agriculture remains the backbone of Somalia's economy, not only as the dominant contributor to national output but also as the foundation of livelihoods for the majority of its citizens. This study investigates the contribution of agriculture particularly livestock production to Somalia's economic growth and draws policy-relevant lessons from Türkiye's agricultural transformation. Building on secondary data, the analysis compares sectoral contributions, employment shares, institutional frameworks, and infrastructure development in both countries, situating Somalia's challenges within a broader developmental perspective.

Somalia's agricultural sector accounts for nearly 70 percent of GDP and provides employment for more than 80 percent of the population. Livestock production is especially significant, serving as the primary source of export earnings and sustaining pastoral and agro-pastoral communities across diverse regions. Beyond its economic importance, livestock also plays a social role, anchoring household resilience and cultural practices. Yet despite this centrality, Somalia's agricultural sector faces persistent structural barriers. Climate shocks, particularly recurrent droughts and floods, routinely disrupt production cycles, while fragile ecosystems compound vulnerability. Irrigation remains underdeveloped, forcing farmers to rely on rain-fed production that is both risky and inefficient. Poor transport and storage infrastructure further constrains domestic markets and limits the ability to connect to regional and international trade. Weak institutional capacity, fragmented agricultural policies, and limited extension services have hindered technological adoption and innovation. Although both domestic authorities and international partners have attempted various agricultural initiatives, progress has often been undermined by political instability, conflict, and environmental stress. As a result, Somalia's

agricultural potential remains underutilized, and the sector struggles to serve as a reliable engine of sustainable growth.

Türkiye's agricultural trajectory offers a useful point of comparison. Like Somalia, Türkiye once relied heavily on subsistence farming and smallholder production. However, over recent decades, Türkiye transformed agriculture into a diversified, productive, and export-oriented sector. This transformation was driven by deliberate policies and investments, including the expansion of irrigation networks, rural infrastructure, and agricultural research and development. Strong and coherent institutions, coupled with market integration strategies, ensured that farmers could access credit, adopt new technologies, and connect with both domestic industries and international markets. Türkiye's agricultural modernization not only stabilized rural livelihoods but also supported broader economic diversification and industrialization, demonstrating agriculture's potential role as a foundation for long-term development.

The comparative analysis underscores both shared features and important differences. Somalia's institutional and economic capacities are far more constrained, but Türkiye's success illustrates how sustained, coordinated investments can unlock agricultural potential. For Somalia, the livestock sector offers a natural comparative advantage that could be further developed through improved veterinary services, stronger market organization, and enhanced regional integration. Investment in rural infrastructure, particularly irrigation systems and transport networks, could significantly raise productivity while reducing vulnerability to climate variability. Strengthening agricultural institutions and extension services would empower smallholders and pastoralists to adopt improved practices and technologies, thereby enhancing resilience and competitiveness.

The paper's unique contribution lies in foregrounding agriculture especially livestock as a legitimate and underexplored pathway for Somalia's economic growth. While much existing literature frames Somalia primarily through the lenses of conflict and humanitarian crisis, this study highlights the strategic role agriculture can play in recovery and development. By bringing Türkiye's experience into dialogue with Somalia's present realities, the research identifies concrete, context-sensitive strategies that extend beyond short-term relief measures and point toward long-term transformation.

Ultimately, the findings suggest that Somalia's agriculture, if supported through targeted investments and institutional reforms, can serve not only as a survival mechanism but also as a foundation for sustainable and inclusive economic development. This study therefore

contributes to academic debates on agriculture and development while offering practical, policy-oriented insights for governments, development partners, and practitioners engaged in shaping Somalia's economic future.

Keywords: Agriculture, Economic Growth, Livestock, Somalia, Türkiye, Agricultural Transformation

The effect of a firm's ownership structure on innovation

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Abstract

Due to the expected social and economic benefits of innovation in particular firms based on the spillovers toward other firms and the consumers, and the obstacles for privately financed innovation, the government offers some type of public support to firms to innovate. The mentioned obstacles are subject to characteristics that cause underinvestment. Imperfect appropriability, a high level of uncertainty, and the tacit character of knowledge justify public intervention. In addition, the limited availability of funds leads to most countries being interested in ascertaining the effectiveness of public funds to encourage or reinforce firms' innovation efforts and increase the knowledge and tools for policymakers.

The principal public policy mechanisms to generate incentives for privately financed innovation are subsidies and tax incentives, although in recent years, new tools have been developed. Recent studies have addressed heterogeneity considering some of the firms' characteristics and the particularities of the support schemes. However, studies that consider the differentiated effect according to ownership structure are scarce.

The main goal of this paper is to estimate the heterogeneous impact of R&D subsidy on innovation input according to the ownership structure of the firms, paying special attention to multinational enterprises (MNEs). An additional goal is evaluating whether there is concordance between access to the aid and performance of the firms, because there has been relatively little research focused on the subsidy allocation process. Hence, this study is oriented to estimate if the R&D subsidies tend to attract new or bigger foreign investments or, on the contrary, these firms are substituting their funds with public ones, and analyze if the MNEs are discriminated in the reception of the aids.

MNEs have an interest for two main reasons. On the one hand, there is consensus that attracting subsidiaries of MNEs can substantially increase a country's technological capabilities and overall R&D spending because multinationals can act as an important stimulus to the domestic

sector by enabling technology spillovers (Görg and Strobl, 2001). Regarding this positive effect, public agencies would be interested in subsidizing MNEs in order to increase foreign direct investment.

On the other hand, the presence of MNEs may also have a negative effect on the domestic firms because an increase in competition might lead to a reduction of market share. In addition, if asset-exploiting strategies are assumed, MNEs exhibit a lower level of innovative input compared to domestically owned enterprises because firm-specific assets are mainly created by the parent enterprise.

Research of this kind confronts the issue of selection bias, which arises because government support is not randomly assigned. In order to overcome this problem, the Propensity Score Matching (PSM) approach is used. We consider three different analyses. In the first stage, we estimate the probability of being awarded and based on this propensity score (PS), we match each treated firm with an untreated one to obtain the Average Treatment Effect on the Treated (ATET) in order to evaluate the effectiveness of the subsidies. In the second stage, we regress the treatment effects at a firm level on a set of firms' ownership structure dummies to estimate whether the presence of foreign capital leads to a higher effect. Finally, in order to analyze the effect on the MNEs in more detail, we estimate the ATET only for subsidized MNEs, considering as a control only MNEs without support. In this stage, we consider new outcome variables to evaluate if the effect varies across kinds of expenditures. With this purpose, we use information from the Spanish Panel of Technological Innovation (PITEC).

Summarizing the main results as regards the three particular aims mentioned before, they are the following. First, the results obtained for the allocation process point to higher participation from public firms and firms that belong to a domestic group. However, MNEs have been discriminated against in the participation in the subsidies, which highlights the presence of a bias towards local firms. With respect to our second goal, we find some interesting differences across firms' ownership. While MNEs are negatively discriminated against in the reception of the aid, these kinds of firms show a higher level of impact. The opposite occurred with public firms, which participate more frequently in the support but has a negative effect on the ITEs. Finally, the analysis for MNEs reveals that the subsidised firms show higher levels of additionality even considering applied research expenditures. However, when basic research expenditures are considered, non non-significant effect is found. Moreover, we observe a positive effect on the percentage of development on total R&D. In view of the results obtained,

we conclude that R&D subsidies tend to increase private effort, although, related to MNEs, subsidies do not incentivize expenditures for activities far from the market.

Keywords: PSM, MNEs, public policy, innovation

AI-Powered Carbon Footprint Tracking for Green Banking: Insights for Smart Economic Planning and Sustainable Finance

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Abstract

The need to counter climate change, juxtaposed with economic instability and shifting regulation worldwide, has set sustainable finance high on the agenda of all banks globally. At the spearhead of this revolution is green banking, at the center of which are green financial products, digitalization as a key component, and mainstreaming sustainability in business. Artificial intelligence (AI) has been a change driver in green finance with the capacity to drive predictive analysis, real-time monitoring, and personalized digital engagement. The study examines the capacity of AI-powered technology to drive digital sustainability for banks with specific reference to Turkey's QNB Finansbank.

The research employs the benchmarking methodology by comparing QNB Finansbank with three comparable banks—Garanti BBVA, ING, and HSBC—having set gold-standard green sustainable finance and innovative digital banking records. The 13-point weighted benchmarking matrix was developed to compare the major areas of AI-enabled green banking such as live carbon footprint tracking, customer sustainability dashboard, ESG integration through AI, and green funding product integration in mobile applications. This is a framework model of the complete evaluation of how good and how far institutions were. QNB Finansbank's progress in AI-contained sustainability work is negligible compared to others. Out of 13 weighted points, QNB can only manage 4, or critical shortfalls. They have no carbon footprint calculators on a mobile phone, real-time AI-based tracking of transactions for the world, and customer engagement features to support sustainable consumption. Conversely, Garanti BBVA scores highest on the mark because of its ground-breaking digital sustainability solutions, such as AI-based carbon footprint and individualized advice. ING and HSBC are also among the

highest scorers, ING's "Carbon Insights" and HSBC's sustainable finance being best-practice examples.

These outcomes have far-reaching institutional and policy implications. For QNB Finansbank, the absence of the carbon monitoring tools with AI capabilities eroded its competitive advantage and left it out of being a successful participant in fulfilling Turkey's climate and sustainability ambitions. Overall, the report is emphasizing the necessity of having a closer regulatory framework and industrial policy to prompt banks to employ AI-powered sustainability solutions. These policies are most relevant to Turkey, hoping to be aligned with the European Green Deal, the Paris Agreement, and international financial sustainability standards.

Beyond the case study, the assessment mirrors the overall potential of AI to enable the transformation of the banking sector into a sustainable development driver. Artificial intelligence technologies enable banks to transcend customer interaction in real-time emission-reduction choices, ESG integration into risk assessment and credit rating, and supporting the financing of low-carbon economies. These technologies increase not only institutional competitiveness but also national and international sustainability agendas. In addition to this, the connection between green banking and AI is quite specifically linked with smart economic planning and industrial policy, which are the most critical issues in recent economic growth.

Finally, the article concludes by presenting strategic recommendations to QNB Finansbank. Some of these suggestions include introducing an AI-driven carbon footprint tracking function in its mobile banking app early on, integrating ESG information into AI-driven risk models, and leveraging digital campaign awareness to drive customers towards more sustainable consumption. Developing more effective partnership with tech suppliers, regulators, and international institutions is also proposed to accelerate the roll-out of AI-driven green finance instruments. Through implementation of these programs, QNB Finansbank will be able to improve its competitiveness, increase its alignment with national purposes in sustainability, and transform itself into a regional green banking champion using AI.

Briefly speaking, in this study, it is discussed how AI technologies are arising as the focal point of the future of banking, green growth, and economic policy-making. In accordance with benchmarking analysis, the paper lays enormous stress on how QNB Finansbank must implement AI-technology-based green banking strategies to compete, fulfill its environmental duty, and green and support the financial system.

Keywords: green banking, artificial intelligence, sustainability, benchmarking, QNB Finansbank

Governance, Partnerships, and Sustainable Development: The Role of Public Sector Capacity in Advancing SDG 16 and SDG 17 in Albania

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Abstract

Corporate governance is obviously a matter of global concern and has gained tremendous importance in recent years in the context of globalization of economies and financial markets. At its heart, corporate governance is concerned with aligning the interests and behavior of managers with the interests of the owners of the firm. Public entities' Corporate Governance is a concept that is gaining more and more field both in specialized literature and in practice. The public bodies' Corporate Governance as leadership and control method involves a set of clear rules and principles such as integrity, honesty / sincerity, transparency and responsibility, clear risk management and control mechanisms, elements needed to achieve the purpose of public entities, which is satisfying public needs. The purpose of the paper is to achieve an academic analysis of the development process of the Corporate Governance concept in public entities and of how it is an efficient governance form. Better governance also reduces the risk of macroeconomic instability. The researchers are focused on exploring the connection of SDG 16 (Peace, Justice, and Strong Institutions) and SDG 17 (Partnerships for the Goals) in the context of Albania, with a particular focus on how institutional capacity in the public sector drives the country's ability to forge and sustain international partnerships. A mixed methodological approach is adopted, combining descriptive trend analysis, regression modeling, and document review of national SDG reports and EU progress evaluations. The findings highlight that improvements in institutional quality—particularly in rule of law, administrative efficiency, and anti-corruption reforms—enhance Albania's capacity to attract external resources, foster technology transfer, and align with broader industrial policy and sustainability objectives. This paper will contribute to the broader debate on industrial development and economic resilience, underscoring the role of governance reforms in enabling small economies like Albania to navigate technological transformation, regional competition, and global economic rebalancing.

Keywords: SDG 16, SDG 17, governance, partnerships, industrial policy, sustainable development, Albania

Carbon Footprint Applications Within The Framework of Türkiye's Climate Law and Its Effects on Customs and Foreign Trade Policies

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Abstract

Global climate change has become one of the most significant global challenges reshaping the economic and environmental policies of states. Reducing carbon emissions and achieving sustainable development goals necessitates a new transformation, particularly in terms of foreign trade policies and customs processes. In this context, the Climate Law, adopted by Türkiye in 2025, provides a comprehensive legal framework in line with the carbon neutrality target and paves the way for the integration of carbon footprint calculations and reporting practices with foreign trade.

The European Union's European Green Deal and Carbon Border Adjustment Mechanism (CBAM) regulations create new opportunities and risks in foreign trade relations for countries operating in carbon-intensive sectors. These regulations directly integrate policies aimed at reducing importing countries' carbon footprints into international trade and mandate carbon reporting for accessing foreign markets. From Türkiye's perspective, CBAM implementations are expected to have direct impacts on export-heavy sectors, such as industrial products, motor vehicles, machinery and mechanical equipment, iron and steel products, and mineral fuels. Therefore, carbon footprint management is of strategic importance not only for environmental sustainability but also for maintaining competitiveness in foreign trade.

This study examines the concept of carbon footprint within the perspective of Türkiye's Climate Law and analyzes its connection to customs practices. Integrating carbon reporting processes at customs with digital platforms, in particular, will both increase the accuracy of emissions data and strengthen transparency in international trade. The development of digital customs applications enables the automatic verification of emissions measurements at border crossings, coordinated databases, and reporting in line with international standards. In this context, digitalization stands out as a critical tool for both improving environmental performance and streamlining foreign trade processes.

However, the impact of carbon footprint management on foreign trade policies is not merely a matter of technical compliance; it is also a strategic area of transformation. Türkiye needs to diversify its export markets, align production processes in carbon-intensive sectors with low-emission technologies, and effectively utilize green financing instruments. In this regard, public-private partnerships, green investment incentives, and strengthening carbon certification mechanisms stand out as key elements to support sustainability in foreign trade.

One of the study's key conclusions is that carbon footprinting practices have acquired not only an environmental but also an economic regulatory function in the foreign trade regime. Turkey's ability to maintain its competitive advantage and minimize carbon compliance costs in trade with the EU and other global actors depends largely on strengthening its carbon reporting infrastructure and expanding digital customs practices. Turkey's Medium-Term Program, adopted on September 7, 2025, covering a three-year period starting from 2026, addresses accelerating technological transformation in the transition to a green and digital economy as one of its main objectives. Therefore, policymakers must coordinate trade and environmental policies in line with carbon neutrality targets.

Consequently, the integration of carbon footprint management and customs practices plays a critical role in Türkiye's compliance with its climate commitments and its ability to maintain its competitiveness in international markets. In this context, accelerating digitalization, aligning carbon reporting standards with international norms, and supporting the green transformation with financial instruments constitute the cornerstones of a sustainable foreign trade strategy.

Keywords: Carbon Footprint, Climate Law, Customs, Foreign Trade, European Green Deal, Digitalization

From Complexity to Prosperity: Economic Complexity's Impact on BRICS Wealth (2000–2020)

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Abstract

The measurement of national welfare has long been based on traditional macroeconomic indicators such as GDP, savings rate, employment rate, or fixed capital investments. However, these indicators do not fully capture the multidimensional nature of economic wealth in a globalized and technology-driven world. This study proposes the Economic Wealth Index (EWI) as a new composite indicator reflecting the structural and institutional dimensions of welfare and examines the impact of economic complexity on economic wealth in BRICS countries through this index.

The research covers the BRICS countries—Brazil, Russia, India, China, and South Africa—over the period 2000–2020. As dynamic and emerging economies, these countries provide a critical sample to analyze the role of technological transformation and institutional change in long-term growth. The core research question is: If the EWI measures economic wealth comprehensively, to what extent is this wealth explained by economic complexity (ECI), and what does this reveal about the technological foundations of development?

Methodologically, the study consists of three stages. First, the Economic Wealth Index (EWI), a composite index covering economic, social, and institutional indicators, was constructed using the Principal Component Analysis (PCA) method. Second, panel unit root and cointegration tests (Fisher-Augmented Dickey-Fuller [ADF], Pedroni) were applied, confirming the existence of a long-term relationship between EWI and ECI. Finally, short-run effects were estimated using the panel fixed effects model with Driscoll–Kraay robust standard errors, while long-run effects were assessed through the Panel Dynamic Ordinary Least Squares (PDOLS) method.

The findings are consistent and significant. In the short run, the fixed effects model indicates that a one-unit increase in ECI leads to an approximate 1.49-unit increase in EWI ($p<0.01$). In

the long run, the Pedroni cointegration test confirms cointegration, and PDOLS estimates show that a one-unit increase in ECI raises EWI by about 1.82 units ($p<0.01$). These results demonstrate that economic complexity—defined as technological capacity, product sophistication, and knowledge intensity—is a critical determinant of wealth creation in BRICS economies.

The contribution of this study is twofold. First, conceptually, the Economic Wealth Index (EWI), developed as a new measure of welfare beyond GDP-centered metrics, has been restructured and applied to the BRICS countries. Second, using this index, the short- and long-term effects of economic complexity on economic wealth have been analyzed through panel econometric methods. Empirical findings reveal that higher economic complexity is not only correlated with economic outcomes but also acts as a causal factor that enhances economic wealth in the long run. At the policy level, these results highlight the need for BRICS countries to prioritize strengthening technological capacity, diversifying production structures, and reinforcing innovation ecosystems.

In conclusion, this study integrates composite index methodology with panel econometrics to show that technological sophistication is not merely an outcome of development but also a fundamental determinant of economic wealth. Thus, it provides a new measurement tool and a fresh analytical perspective on the determinants of welfare for the rising economies of the 21st century.

Keywords: Economic Wealth Index (EWI); Economic Complexity Index (ECI); Principal Component Analysis (PCA); BRICS; Panel Data Analysis

From the Balkans to Turkey: Why some economies lag behind while others succeed in technological development.

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Abstract

Technological development is one of the main determinants of economic growth and competitiveness in the era of rapid technological, geopolitical, and environmental change. Although the Balkan countries, including Albania, have undertaken steps toward digitalization and the green transition, they continue to lag behind compared to the European Union and other regional economies. By contrast, Turkey represents an example of an economy that has applied active industrial policies and sustained investments to enhance its technological capacity, particularly in strategic sectors such as defense, energy, and transportation. This paper aims to analyze the key reasons why the Balkans remain in a peripheral technological position, including low levels of investment in R&D, brain drain, uneven digital infrastructure, and the absence of long-term industrial strategies. At the same time, it examines Turkey's experience, which, although facing challenges such as dependency on foreign technologies and regional inequalities, has managed to build a strong profile in strategic technologies through state intervention and innovation support. The comparison highlights the need for Balkan countries to develop more proactive industrial policies, based on public-private partnerships, orientations toward digitalization and the green transition, and greater involvement of SMEs in global value chains. The findings suggest that an integrated industrial policy, supported by EU funds and regional cooperation, could reduce the technological gap and improve the economic resilience of the region. The originality of this paper lies in comparing the Balkan countries' approaches with Turkey, providing an analytical framework to understand why some economies lag behind while others succeed in leveraging technological transformations.

Keywords: Balkans, Albania, Turkey, industrial policy, digitalization, technological development, innovation, R&D, regional economy

Property rights enforcement and Albania's ongoing challenges to sustainable development

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Abstract

This paper examines the relationship between property rights, judicial enforcement, and sustainable development, focusing on the case of Albania. For more than thirty years, Albania has struggled to resolve the legacy of property confiscation and restitution left by its socialist past. Thousands of individuals have brought cases before the European Court of Human Rights (hereinafter the European Court or the ECtHR), which has repeatedly found violations of the right to property and ordered remedies. Yet, enforcement of these judgments has been partial and inconsistent. The persistence of this problem illustrates how unresolved property rights undermine not only the rule of law but also long-term economic development.

Secure property rights are fundamental for building trust, attracting investment, and enabling sustainable growth. In Albania, the absence of clarity in land ownership and the non-execution of court judgments have slowed investment in sectors such as energy, infrastructure, and tourism. Both domestic and international entrepreneurs hesitate to expand when ownership is disputed, and foreign investors view legal uncertainty as a major risk. This has limited Albania's ability to fully integrate into regional and European markets, especially at a time when global supply chains are shifting, and economies are competing to attract capital and technology.

Also, the impact of weak property rights extends beyond investment. Albania still faces pressing needs pertaining to urban planning and environmental protection, all of which depend on clear legal frameworks for property and land ownership. Unresolved disputes complicate efforts to develop renewable energy projects, to adapt to climate change, and to modernise the country's agriculture. In this sense, the inability to enforce property rights is not a narrow legal issue but a broader obstacle to economic modernization and resilience.

This paper further argues that consistent enforcement of the European Court's judgments is a strategic necessity for Albania's future. By guaranteeing effective remedies and establishing a transparent property regime, the country would signal reliability to both citizens and international partners. Stronger property rights would reduce corruption, increase social trust,

and create a stable foundation for industrial strategies that depend on long-term investment. For example, large infrastructure projects, digitalization of property registers, and the expansion of green energy require legal certainty that only enforceable rights can provide.

To conclude, the analysis also aims to highlight the social dimension of property disputes, as for many families, unresolved claims are tied to questions of justice, dignity, and fairness. Failure to resolve these disputes perpetuates inequality and undermines faith in institutions. Therefore, a credible system of enforcement would not only improve Albania's investment climate but also strengthen its democratic legitimacy.

Keywords: Property rights, ECtHR, legal certainty, economic development, sustainable development

Transforming the Ceramic Industry through Industry 4.0: A Quantitative Life Cycle Assessment of Resource Efficiency and Emission Reduction

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Abstract

The ceramic industry represents a highly resource- and energy-intensive manufacturing sector, with significant environmental impacts spanning its entire life cycle, from raw material extraction to product disposal. As global industrial policies increasingly emphasize sustainability, efficiency, and climate responsibility, the integration of Industry 4.0 technologies emerges as a transformative approach to mitigate environmental burdens while enhancing production performance. This study provides a comprehensive quantitative assessment of how Industry 4.0 adoption—encompassing sensor-based quality monitoring, digital logistics management, artificial intelligence-driven process optimization, and smart energy systems—affects resource consumption, emissions, wastewater generation, and recycling efficiency within ceramic manufacturing processes.

Using a life cycle perspective, pre- and post-Industry 4.0 scenarios were analyzed across all major stages of ceramic production. At the raw material procurement stage (A1), conventional inputs such as kaolin, feldspar, clay, and quartz generated substantial dust and CO_2 emissions. Implementation of sensor-supported quality control and digital inventory systems reduced dust emissions by 15% and CO_2 emissions by 10%. Similarly, in raw material transportation (A2), the replacement of diesel-based logistics with electric vehicles and AI-enabled route optimization achieved reductions of 20% in CO_2 and 25% in NO_x emissions.

During the production stage (A3), water consumption decreased by 15% from 10,500 to 9,000 m^3/day due to advanced process monitoring and recycling systems. Natural gas demand dropped by 17% from 4.2 to 3.5 million Sm^3/year, while electricity use declined by 10% from 30 to 27 million kWh/year, reflecting the benefits of energy-efficient furnaces and predictive maintenance enabled by Industry 4.0. Wastewater management also showed marked improvements, with discharge volumes reduced by 20% and COD concentrations lowered by

18%. Emission profiles were significantly mitigated: SO_2 decreased by 15%, NO_x by 18%, CO by 12%, and particulate matter by 20%. These results underscore that Industry 4.0 adoption not only optimizes energy and water use but also meaningfully diminishes environmental pollutants across the production lifecycle.

Beyond direct environmental improvements, Industry 4.0 facilitates enhanced energy recovery and circularity in ceramic manufacturing. Advanced cogeneration systems improved energy recovery by 25%, while digital monitoring of waste streams enabled a 20% increase in recycled material substitution, promoting both cost savings and sustainable resource management. In the use phase (B1) and end-of-life scenarios (C1, D1, D2), smart energy management and digital dismantling strategies further contributed to CO_2 and particulate reductions, highlighting the cross-cutting impact of digital transformation across the full life cycle.

Despite these substantial benefits, the transition to Industry 4.0 introduces structural challenges. Investment costs for advanced sensors, AI systems, and energy-efficient equipment are significant, potentially affecting short-term production economics. However, the long-term advantages—including increased operational resilience, enhanced competitiveness, alignment with sustainability goals, and improved regulatory compliance—demonstrate a compelling business case for digital transformation. Evaluation indicators reveal a high level of awareness (4/5) and a very high necessity for transition (5/5) within the sector, positioning Industry 4.0 adoption as a strategic imperative for the global ceramic industry in light of climate commitments and evolving industrial policies.

In conclusion, this study highlights that Industry 4.0 serves as a dual enabler of environmental performance and strategic industrial development. By quantifying reductions in resource consumption, emissions, and waste, as well as improvements in energy recovery and recycling, the research provides actionable insights for policymakers, industry leaders, and sustainability planners seeking to balance economic growth with ecological responsibility. The findings underscore that the digital transformation of ceramic manufacturing is not merely a technological upgrade but a comprehensive pathway toward sustainable, competitive, and resilient industrial systems.

Keywords: Ceramic industry, Industry 4.0, life cycle assessment, energy efficiency, emission reduction, digital transformation, sustainable industrial policy

Industry 4.0, Machine Learning, and Green Industrial Policy: Evidence from Textile SMEs in Turkey

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Abstract

In the contemporary global economy, which is increasingly defined by the intersecting dynamics of industrial digitalization, sustainability, and climate change, small and medium-sized enterprises (SMEs) have emerged as both vital economic actors and critical contributors to environmental challenges. The textile sector, particularly in developing economies such as Turkey, is simultaneously energy-intensive and highly dependent on resource efficiency, making it a priority field for evaluating the transformative potential of Industry 4.0 (I4.0) technologies. Despite growing academic attention, the empirical evidence on how digital transformation affects the environmental performance of SMEs remains limited, especially in non-European contexts. This study contributes to closing this gap by systematically investigating the environmental outcomes of I4.0 adoption among 30 textile SMEs in Turkey, drawing on a comprehensive mixed-methods research design.

Data were collected from structured surveys, operational logs, and resource consumption records (electricity, water, natural gas, and waste). To translate raw operational data into standardized sustainability indicators, carbon footprint equivalents (kg CO_2-eq) were calculated using internationally recognized emission factors. The empirical framework combined descriptive and inferential statistics, scenario-based forecasting for 2025–2030, and advanced machine learning algorithms—including XGBoost, CatBoost, and Random Forest—augmented with SHapley Additive exPlanations (SHAP) for model interpretability. This multi-method approach enabled both rigorous prediction of environmental outcomes and an understanding of the relative importance of perceptual, organizational, and operational factors in driving carbon reductions.

The results indicate that digital transformation yields measurable and statistically significant environmental improvements across multiple dimensions. Post-I4.0 adoption, electricity-

related emissions decreased by 2%, natural gas consumption by 8%, and waste generation by 5% ($p < 0.001$). Scenario-based projections further demonstrate that, under a high-digitalization pathway characterized by extensive deployment of IoT-enabled monitoring, smart grids, and AI-driven process optimization, textile SMEs could achieve cumulative reductions of up to 17.3% in total carbon footprint by 2030. Importantly, feature importance and SHAP analyses revealed that actual operational metrics—such as resource consumption and forecast error variables—were the most robust predictors of environmental performance. By contrast, perceptual and strategic readiness indicators (e.g., I4.0 awareness, perceived transition need) had negligible predictive weight, underscoring a persistent gap between conceptual acknowledgement of digital technologies and their operational integration within SMEs.

The study's findings provide important theoretical and practical contributions. First, they empirically validate the argument that data-driven digitalization can serve as a cornerstone of SME decarbonization strategies. Second, they demonstrate the effectiveness of machine learning-based approaches in modeling and forecasting SME carbon footprints, offering methodological innovation for future sustainability analytics. Third, the research highlights the centrality of operational behavior and infrastructural change—rather than awareness or intention—in determining environmental outcomes, suggesting that effective policy must extend beyond information campaigns to targeted support for implementation.

Policy implications are particularly salient in the Turkish context, where SMEs dominate the national economy but face constraints in financial resources, digital maturity, and access to green technologies. The results point to the need for dedicated green financing mechanisms, SME-specific digitalization grants, and tax incentives to mitigate adoption asymmetries. Investments in digital infrastructure and technical training are likewise essential for bridging the gap between awareness and execution. Moreover, integration of I4.0 technologies with green industrial policy frameworks could enhance not only firm-level efficiency but also national competitiveness within the broader context of global decarbonization commitments.

In conclusion, this study demonstrates that Industry 4.0 adoption within the textile SME sector in Turkey yields statistically significant and policy-relevant reductions in carbon footprint. By integrating statistical evidence, scenario-based projections, and machine learning models with interpretability tools, the research provides a nuanced and empirically grounded account of the sustainability potential of digital transformation. The findings reaffirm that industrial digitalization and climate action are not mutually exclusive but rather mutually reinforcing processes, positioning SMEs as key actors in the transition toward a green and digitally enabled economy.

Keywords: Industry 4.0, Textile SMEs, Carbon Footprint, Machine Learning, Sustainability, Digital Transformation, Green Industrial Policy

Firm Size Premium: Productivity vs. Rent Sharing —Evidence from Matched Employer–Employee Data

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Alper Yıldırım

Abstract

We exploit Turkish matched employer–employee data to quantify the level and evolution of the large-firm wage premium (LFWP). Using worker and firm fixed-effects models, we show that larger firms pay higher wages for two reasons: (i) composition/sorting—large firms employ more productive workers—and (ii) firm-specific pay premia, whereby observationally similar workers earn more at larger firms. The overall LFWP remains sizable but has attenuated in recent years; this decline is driven mainly by weaker positive sorting of high-skill workers into high-paying large firms, while the gap in firm-specific pay premia between large and small firms has remained relatively stable. Decomposing the pay-premia gap, we find that it is largely driven by rent-sharing differentials between large and small firms, with productivity differences playing a smaller role. The contribution of rent sharing to these premia differentials declines over time, suggesting structural changes in the Turkish labor market.

Keywords: Firm Size Wage Premium, Rent Sharing, Productivity, Two-way Fixed Effects

Theoretical and Conceptual Approaches to the Phenomenon of New Regionalism

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Abstract

The phenomenon of "new regionalism" represents a contemporary trend in the analysis of international relations and territorial development, emerging in the context of global transformations after the end of the Cold War. Unlike "old regionalism," which was mainly focused on formal economic integration between states, new regionalism is multidimensional, encompassing economic, political, cultural, social, and security aspects. It is no longer solely state-driven, but also involves non-state actors such as NGOs, local authorities, and subnational regions.

In theoretical perspective, new regionalism is analyzed through various paradigms—from neoliberalism to constructivism—that highlight growing interdependencies and the fragmentation of the traditional international order. The process is influenced by globalization, which does not diminish the importance of regions but rather reconfigures them as strategic actors in global networks. A "bottom-up" orientation is observed in the formation of regional identities and interests, with emphasis on complementarity and interregional cooperation.

New regionalism is often perceived as a form of alternative governance, adaptable to local contexts yet connected to global dynamics. Therefore, it provides a relevant theoretical and practical framework for understanding the new forms of regional organization in a multipolar and complex world.

Keywords: region, regionalization, new regionalism, international relations.

Industrial Policy, Economic Strength, and Supply Chain Safety in the Age of Digital, Green, and Trade Changes

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Abstract

Trade wars, geopolitical tensions, and overlapping environmental and health crises have massively disrupted supply chains over the past decade. Industrial policy has therefore emerged as a strategic tool for countries to reinforce competitiveness, including fostering innovation and securing economic autonomy. Thus, digital transformation and green transition are not an alternative but rather a prerequisite of existence and development. This paper discusses the interlinkage between industrial policy, economic resilience, and supply chain security with particular reference to their existing dual dynamics in small economies against the major global powers. It further dwells on how industrial structures are being remodeled due to the ongoing US-China & EU-China trade wars, plus changes in supply chain dependencies brought about by these conflicts that lead to production capacity relocation. The opportunities arising from this adversity, which could enable seamless integration into global value chains while providing protection, will be further complicated by challenges faced by smaller economies. It analyzes the policy tools available to ensure trade openness, balance with national economic security, and innovation, sustainable manufacturing, and technological transfer policies under the framework of Industry 5.0. This paper tries to draw actionable approaches to resilient, competitive, and sustainable industrial systems in a well- connected but highly vulnerable global economy by bringing such issues from a comparative perspective.

Keywords: industrial policy, economic resilience, supply chain security, trade wars, Industry 5.0.

Regional Development, Innovation, and the Future of Industry

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Abstract

Albania, as part of the developing countries, is increasingly engaged in innovation due to the importance that innovation has as a key pillar of regional development. The multidimensional character of innovation is seen as a necessity for economic development, modernization of the public sector, improvement in the quality of services, improvement in the education system and quality of life.

According to a definition made by Baregheh et al. innovation is a multi-stage process where organizations transform ideas into new products, services or processes to advance, compete and differentiate successfully in the market. OECD introduces us with the concept of Responsible Innovation as a process guided by democratic values, trustworthy and socially responsible which includes the engagement of civil society actors, assessment of consequences and the balance between risks and benefits.

The European Union, as an institution promoting cohesion policies between states, aims to reduce major inequalities between states by promoting economic development. The EU's role is essential in supporting countries like Albania in developing sustainable innovative policies. In order to have innovative development, governments of regional countries must draft policies harmonized with EU innovation policies. In this context, it is worth appreciating the commitment of Albania, as an EU candidate country, regarding the initiatives undertaken in the approximation of its legislation and innovation policies with those of the EU. Albania is already part of the Horizon Europe research and innovation program, which gives local actors the opportunity to become part of research activities on equal terms with other European Union member states. In addition, it is part of COSME, a program that supports innovation and entrepreneurship of small and medium-sized enterprises. An important step is also the participation of Albania in the Western Balkans EDIH network, as part of the EU enlargement plan.

This paper aims to present a clear picture of the important steps that Albania has taken in the framework of harmonizing innovation policies with community ones, national and international strategies, innovative initiatives built on EU support programs, challenges and objectives set.

Keywords: Innovation, Regional Development, EU and support programs, Western Balkans, Albania, developing countries, Horizon Europe, COSME, EDIH

Rebalancing the AI Economy: Strategies for Enhancing Latin America's Competitiveness in the Global AI Era

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Abstract

The development and competition of artificial intelligence (AI) technologies over the past few years have significantly reshaped the global economic landscape, concentrating technological capabilities and economic benefits in a few leading countries, particularly the United States, China, and Europe. This concentration has created a growing competitiveness gap for regions like Latin America, which face structural challenges in innovation capacity, industrial policy alignment, and digital infrastructure. Addressing this gap requires strategic interventions that align AI adoption with regional economic development goals.

This study explores the concept of rebalancing the AI-driven economy in Latin America, focusing on the interactions between industrial policy, global competition, and regional development. This explores the current state of AI adoption in selected Latin American countries, including Brazil, Mexico, and Chile, analyzing their respective innovation ecosystems, Research and Development (R&D) capabilities, and integration of AI into industry and public policy. By considering these factors, the paper identifies critical obstacles that limit the region's ability to participate competitively in the global AI economy.

The paper further investigates the role of industrial policy in mitigating global economic imbalances. Policies that foster investment in AI, promote technology transfer, and support small and medium-sized enterprises (SMEs) are key to mechanisms for increasing regional competitiveness. In addition, the study examines how AI can enhance productivity and efficiency in sectors such as manufacturing, agriculture, and services, while aligning with sustainability goals through green technology initiatives.

Finally, this work proposes a framework of strategic recommendations for policymakers and industry stakeholders aimed at rebalancing the AI economy in Latin America. These include strengthening regional innovation networks, incentivizing cross-border AI collaborations, and

developing targeted workforce training programs to equip the labor market with AI-related skills. The framework is intended to guide actionable steps toward reducing the digital and economic divide while fostering long-term, sustainable growth.

By addressing the intersection of AI adoption, industrial policy, and global competitiveness, this study contributes to the broader discourse on economic rebalancing in the era of technological transformation, providing insights that are relevant to both regional and international stakeholders. This paper offers a concrete, region-specific perspective on how Latin America can navigate the challenges and opportunities presented by the AI-driven global economy.

Keywords: Artificial Intelligence, Latin America, Industrial Policy, Economic Rebalancing, Global Competitiveness, Innovation Ecosystem, Sustainable Development

Adaptive Industrial Policy: AI as a Tool for Smarter Governance

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Abstract

Industrial policy is now a key tool for governments, especially in fields like green technology, semiconductors, and supply chains. Traditionally, its design has depended on trial and error by bureaucracies, as seen in China's pilot zones and Western regulatory sandboxes. These methods offer valuable feedback but can be expensive, slow, and inefficient. This paper explores how artificial intelligence simulations could serve as 'virtual pilot zones' for industrial policy. By simulating a range of risks, AI can help with feedback and unexpected outcome prediction. AI simulations can therefore speed up decision-making, reduce rent-seeking, and lower the possibility of costly errors. As a result, AI simulations can decrease the likelihood of expensive mistakes, speed up decision-making, and lessen rent-seeking. AI can encourage a more open and adaptable approach to industrial policy in an era of growing global competition, even though it cannot be held politically accountable. Additionally, AI simulations provide a more economical means of testing industrial policy. They can be used to make predictions in relation to when the policy loses its cost-effectiveness. However, if the data is unreliable or biased, it could mislead the policymaker. Therefore, to be reliable and accurate, you would need objective, accurate data and transparent models on the results will be put to. It is possible to set up models in a way that the policymaker gets the answer they want.

AI simulations move policy testing from real-world communities to computer models, unlike China's pilot zones or Western sandboxes that inspired this idea. This model raises concerns about accountability, even though it can speed up governance. Policymakers could also run the model in their own favour. Furthermore, there is also the matter of AI systems, some of which are inscrutable, which makes it difficult to assess the accuracy of the results or interrogate the assumptions on which the models are based. Used appropriately, simulations can help to improve policy; they can provide good feedback and insights while leaving space for human judgment and oversight. To make this work, it is important to manage data carefully and use

transparent models so that AI analyses decisions without taking over from human administrators.

Industrial policy is an established term that is understood to be a way of structuring economic change and bolstering national development. Various theorists (Dani Rodrik and Ha-Joon Chang) have observed how it can promote structural change, push technological change, and provide support to strategic sectors. Critics have observed the inefficiencies and potential worsening of political manipulation. A selection of more recent studies on AI conducting similar roles in governance point to strategic uses, in particular, for predictive modelling, fiscal policy, urban design (and other planning), and mostly on efficiency. However, few studies specifically address the use of AI in industrial policy design. This gap suggests that AI-driven "virtual pilot zones" could merge the experimental insights of traditional methods with the speed, adaptability, and cost-effectiveness of computational simulations, forming a new model for policy experimentation.

This paper uses a mixed-methods approach that includes data analysis and case study evaluation. First, it examines existing datasets on trade flows, labor markets, technology adoption, and industrial subsidies to identify patterns and assess traditional policy outcomes. Second, it uses theoretical case studies to demonstrate how AI-driven simulations could forecast efficiency peaks and vulnerabilities across various timelines and scenarios. Examples of these include semiconductor incentives and subsidies for renewable energy. The methodology highlights the technical potential of AI simulations as well as the governance challenges of incorporating them into industrial policy design by fusing quantitative analysis with illustrative examples.

AI simulations provide a new way to design industrial policy. They help policymakers see how different actions might work in various economic, technological, and political situations. Unlike older models that rely on simple assumptions and past data, AI can test many scenarios and spot risks before policies are put in place. This leads to better, more flexible decisions. When used well, AI's virtual pilot zones can make policy more transparent, efficient, and forward-looking.

Contribution of Public Environmental Expenditures to Green Transformation at the Provincial Level in Türkiye

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Abstract

Environmental problems have become a threat not only to ecological balance but also to economic and social sustainability. Problems such as air pollution, increased hazardous waste, and water resource contamination can reduce the quality of life in societies and generate economic costs. In this context, green transformation plays a critical role in achieving both environmental and economic sustainability. Green transformation encompasses the economic and social transformations necessary for the emergence of environmentally friendly production and consumption processes and the efficient use of natural resources. Public spending, in particular, stands out as a critical factor in this transformation. Consequently, the pressures caused by environmental problems have led public authorities to develop increasingly comprehensive policy and investment programs. This transformation represents a holistic process that not only addresses environmental protection but also enhances economic competitiveness and social welfare.

From an environmental economics perspective, public expenditures are an indispensable tool for generating social benefits, reducing negative externalities, and supporting sustainable growth in areas where market mechanisms are inadequate. In Türkiye, municipal environmental investments, particularly those undertaken by municipalities, contribute to local-level improvements in air quality, effective waste management, and conservation of natural resources. However, regional disparities and interprovincial inequalities are among the factors limiting the effectiveness of public policies. Therefore, it is important to scrutinize not only the

amount of public resources but also the areas, methods, and scales to which they are allocated. The findings of this study aim to contribute to the spatial literature on environmental economics by providing insights into the extent to which public policies play a guiding role in the green transformation process in Türkiye.

The research examines the relationship between environmental spending by municipalities at the provincial level for the period 2009–2016 and indicators such as air pollution, wastewater management, municipal waste, and hazardous waste disposal methods. Maps prepared using the GeoDa program, based on a quartile distribution, illustrate the differences in spending across provinces and the extent to which these differences align with environmental indicators. Assessing spending not only in terms of financial aspects but also in terms of environmental performance allows for a more comprehensive discussion of the potential impact of public resources on green transformation.

Therefore, when these maps are examined, the relationship between municipal environmental spending and air pollution reveals regional differences. High spending levels are observed in the coastal Aegean, Marmara, and Central Anatolia regions. Pollution is observed to be decreasing in some provinces of these regions. Despite high spending in the major industrial centers of Marmara, pollution persists, while in Eastern and Southeastern Anatolia, spending is concentrated in certain provinces, and a reduction in air pollution is observed in these provinces. In the Black Sea, since pollution levels are low, expenditures also remain low.

In terms of wastewater, high expenditures are in place in much of the Aegean, Mediterranean, and Marmara regions, and these expenditures appear to impact wastewater discharge volumes. Expected wastewater discharge levels are not being achieved in some provinces in Western and Eastern Marmara. Low wastewater discharges have led to low expenditures in the Black Sea and Eastern and Southeastern Anatolia regions. While high wastewater discharge capacity is observed in the central parts of Central Anatolia and in some provinces of Marmara, Western Black Sea, and Southeastern Anatolia, some provinces in these regions exhibit a low expenditure trend. Municipal waste disposal exhibits spatial patterns similar to wastewater.

Comparing municipal environmental expenditures with the hazardous waste map reveals that while high spending is concentrated in the Marmara, Coastal Aegean, and Mediterranean regions, hazardous waste collection and recycling remained at high levels. These regions demonstrate a significant increase in spending. The Central Anatolia Region exhibits a more heterogeneous structure. In the Black Sea, Eastern, and Southeastern Anatolia regions, low spending is observed, largely due to low hazardous waste recycling levels.

The relationship between municipal environmental spending at the provincial level and indicators of air pollution, wastewater, municipal waste, and hazardous waste is not uniform. The impact can be limited, particularly in industrial centers. The effectiveness of environmental spending may depend not only on quantity but also on directing spending to the right areas, considering regional conditions, and regularly monitoring the results. Increasing infrastructure investments in industrial centers and addressing capacity gaps caused by low spending in other regions are crucial.

Keywords: Green Transformation, Environmental Expenditure, Public Policy, Spatial Analysis

Determinants of Housing Price Dynamics Across Turkish Provinces: A Dynamic Panel and Spatial Econometric Approach

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Abstract

Housing price dynamics in emerging markets are shaped by the interaction of macroeconomic conditions, credit market developments, housing regulation, and region-specific shocks. This paper investigates the determinants of provincial housing price growth in Turkey using a panel dataset of monthly Housing Price Index (HPI) values for all Turkish provinces from 2010 to 2025. Given the lack of transaction-level data, we adopt a province-level approach that leverages both cross-sectional and temporal variation to explore the drivers of aggregate price movements. The empirical strategy is threefold. First, we will employ dynamic panel estimators, including system GMM, to examine the short- and long-run effects of mortgage interest rates, construction costs, credit supply, population changes, housing regulations, and macroeconomic shocks (inflation and exchange rate volatility) on provincial housing prices. Housing regulation variables will include measures such as zoning reforms, macroprudential lending restrictions, and housing subsidy or tax incentive programs, coded as province-specific or nationwide policy dummies. Second, we will identify structural breaks in provincial HPI series using Bai–Perron multiple breakpoint tests and assess whether these breaks align with major regulatory or macroeconomic regime shifts, such as credit expansion policies, fiscal stimulus programs, or large-scale infrastructure investments. Third, we will explore spatial dependencies across provinces through a spatial panel model, testing for price convergence and spillover effects that indicate interconnected regional housing markets. We expect to find that credit market conditions, regulatory interventions, and exchange rate fluctuations play significant roles in shaping provincial price growth, with measurable spatial spillovers from

metropolitan hubs to secondary provinces. Structural break analysis is anticipated to reveal that changes in regulatory regimes and macroeconomic stabilization policies coincide with turning points in regional housing cycles, underscoring the importance of institutional factors in price dynamics. By integrating dynamic panel, regulatory event coding, structural break, and spatial econometric approaches, this study aims to demonstrate that even in the absence of microdata, meaningful insights into the interaction between regulation and housing market outcomes can be obtained at the provincial level. The paper concludes by discussing implications for policymakers, particularly regarding the design of credit and housing regulations to mitigate excessive volatility, and suggests directions for future research, including linking regulatory heterogeneity to affordability outcomes and employing satellite-derived indicators to refine sub-provincial analysis.

Keywords: Housing Price Dynamics, Housing Regulation, Dynamic Panel Data, Spatial Econometrics

Inflation, Exchange Rate and Housing Prices in Türkiye: An Augmented ARDL Approach with Structural Breaks

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Abstract

This study investigates the determinants of housing prices in Türkiye, focusing on the effects of inflation and the real effective exchange rate (REER) over the period 2010:01–2025:03. Housing prices directly affect individuals' investment behaviour, quality of life and savings preferences, while also serving as an important indicator in terms of macroeconomic balances. In Türkiye, housing prices have been on an upward trend in recent years due to rising inflation rates, exchange rates and, consequently, price volatility in imported construction materials. As the housing sector is viewed as an investment vehicle, prices are rising at an unstoppable rate. Against this background, the present study provides new empirical evidence on the determinants of housing price dynamics, with a special emphasis on the dual roles of inflation and exchange rate movements.

The study applies the Augmented ARDL model proposed by Sam et al. (2019), explicitly accounting for structural breaks via sharp and smooth breaks. This econometric model offers several key advantages. First, it does not require the dependent variable to be strictly I(1), allowing for mixed orders of integration in the dataset. Second, it provides small-sample and asymptotic critical values, enhancing the robustness and reliability of inference. Third, the inclusion of an extra F-test on the lagged levels of the independent variables, combined with a bootstrap procedure, ensures a clearer and more conclusive determination of long-run

cointegration through three complementary tests. These features make the approach particularly suitable for analyzing Türkiye's housing market, which has experienced both gradual structural shifts and a notable sudden break in 2020, reflecting policy changes and external shocks such as the COVID-19 pandemic.

The results confirm the presence of a long-run cointegration relationship between housing prices and the macroeconomic variables considered. Specifically, long-run estimates reveal that inflation exerts a positive and statistically significant effect on housing prices, while the REER has a negative effect. The theoretical interpretation is consistent with the existing literature. Inflationary pressures drive up construction costs and encourage households and investors to move wealth into real assets, resulting in higher housing prices. Conversely, an appreciation of the domestic currency leads to relatively higher housing prices for foreign investors, limiting external demand, whereas currency depreciation stimulates foreign demand and simultaneously raises import costs, which intensifies inflationary pressures.

The study offers several policy-relevant implications. Maintaining price stability is essential not only to reduce inflationary pressure, but also to ensure long-term financial stability, economic growth, macroeconomic balance and a smoothly functioning supply-demand equilibrium. As a result of this situation, individuals will be able to build up healthy savings or investments, strengthening the climate of prosperity and providing foreign investors with a secure environment for their long-term decisions. Therefore, curbing inflation and stabilising the exchange rate are essential for a stable economic growth model and social welfare in the country.

Overall, this study contributes to the literature by combining an advanced econometric methodology with the explicit treatment of structural breaks to provide robust evidence on the determinants of housing prices in an emerging market context. The findings highlight the intertwined roles of inflation and exchange rate dynamics in shaping Türkiye's housing market and underscore the importance of coherent policy frameworks to support financial stability and sustainable economic growth.

Keywords: Housing Prices, Inflation, Exchange Rate, Augmented ARDL

The Automotive Maintenance Industry Market In Albania

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Abstract

With the increase in the number of vehicles in circulation, the number of services that perform technical maintenance has also increased significantly, because they ensure the technical conditions for the circulation of vehicles. An important place is occupied by individual vehicles used by residents of urban and interurban areas. In this context, the market for performing technical services has also emerged, constituting a separate industry. In this paper, we have analyzed the automotive technical services market in Albania, where the feature is that it is over 80% composed of vehicles purchased on the secondary market with an average age of 15 years, which are associated with high risk. This fleet of vehicles requires the increase of the number of services. The paper analyzes the works carried out for the maintenance of vehicles and the cost of their maintenance in other countries and in Albania. In addition, the formation of the fleet of vehicles in circulation was carried out with vehicles purchased on the secondary market, where it results that the average age of used vehicles is over 15 years and the average mileage is 12,300 km/year. The study shows that the growth of the automotive industry market depends on the growth of used vehicles and the increase in the total number of vehicles. The market for vehicle maintenance within cities has a cost twice as high as in suburban areas. The cost of maintaining a used vehicle is twice as high as that of a new vehicle, therefore the secondary market for used vehicles over 15 years old should be stopped by the government.

Keywords: Car technical maintenance, technical services cost, automobile service mechanics

The Historical Development of the Housing Problem in Turkey A Comparative Analysis Across Countries

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Abstract

Housing—including houses, villas, mansions, summer residences, shelters, camps, and tents—is a subject that has evolved since the dawn of humanity to the present day, shaped by the need for shelter and social status, and has caused crises throughout history. When viewed in terms of its historical development, this problem has become chronic and has not been resolved definitively. The fact that the concept of housing, which is related to our most fundamental right, the right to shelter, is also preferred as an investment tool today, demonstrates that the concept has a multi-faceted structure and impact, not just a physical one. While the housing problem creates financial crises in developed countries, it can create multifaceted and deeper crises in developing and underdeveloped countries For example, from an economic perspective, unplanned urbanization has created serious unemployment problems in terms of health and social environment, while also affecting home ownership rates. The housing crisis is not only a situation where supply cannot meet demand; It also occurs when demand is insufficient to meet supply. While the first situation is observed in cities, housing problems arising from the other situation mentioned are encountered in rural areas.

As we have addressed the crisis and the problem from a supply and demand perspective, war, natural disasters, population growth, migration, and political events are among the other factors affecting the crisis and the problem. Considering the historical flow of Turkey's housing sector in light of these factors, it is observed that the migration from rural to urban areas, which began with the Industrial Revolution, led to faster urban development, while also increasing regional inequality and leading to unplanned urban development. From the Tanzimat period to the War

of Independence, it was observed that the regulations made in this regard, as well as the tax policies implemented and proposed, remained inadequate and unregulated. After the War of Independence, while countries were striving to recover sociologically and economically, urbanization gained momentum, revealing the need for more effective technical and legal regulations on this issue. However, the economic and sociological collapse of the Great Depression in 1929, coupled with delays in the expected urbanization process, continued until the Second World War in 1945. With the economic downturn that occurred in Turkey, regulatory efforts that had been postponed were made effective thanks to NATO support and support funds from the United States in order to solve the housing problem of the developing society In 1973, due to the impact of the Cyprus Peace Operation, the support and investments received by the construction sector in 1945 were not welcomed by the US and Europe, leading to the imposition of certain sanctions on Turkey. After a gap of approximately 10 years, the positive outcome of the collapse of the USSR led to a national and international revival in the construction sector. However, while Turkey's social and political adversities until 1990 paved the way for the 2001 crisis, the impact of the 2008 mortgage crisis was minimized due to the oversight deficiencies in the 2001 financial crisis being addressed. In the following period, until 2020, housing was considered a preferred investment vehicle as it provided more protection against inflation in terms of risk; however, the policies implemented during and after the Covid-19 pandemic increased asset prices worldwide. Looking specifically at Turkey in 2020, the interest rate policy implemented increased housing sales, while fluctuations and uncertainties in the value of the Turkish lira during the process increased demand for housing and caused the housing problem to resurface.

This study examines the historical development of housing in Turkey; housing and housing-related practices in various countries, including Turkey, are analyzed using comparative analysis methods. The analysis reveals that the absence of any deterrent or regulatory sanctions for this problem has made it permanent in terms of legislation.To compare the problem on a general level, when the legislation of Turkey and other countries (USA, Canada, Germany…) is compared in terms of housing and real estate, it has been observed that taxation policies are applied through percentage and per thousand systems. As a result of this comparison, the areas where Turkey was considered to be lagging behind in practice and theory were identified. Accordingly, in order to minimize the impact of the factors causing the housing problem in the general economic sphere, policy recommendations have been put forward, such as budget-friendly, percentage and proportional tax practices that fill legislative gaps and make legislation

clearer and more understandable, and the application of progressive taxation to multiple property owners.

Keywords: Housing Crisis, Property Tax, Ghost House, Supply and Demand, Social Environment

The Effects of Monetary Policy Instruments on Manufacturing Industry Capacity Utilization Rate in Turkey: 2007–2024 Period

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Abstract

The manufacturing industry is one of the most critical sectors of the Turkish economy, both in terms of its contribution to national income and its role in exports. The capacity utilization rate, which reflects the production volume of this sector, provides important information about investment appetite, production efficiency, and the outcomes of economic policies. This study examines the effects of various monetary policy instruments implemented in Turkey between 2007 and 2024 on the manufacturing industry's capacity utilization rate. The primary objective of this study is to examine the dynamic effects of monetary policy indicators, including money supply, policy interest rates, and foreign exchange reserves, on the real sector.

The literature extensively emphasizes that central banks can influence the real economy through various channels using their available monetary policy tools. Tools such as policy rates, reserve requirement ratios, and liquidity regulations primarily influence demand conditions, financing costs, and investment decisions, ultimately impacting production levels. Furthermore, the exchange rate channel can have a significant impact on the manufacturing industry through imported input costs and foreign trade competition. The credit channel, in turn, directly influences firms' ability to utilize their production capacity by altering access to financing. Therefore, the functioning of the monetary policy transmission mechanism can be concretely monitored through fluctuations in real sector indicators such as the capacity utilization rate.

The monetary policy framework of the Central Bank of the Republic of Turkey (CBRT) has undergone significant transformations over various periods, particularly due to economic crises,

global financial fluctuations, and changes in domestic macroeconomic conditions. This study analyzes these transformations in separate periods. Therefore, it aims to reveal the changes in the effects of the three main monetary policy instruments across different periods. Thus, it aims to contribute to the literature on the effects of monetary policy on output and capacity utilization rates, both on an instrumental and periodic basis.

The Vector Autoregression (VAR) model was employed as an econometric method, enabling the examination of dynamic relationships between variables without prior constraints on causality. Appropriate lag lengths were determined using autocorrelation and stability tests; the models were found to be stable. Three different VAR models were used to analyze the impact of monetary policy on capacity utilization through alternative indicators in a comparative manner. The findings reveal that the strongest determinant of the capacity utilization rate is its own past values.

The study's findings reveal that monetary policy instruments have a weak direct effect on the capacity utilization rate in the manufacturing industry, but rather exert an indirect effect through channels of expectations and financial stability. Therefore, monetary policy alone is insufficient for the effective utilization of production capacity; confidence-building, predictable, and structural policies must support it. The decisive role of real sector confidence highlights the importance of transparent and consistent economic policies that strengthen investor and producer expectations. Furthermore, developing sectoral support mechanisms is crucial for building a resilient industrial structure against crisis periods.

In conclusion, the impact of monetary policy on the manufacturing industry capacity utilization rate in Turkey is indirect and limited. To achieve more lasting and robust results, monetary policy must be implemented in an integrated manner with expectation management and fiscal policies that support production. This approach will contribute to both the sustainable increase in industrial capacity and the stabilization of economic growth.

Keywords: Manufacturing Industry, Manufacturing Industry Capacity Utilization Rate, Monetary Policy, VAR, M2, Policy Interest Rate

A New Industrial Policy in The Context of Climate Change: Instruments for Low-Carbon Sustainable Growth

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Abstract

The climate crisis increasingly threatens the fundamental human right to life, while major global markets, particularly the European Union (EU), are rapidly implementing carbon adjustment mechanisms (such as Carbon Border Adjustment Mechanism – CBAM) that require a fundamental transformation of industrial policies. These developments challenge traditional growth models and necessitate a rethinking of industrial strategy to ensure compatibility with a low-carbon future. Within this context, the concept of "New Industrial Policy" emerges as a framework for integrating environmental sustainability into industrial competitiveness, providing policy instruments that not only encourage economic growth but also mitigate carbon-related risks. This paper aims to explore how a new generation of industrial policy tools, including carbon pricing, emissions trading systems, green finance, renewable energy incentives, and targeted R&D support, can be combined with conventional industrial incentives to promote sustainable and low-carbon growth, particularly in Türkiye. The study emphasizes the dual objective of safeguarding economic competitiveness while supporting the transition to a greener industrial structure.

The study adopts a competitiveness-oriented perspective by linking product complexity with carbon intensity, offering a climate-sensitive industrial strategy framework. By examining the interdependencies between export performance, product sophistication, and carbon emissions, the paper aims to provide a nuanced understanding of how low-carbon transition policies interact with sectoral competitiveness. It particularly tries to highlight the role of the EU's CBAM as both a potential challenge and an incentive for Türkiye's export-oriented sectors. Despite the growing literature on industrial policy and climate change, few studies have simultaneously addressed carbon risk and competitiveness at the product level. This paper seeks to fill this gap by offering a systematic analysis of Türkiye's export portfolio through an integrated lens that combines economic complexity, carbon intensity, and trade vulnerability.

Methodologically, the paper utilizes Türkiye's HS4-level export data, matching each product group with complexity indicators to evaluate competitiveness, while sectoral carbon intensity metrics classify products according to their environmental risk profile. Cross-sectional and panel data analyses are conducted to detect patterns in carbon-intensive sectors, and clustering techniques identify groups of products that share similar risk and opportunity profiles. Benchmark modeling is employed to simulate the potential impacts of CBAM on Türkiye's largest export market, the EU, while also exploring mitigation strategies such as investment in energy efficiency, adoption of low-carbon production technologies, and targeted green finance programs. This methodological framework allows for a granular assessment of vulnerabilities, providing actionable insights for policymakers to prioritize sectors for technological upgrading, financial support, or structural transformation.

Preliminary findings suggest that certain high-export-volume products in Türkiye are highly carbon-intensive and therefore particularly exposed to CBAM and similar regulatory measures. Conversely, sectors characterized by higher product complexity and lower carbon intensity are more likely to maintain comparative advantage under a low-carbon global trade regime. These insights offer a roadmap for strategic policy interventions, highlighting sectors where the public sector can facilitate the green transition through partnerships, subsidies, or innovation support, as well as sectors that may require deeper structural changes to remain competitive. Additionally, the analysis underscores the importance of combining industrial policy with climate policy instruments to maximize their effectiveness, demonstrating that well-targeted R&D incentives, green finance mechanisms, and energy efficiency investments can significantly offset potential losses in carbon-intensive industries.

In conclusion, 'New Industrial Policy' represents an evolution in policy design, integrating environmental sustainability directly into industrial strategy to enhance the effectiveness of the green transition while ensuring economic competitiveness. By combining competitiveness metrics with carbon risk assessments, this study not only offers a methodological contribution to the literature but also provides practical guidance for policymakers in Türkiye and other medium-sized economies seeking to balance trade performance, industrial growth, and carbon mitigation. The framework presented here delivers a comprehensive toolkit for long-term sustainable growth, aligning national industrial priorities with international climate commitments, facilitating technological upgrading, and supporting the resilience of export-oriented sectors in an increasingly carbon-constrained global economy.

Keywords: Industrial Policy, Low-Carbon Growth, Competitiveness, Carbon Border Adjustment Mechanism, Green Transition, Turkish Economy

From Factories to Functions: Navigating Deindustrialization through Regional Capability

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Abstract

Turkey's industrial development presents a puzzling contrast. On the one hand, national data points to premature deindustrialization—a decline in manufacturing before reaching high-income status. On the other hand, regions like Ankara seem to be moving in the opposite direction, showing signs of resilience and functional upgrading. This paper explores how digital technologies, when embedded in strong institutional ecosystems and supported by mission-driven public procurement, can help regions like Ankara maintain industrial capabilities despite national-level decline. We approach digitalization not as a disruptive force in isolation, but as a tool that strengthens existing capacities—its impact shaped by governance, institutional density, and collaboration among universities, technoparks, and firms.

We focus on the Ankara region (TR51) and build a qualitative framework around three interrelated mechanisms. First, reallocation: buyer–supplier relationships are being restructured, with fabrication and specialized services increasingly concentrated in a few capable nodes. This is evident in long-term contracts, preferred vendor programs, and recurring partnerships that stabilize production routines. Second, composition effects: the region is shifting toward higher-value roles such as systems engineering, certification, and program management. Instead of mass production, firms are engaging in design reviews, failure analysis, configuration control, and traceability—functions that require deeper technical and organizational capabilities. Third, anchor institutions: public procurement led by defense and aerospace primes plays a central role in shaping industrial learning. These institutions not only set technical standards but also facilitate trust and knowledge exchange across supply tiers, allowing smaller firms to participate in more complex tasks.

Digital tools—such as product lifecycle management systems, secure cloud platforms, and model-based engineering—can support upgrading, but only when they are part of a broader institutional framework. In Ankara, we observe that industrial strength is no longer measured by the number of factories, but by who owns the design, who qualifies the product, and who

provides lifecycle services. This challenges the notion that digitalization alone drives transformation. Without deliberate efforts to deepen supplier capabilities and share infrastructure, regional success stories risk becoming isolated enclaves with limited spillover effects. In this context, the middle-income trap is less about technology and more about the difficulty of scaling learning and coordination under fragmented governance.

To be effective, digital industrial policy must be both performance-based and function-oriented. First, public procurement should be tied to measurable capability gains, with clear conditions and accountability mechanisms. Second, open standards and interoperable data models should be promoted to ensure broad participation and prevent vendor lock-in. Third, supplier development should be treated as a collaborative engineering effort, not just a financial subsidy. Fourth, testing and certification infrastructure must be expanded and made accessible across regions to democratize access to quality. Finally, transparency and multi-region participation rules are essential to prevent policy capture and ensure that learning spreads beyond anchor institutions.

This paper reframes deindustrialization as a problem of capability allocation rather than just a decline in manufacturing volume. It argues that what matters is not only how much a country produces, but which functions it performs and how those functions are governed. By integrating insights from regional resilience, global value chain governance, and mission-oriented procurement, the paper offers a fresh perspective on industrial strategy in middle-income countries. The case of Ankara provides a practical roadmap for regions seeking to build digital capabilities without falling into the trap of isolated modernization.

Keywords: Premature Deindustrialization; Digital Industrial Policy; Anchor Institutions; Smart Specialization; Procurement Governance

The Relationship Between Social Security Expenditures and Income Inequality: An Empirical Study on EU Countries and Türkiye

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Abstract

Income inequality is critical to social justice, and in this context, social spending is seen as one of the main policy tools for ensuring equality in income distribution. This research focuses on the relationship between social spending and income inequality. It also examines the development of labor social security systems, the organization and objectives of various social security frameworks, and social security spending in different countries. Social security spending, a key component of public spending, is vital for reducing poverty, increasing social welfare, and achieving income equality. Social spending includes expenditures such as healthcare, old-age benefits, retirement, and family and child support. When we examine the literature, there are studies supporting the traditional view on the impact of social security spending on income distribution, suggesting that increasing social spending reduces income inequality. Ulu (2018) emphasized in his study that increasing social spending will reduce income inequality. Kalkavan and Ersin (2020) found a significant relationship between social spending and income inequality. In this context, the study aimed to examine the impact of social security expenditures on the Gini coefficient. The study compared various selected EU countries and Türkiye in terms of these expenditures. Countries with missing data were excluded. The study was conducted using panel data analysis and used data from the relevant countries. Data were obtained from reliable sources such as Eurostat, the World Bank, and the OECD. The Gini coefficient was used as an indicator of income inequality, and the share of public expenditures in gross domestic product was used as the independent variable. Control variables included indirect tax rates, unemployment rates, per capita income, and inflation. The findings of the analysis reveal a significant relationship between social security expenditures and the Gini coefficient. In this context, the findings are consistent with the literature and indicate that social expenditures are a fiscal policy tool that has a welfare-enhancing effect on disadvantaged segments of society.

Keywords: Social Expenditures, Income Inequality, Gini Coefficient, Income Distribution, Panel Data Analysis

Integrating Remote Work into Industry 5.0: A Public Law Framework for Employee Health and Safety in the Digital Age

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Abstract

The new era of Industry 5.0 is about more than just technology; it's about putting people first, aiming for a more sustainable and resilient way of doing business. At the same time, remote work has gone from a niche perk to a global standard. While the combination of advanced technology and remote work offers incredible flexibility, it also shines a light on a major gap in our legal system. The health and safety laws we rely on were written for a different time, for physical workplaces controlled by an employer. These old rules are simply not adequate for the challenges of today's decentralized, digital work environments. My paper argues that to truly make Industry 5.0 human-centric, we must build a new and forward-thinking legal framework through public law. From a legal standpoint, the shift to remote work creates a difficult situation. The state has a duty to protect the health and well-being of its workforce, but how can it do that effectively when the "workplace" is now a private home? My research tackles the tough questions that arise from this shift. How can we extend safety protections into the domestic sphere without crossing a line into an employee's private life? If an employee suffers from burnout or an injury from a poor home-office setup, who is legally responsible? And practically speaking, how can our national labor inspectors ensure companies are complying with safety standards they can't physically see? To find answers, this paper analyzes existing occupational health and safety laws to pinpoint exactly where they fall short. Based on this analysis, I propose a new legal concept: a "digital duty of care." This isn't just a suggestion; it's a concept that I argue should be written into our public laws. This duty would require employers to actively ensure the remote work environment is safe, covering everything from proper ergonomic setups to protecting an employee's mental health. This includes putting in place real measures to

prevent digital burnout and establishing a formal "right to disconnect" from work. This legal reform is not just a matter of compliance; it is a core component of smart economic planning and industrial policy, which is a central theme of this conference. A nation's industrial strategy for the Industry 5.0 era will fail if it doesn't account for the new reality of how its people work. Creating a strong legal framework for remote worker safety is an industrial policy that offers a real competitive edge. It helps companies attract and keep top talent, reduces the long-term public health costs of stress and burnout, and ensures the economic benefits of going digital are shared fairly. My paper will outline a policy model that includes updating legislation to redefine the "workplace," issuing clear government guidance for remote work safety, and using public incentives to help smaller businesses adopt these crucial best practices.

In the end, this paper offers a clear path forward. It shows how we can align the reality of remote work with the people-focused goals of Industry 5.0. Looking after the health and safety of remote workers isn't just an HR task-it is a fundamental challenge for public law and a vital part of a building an intelligent industrial policy for the future. By closing this legal gap, we can build a future of work that is not only innovative but also safe, healthy, and fair for everyone.

Keywords: Public Law, Industry 5.0, Remote Work, Occupational Health and Safety, Industrial Policy, Labor Law Reform

Gatekeepers of Accession: Albania's Rule-of-Law Benchmarks in Chapters 23/24

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Abstract

The European Union's 2020 enlargement methodology established a "fundamentals-first" principle, positioning Chapters 23 (Judiciary and Fundamental Rights) and 24 (Justice, Freedom and Security) as gatekeepers to the entire accession process. This article provides a comprehensive analysis of the legal, institutional, and political mechanisms through which these chapters function as decisive determinants of negotiation pace and policy credibility for candidate countries. Focusing on Albania, which formally opened Cluster 1 negotiations in October 2024, the study argues that gatekeeping is not merely rhetorical but is legally codified, operationally focused on auditable results, and politically reinforced through reversible incentives. The analysis synthesizes doctrinal legal review with process tracing of EU institutional practice and evidence from Albania's justice reform architecture. The paper contributes an original "Extended Rule-of-Law Scoreboard," a policy-relevant framework of indicators mapped directly to interim and closing benchmarks across five dimensions: judicial integrity, efficiency, anti-corruption track records, asset recovery, and JFS systems. The findings indicate that for Albania, sustained delivery on these measurable outcomes between 2025–2027 is the essential fulcrum for unlocking progress across the entire acquis and accessing incentives under the new EU Growth Plan.

Keywords: EU enlargement; Fundamentals cluster; Chapter 23; Chapter 24; rule of law; anti-corruption; organized crime; judicial reform; asset recovery; migration and asylum; conditionality; reversibility; Albania

The Role of the World Bank and Islamic Development Bank in Turkey After 2002: Navigating a Dynamic Global Order and Reshaping Development

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Abstract

This study investigates the evolving roles and strategic approaches of the World Bank and the Islamic Development Bank (IsDB) in supporting Turkey's development trajectory since 2002, a transformative period marked by significant shifts in the global economic order, technological advancement, and intensifying environmental and geopolitical challenges. The research situates Turkey's experience within broader debates around development finance, industrial policy innovation, and the changing nature of multilateral cooperation in an increasingly interconnected and uncertain world.

Following the political and economic stabilization in the early 2000s, Turkey launched an ambitious program of economic reform and modernization aimed at enhancing its competitiveness in global markets. This period witnessed intensified engagement with international financial institutions, including the World Bank and IsDB, as Turkey sought to align its domestic development strategies with global trends. The World Bank's involvement emphasized structural reforms, public sector modernization, macroeconomic stabilization, human capital investment, and the mainstreaming of sustainability and green finance into policy planning. In particular, the Bank has been instrumental in financing large-scale infrastructure, renewable energy, education reform, and urban development projects that supported Turkey's long-term economic transformation.

In parallel, the Islamic Development Bank, guided by the principles of Islamic finance and solidarity-based development, has contributed to Turkey's inclusive growth goals by financing projects in health, transportation, education, and rural development. Its model of development cooperation emphasizes equitable growth, ethical investment, and regional integration, providing a distinctive alternative to the traditional neoliberal frameworks often associated with Western-dominated institutions. The IsDB's growing partnership with Turkey also reflects the

country's strategic orientation towards strengthening economic and political ties within the Islamic world and fostering South-South cooperation.

This paper argues that both the World Bank and IsDB have played complementary and, at times, overlapping roles in shaping Turkey's development priorities in response to domestic needs and global shifts. The study draws attention to how both institutions have adapted their strategic frameworks to address emerging challenges such as climate change, digital transformation, and growing economic uncertainty. For example, Turkey's increasing vulnerability to environmental risks and energy dependence has catalyzed a greater focus on renewable energy, sustainable urban planning, and green finance, areas where both banks have contributed technical expertise and funding.

Additionally, the research highlights the role of multilateral development banks in promoting resilience in the face of global supply chain disruptions, inflationary pressures, and geopolitical tensions. The incorporation of digital technologies, big data analytics, and hybrid computing in industrial policy and economic governance has further redefined development priorities, pushing both the World Bank and IsDB to support Turkey in building digital infrastructure, enhancing institutional capacity, and promoting innovation-led growth.

Ultimately, this paper contends that Turkey's engagement with the World Bank and the IsDB exemplifies a flexible and strategic approach to development cooperation—one that blends global best practices with context-specific models of inclusive and sustainable growth. The Turkish case offers valuable insights into how emerging economies can leverage the strengths of diverse international financial institutions to navigate complex global transformations and pursue long-term development goals in a more adaptive and resilient manner.

Keywords: World Bank (WB), Islamic Development Bank (IsDB), Development Finance, Sustainable Development, Industrial Policy

Regional Organizations: Conceptual and Theoretical Aspects

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Abstract

Regional organizations are essential institutional actors in the contemporary architecture of international relations, positioned at the intersection of interstate cooperation and processes of regional integration. The study of their conceptual and theoretical aspects involves, on the one hand, delineating the terminological and normative framework through which they are defined and, on the other, analyzing the diversity of forms and functions they may perform. From a theoretical perspective, regional organizations can be examined through multiple paradigms: liberal institutionalism, which views them as instruments for strengthening cooperation and reducing uncertainty in the international system; realism, which interprets them as mechanisms for projecting the power of dominant states; and constructivism, which assigns them the role of generating shared identity and norms.

Therefore, the conceptual-theoretical analysis of regional organizations highlights the complexity and multidimensional nature of the phenomenon, emphasizing both their relevance in global governance and the limitations imposed by the divergent interests of member states.

Keywords: regional organizations, integration, international cooperation, international relations

The Asymmetric Effect of Shortage Shocks on Trade

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Abstract

Shortage disturbances represent a critical channel through which global frictions shape international trade. This paper examines the asymmetric and state-dependent effects of shortage shocks on export and import volumes in U.S.. Using local projections and a time-varying parameter extension, we estimate horizon- and sign-specific impulse responses. Negative shortage shocks generate immediate and sizable gains on exports, peaking within six months, whereas positive shortage shocks depress exports on impact and only partially recover after a year. As for the imports, the asymmetry is sharper. Relief shocks boost imports strongly within the first year, while adverse shocks compress them initially but reverse into significant gains by the second year, reflecting backlog clearing and substitution effects. Time-varying analysis reveals that these asymmetries are not constant but intensify during periods of acute supply stress, with wider envelopes particularly for imports. The contribution of this paper is that it demonstrates robust asymmetry and regime dependence in shortage-trade dynamics, and it introduces a tractable empirical framework that connects high-frequency shortage indicators to policy-relevant elasticities, thereby enriching the literature on supply chain disruptions, trade resilience, and the nonlinear propagation of global shocks.

Path Creation Processes of Wind Industry Clusters: The Role of Human Agency at The Multi-Scaler Level

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Abstract

This research seeks to understand how new industrial pathways emerges under the impacts of regional, national and international factors. To define emergence of new industrial pathways, 'path creation" is used in Economic Geography (Martin and Sunley, 2006; MacKinnon et al., 2019; Huggins and Thompson, 2023).

The significance of the path creation process for regional economies lies in its ability to adapt to rapidly changing technological trajectories, intensifying competition, recurring economic and social crises, and the growing climate crisis. If regions can drive path creation processes successfully, they can deal with mentioned problems better.

Accepting the importance of path creation process, this research prefers to focus on wind industry clusters of the UK and Turkey. This is a topic worth studying because emergence of new renewable industries is critical for energy security and climate crisis in broader manner but also provides new employment opportunities for regional economies (Simmie, 2012)

Path creation process is a socio-economic change process, to clarify this change process, this research based on critical realist philosophy (Archer, 1995) accept the role of human agency which means purposeful and intentional actions to create a change (Grillitsch et al., 2020). However, human agency works under the impacts of structural inputs. Existing literature shows the significance of industrial structure (Boschma, 2017) and institutional structure (Chelebna and Simmie, 2018). But according to this research, in addition to them social network structure (Huggins and Thompson, 2022) and ecologic structure (Whiteman and Cooper, 2000) are important as well. In summary, in path creation process, industrial structure, institutional structure, social network structure and ecologic structure enable or constrain human agency.

When it comes to human agency, existing literature focus on innovative entrepreneurship (Schumpeter, 1934) and institutional entrepreneurship (Sotarauta & Pulkkinen, 2011). According to this research, in addition to them, agency of multi-national companies (MNCs)

(Fuller and Phelps, 2018) and network orchestration (Djanarah & Parkhe 2006) work in path creation as well. In summary based on interaction between structural inputs (industrial structure, institutional structure, social network structure and ecologic structure) and different agency types (innovative entrepreneurship, institutional entrepreneurship, MNC agency and network orchestration) work in path creation processes of wind industry clusters of the UK and Türkiye. Finally, this research seeks to understand impacts of path creation on regional economies. The research accepts that industrial clusters emerge as a result of path creation of wind industries because agency is based on interactions and cooperations between different actors (Emirbayer and Mische, 1998). The definition of industrial cluster is related companies and organizations (Porter, 1998). That means to understand impacts of path creation on regional economies a cluster analysis seems useful. That's why a cluster analysis based on statistical values of wind industry companies (e.g. employment numbers, production sizes) is preferred first. Second, since clusters are based on connected companies and organizations, their connections can be called social networks. So, a social network analysis (SNA) can be applied on clusters (Huggins and Prokop, 2017). Finally, inevitably, new industries have ecological impacts positively or negatively and they are needed be understood (Breul et al 2025). In summary, as a result of path creation processes of wind industries, wind industry clusters emerge. To analyse them, characteristics of companies and organizations, social networks and ecological impacts can be worked both quantitative and qualitative ways.

Industrial Policy, SMEs, and Export Competitiveness: Lessons from Türkiye's Defense and Manufacturing Sectors

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Abstract

Industrial policy has become increasingly relevant in contemporary economic debates, especially in the context of geopolitical uncertainty, trade wars and the transition to Industry 4.0 and Industry 5.0. While the literature has traditionally emphasized macro-level strategies in advanced economies, there remains a gap in understanding how industrial policy interacts with small and medium-sized enterprises (SMEs) in emerging markets. This study seeks to address that gap by analyzing Türkiye's defense and manufacturing sectors, where SMEs play a central role in both technological upgrading and export competitiveness.

The purpose of the study is to evaluate the effectiveness of industrial policy instruments in fostering innovation and reducing external dependency in critical industries. Specifically, this research examines the design and implementation of R&D incentives, public procurement schemes, and export promotion measures that directly target SMEs. In doing so, the study highlights the extent to which industrial policy has contributed to building defense and manufacturing sector capacity while enabling firms to integrate into global value chains.

The emperical part combines secondary data analysis and policy review with sector-specific insights. This analysis relies on official policy documents from the Ministry of Industry and Technology and the Presidency of Defense Industries, as well as statistical data from the Turkish Statistical Institute (TSI). This is further enriched by applied knowledge drawn from professional engagement within the OSTİM ecosystem, where defense-related SMEs form a crucial part of the supply chain. These practical insights provide context for understanding how policy frameworks translate into firm-level strategies, particularly in production, procurement, and export operations. This blend of academic research and applied sectoral expertise strengthens the validity of the analysis.

The emperical findings suggest that industrial policy in Türkiye has achieved notable progress in supporting SMEs. Targeted R&D incentives and public procurement programs have stimulated innovation in niche areas, enabling SMEs to contribute to industrial sovereignty, particularly in defense-related manufacturing. Export promotion strategies have also facilitated new market access, contributing to Türkiye's broader economic diversification. Nevertheless, persistent challenges remain. SMEs continue to face structural barriers in accessing long-term finance, adopting high technologies, and achieving scale. Institutional fragmentation further undermines policy coordination, while the tension between immediate export goals and long-term capacity building raises concerns about sustainability.

This paper contributes to the industrial policy debate by centering SMEs as strategic actors in economic transformation. It advances the argument that SMEs, when adequately supported, can become engines of innovation and competitiveness, not only in traditional manufacturing but also in sectors of strategic importance such as defense. For emerging economies, the Turkish case demonstrates that the potential of integrating SMEs into national development strategies, while also exposing the risks of fragmented implementation. Policy implications include the need for consistent long-term investment in SME R&D, enhanced institutional coordination, and the strengthening of regional clusters such as OSTİM to support technology transfer and supply chain resilience.

From the perspective of an economics graduate trained in policy analysis and with applied experience in government support programs and manufacturing industries, this study reflects both theoretical knowledge and practical expertise. The analysis is not limited to statistical outcomes but integrates real-world observations of how firms respond to policy environments. This dual perspective underscores the relevance of the research for both academic audiences and policymakers seeking to design effective industrial strategies.

In conclusion, Türkiye's experience in the defense and manufacturing sectors illustrates both the promise and the limitations of state-led strategies in transforming SMEs into globally competitive actors. While significant progress has been made, particularly through targeted incentives and procurement policies, greater emphasis is required on long-term capacity building, innovation financing and coordination mechanisms. The lessons drawn from this case are valuable not only for Türkiye but also for other emerging economies seeking to strengthen industrial sovereignty and integrate into global value chains in an era of rapid technological change.

Keywords: Industrial Policy, SMEs, Defense Industry, Manufacturing, Export Competitiveness, Türkiye

The Strategic Importance of Advanced Materials in Nuclear Energy Technologies from the Perspective of Industrial Policies and Sustainability

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Abstract

Nuclear energy, with its low carbon emissions and high energy density, is regarded as one of the fundamental components of sustainable development in global energy policies. In an era marked by energy supply security concerns, the fight against climate change, and the restructuring of industrial policies, the strategic importance of nuclear technologies has become increasingly evident. In this context, the safety, efficiency, and long-term operation of nuclear technologies play a critical role not only in energy production processes but also in shaping national industrial policies and strengthening global competitiveness. Advanced materials used in nuclear reactors are among the key elements of this strategic process. High-temperature-resistant metal alloys, radiation-resistant platinum-based alloys, and corrosion-resistant composite materials provide significant advantages in enhancing reactor safety, reducing efficiency losses, and enabling the development of next-generation reactor designs.

From the perspective of industrial policies, the development of advanced material technologies is considered not only as a technical innovation but also as an instrument of strategic independence. Enhancing domestic production capacity, reducing external dependency, and increasing R&D investments make it essential to integrate nuclear energy technologies into national development strategies. In terms of sustainability, the use of advanced materials contributes to extending reactor lifespans, improving safety standards, and enhancing waste management practices. Thus, the role of nuclear energy in achieving carbon-neutral goals is reinforced, offering more reliable and environmentally acceptable solutions for the energy transition. This study aims to discuss the strategic importance of advanced materials in nuclear energy technologies from the perspective of industrial policies and sustainability, adopting an interdisciplinary approach.

Driving Low-Carbon Growth: The Roles of Digital Transformation and Climate Mitigation Technologies in Enhancing Carbon Productivity

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Abstract

This study explores the factors that influence carbon productivity in 20 nations between 1990 and 2023, paying particular attention to the complementary functions of digital transformation (DT) and climate change mitigation technologies (CCMTs). The economic production per unit of CO_2 emissions, or carbon productivity, has emerged as a crucial indicator for balancing sustainability and growth. Finding the elements that can promote low-carbon growth is urgently needed because rising global emissions, technological differences, and policy fragmentation have made progress toward the Paris Agreement and the UN's 2030 Agenda more difficult. Against this backdrop, the current study offers fresh empirical data on the ways in which digital and green technologies enhance carbon efficiency, taking into consideration the function of renewable energy consumption as a control variable.

A structured panel econometric framework created to manage the intricacies of multi-country data is used in the empirical investigation. In order to determine long-term correlations between the variables, the study first assesses cross-sectional dependence before using panel unit root and cointegration tests. Pooled OLS, fixed effects, and random effects models are used for estimation, and Driscoll-Kraay standard errors are used to account for heteroskedasticity and cross-sectional dependence. There are various benefits to this approach. First, it takes into account the interdependencies among nations, which are especially significant in circumstances pertaining to global sustainability. Secondly, it guarantees strong inference in spite of serial correlation and heterogeneity. Third, it offers a thorough yet economical framework for examining the dynamics of carbon productivity by directly integrating DT, CCMTs, and renewable energy use.

The findings support the notion that carbon productivity and the explanatory factors have a long-term cointegration relationship. In particular, by improving resource efficiency, emissions

monitoring, and smart system integration, digital transformation, measured by internet penetration, has a positive and statistically significant impact on carbon productivity. The decarbonization of industrial processes, agriculture, and energy systems is another way that climate change mitigation methods, as assessed by patents in technology dissemination, show a major positive influence. By raising the proportion of clean energy in the total mix, the control variable, renewable energy consumption, to further promote the anticipated transition. These results are in line with the Porter Hypothesis and the Environmental Kuznets Curve, which postulate that innovation and technological adoption can separate environmental degradation from growth.

These findings have direct policy implications. Investing in digital infrastructure and capacities is crucial for enabling climate monitoring and adaptive governance, as well as for increasing productivity. Second, low-carbon transitions across a variety of industries can be accelerated by promoting CCMT innovation through focused incentives, research assistance, and global technological dissemination. Third, expanding renewable energy is still a vital addition that strengthens the advantages of green and digital technologies. These actions collectively demonstrate the significance of integrated policy design, in which climate and digital policies are coordinated rather than pursued separately.

Overall, this study adds to the body of literature by demonstrating the relationship between digitalization, climate technology, and carbon productivity through a combination of a sound theoretical framework and solid econometric analysis. The findings provide policymakers with practical insights for promoting egalitarian, resilient, and climate-aligned development by highlighting how coordinated digital-green transitions, bolstered by the growth of renewable energy, can improve economic performance while lowering environmental pressures.

Keywords: Sustainable Development, Digital Transformation, Climate Change Mitigation, Carbon Productivity, Panel Regression

Regenerative Entrepreneurship: Bridging Industrial and Civilizational Rationality in Digital Globalization

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Abstract

In this paper we argue that the contemporary entrepreneurial landscape is increasingly shaped by what is termed a “Digital Cage” of Globalisation - a system of algorithmic dependencies, platform monopolies, venture capital growth imperatives, and standardized global supply chains. While this system promises boundless opportunities, it paradoxically restricts entrepreneurial agency by locking ventures into predetermined growth pathways that often prioritize efficiency and scalability over long-term sustainability. Entrepreneurs are compelled to optimize for metrics dictated by algorithms, conform to platform terms of service, and compete in globalized markets that reward extraction rather than regeneration.

This paper introduces a Dynamic Prescriptive Economics (DPE) framework to diagnose and transform entrepreneurship under these constraints. Using a two-dimensional quadrant analysis - Accumulated Epistemic Rationality (AER) on the x-axis (ethical grounding, civilizational wisdom, and intergenerational foresight) and Industrial Rationality on the y-axis (efficiency, adaptability, and scalability) - the paper categorizes ventures into four entrepreneurial archetypes: Regenerative Startups (Q1), Growth-at-All-Costs Unicorns (Q2), Bureaucratic Multinationals (Q3), and Ethical but Inefficient NGOs/Social Enterprises (Q4).

The analysis demonstrates how the digital cage reinforces Q2 and Q3 pathways, while sustainable entrepreneurship requires transitions toward Q1: Regenerative Startups. To enable this, the paper proposes Strategic Transition Mechanisms (STOs) - substitutions, transformations, and offsets - that guide entrepreneurs from dependency-driven models to regenerative ones. Real-world illustrations from green finance, digital platforms, and Indigenous-inspired governance models show that regenerative entrepreneurship is not merely an ethical choice but a strategic necessity for survival, resilience, and authentic innovation in an era of systemic fragility.

Keywords: Applied Ethics, Decision Systems, Regenerative Entrepreneurship, Polycentric Governance, Organizational Behavior, Synergistic Rationality

Use of Artificial Intelligence as A Managerial Tool in Designing National Development Plans: A Development Plan Proposal Based on Artificial Intelligence

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Abstract

In today's competitive world, artificial intelligence (AI) technologies play a critical role in the transformation of public sector as well as private sector. Thus, the purpose of this paper is to share information about the thesis study that was conducted focusing on the question of whether AI can be used as a management tool in the preparation of national development plans. As far as we know, this study was conducted for the first time in Türkiye. It aims to prepare a draft national development plan proposal by using AI as a managerial tool.

For the purpose of the study, the format of Türkiye's Eleventh Development Plan (2019-2023) was created and 71 Specialized Commission Reports developed in the preparatory work of this plan were downloaded from the website of The Presidency of Strategy and Budget of Türkiye. Gemini 1.5 Flash in Google AI Studio was also used as an AI tool to upload the reports to generate the answers for the questions.

The answers to the questions posed to the AI program regarding the uploaded reports were gathered and recorded into the Draft Eleventh Development Plan format. Having completed the draft development plan proposal, the answers to the questions posed to the AI program regarding the key policies and strategies specific public entities should follow for the next development plan period were identified. Finally, the solution suggestions of AI program for Türkiye regarding the examples of key issues that could be in any country were generated. The key findings of the study are as follows:

- Draft Eleventh Development Plan Proposal was generated by utilizing AI technologies as a management tool.
- AI program generated what public policies and measures particular plan stakeholders should follow for the plan period depending on the draft plan proposal.
- Solution suggestions regarding the particular key issues were also generated from the same draft plan proposal through AI program.
- Some policy subheadings of the Draft Plan Proposal were left blank since there were not any published reports in the website of The Presidency of Strategy and Budget of Türkiye regarding to these policy sub-headings.

The thesis study concludes that AI technologies can be used as a management tool by public authorities in the process of developing a comprehensive, impartial, holistic, analytical and consistent national development plan of the country. Key suggestions of this study are as follows:

- The question of where are we in terms of understanding, evaluating, and implementing national development plan should always be on the national agenda.
- Approaches that develop planning and economic literacy among the broad public and planning stakeholders should be pursued.
- Citizen Survey activity in the process of preparing national plan development could be effectively implemented.
- Routine and sustainable reporting to the Turkish Grand National Assembly on the results of the implementation of National Development Plan should be ensured.
- Strengthening of public integrity should be a main heading in National Development Plans.
- In case of preparing national development plan by utilizing AI, plan preparation calendar should be adjusted appropriately.
- AI should be considered and positioned as one of the management tools in decision support systems.
- The principles developed by Council of Ethics for Public Officials of Türkiye regarding ethical conduct to be complied with by public officials in the use of artificial intelligence systems should also be taken into consideration in the preparation of national development plans.

The thesis encourages academic discussions on the use of AI in the preparation of development plans in public administration. It provides a model for public authorities, policy decision makers

and practitioners to prepare national development plan by using AI. The thesis also provides an important resource for researching the possibilities of using AI not only in the design of national development plans but also in the design of strategic plans of public administrations and private sector organisations.

Keywords: National Development Plan, Artificial Intelligence (AI), Public Policy, Policy Measure

Quantum Technologies as a Driver of Future Industrial Policy

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Abstract

Quantum technologies are increasingly recognized as a disruptive frontier that will shape the next generation of industrial strategies. Developments in quantum computing, communication, and sensing promise not only technical breakthroughs but also significant economic and geopolitical consequences. Quantum computing can accelerate drug discov-ery, materials research, and complex optimization (Arute et al., 2019), while quantum com-munication opens new possibilities for secure data transfer beyond the reach of classical encryption.

Leading economies are already investing heavily: the European Union has committed over €1 billion to its Quantum Flagship program (European Commission, 2018), while the United States launched the National Quantum Initiative Act in 2018 to coordinate research and industrial applications (National Quantum Initiative Act, 2018). These initiatives under-score the strategic nature of the field. For industrial policy, they also raise important ques-tions: How should governments design roadmaps that foster public–private collaboration? What forms of regulation or incentives are needed to align innovation with competitiveness and security? At the same time, quantum technologies could support sustainability goals, for example through energy-efficient algorithms and advanced climate modeling (Kattel et al., 2018).

Positioning quantum technologies not only as an enabler but as a driver of future in-dustrial policy is essential. Unlike incremental innovations, quantum breakthroughs will actively shape the direction of national strategies, global competitiveness, and sustainability agendas. Recognizing this driver role ensures that policymakers and industries move beyond adaptation, taking a proactive stance in designing resilient and forward-looking industrial ecosystems.

Keywords: Quantum technologies, industrial policy, economic development, sustainability, geopolitics, innovation driver, national impact

Shift From Extractive to Meaningful Engagement of Communities for Sustainable Development in Rural Economies

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Abstract

Various interventions to engage communities for sustainable development have been implemented. However, the interventions impacts remain less understood. This study assessed the challenges of launching community programs without context analysis, telling community stories without consent, leading communities without listening and non-collaborative exit mechanisms when the funding ends using selected community led projects experts and document mapping and review. Largely rural communities are frequently engaged in extractive ways, where they are viewed more as passive recipients or case studies rather than as co-creators and long-term partners in change. The aimed at examining the implications of extractive engagement on the effectiveness of interventions and sustainability outcomes.

The study utilized mixed method approach where a concurrent design was used to collect quantitative data secondary data extraction from social and economic sector reports and qualitative data from selected impact evaluation expert field experiences and selected community dialogue reflections to triangulate and complement the quantitative data.

The findings of the study revealed important areas of transition needed to support meaningful engagement as co-creation for ownership, shift from tokenism to shared leadership. The engagement also noted that data mining was rampant and there is need for ethical knowledge exchange. Community projects that neglect meaningful engagement usually result to fragmented ownership, and ultimately, failed or abandoned interventions once donor funding ceases.

In conclusion, meaningful community engagement should be treated as a strategic approach to achieving sustainable development in rural economies and by extension at all levels. There is need to enforce a policy framework that focus on inclusive co-design mechanisms and also evaluation experts to continuously consider qualitative and relational indicators of success that

reflect community values and defined outcomes. Finally, enable communities to lead engagement processes after projects have ended and donors have exited.

Keywords: Meaningful Engagement, Extractive Practices and Participatory Co-Creation

AI-Driven Project Management in Industrial Policies: Opportunities and Challenges

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Abstract

Nowadays, industrial policies are becoming more complex due to technological changes, unstable global trade, and growing environmental pressures. Governments and industries must plan and manage large projects that involve many actors and face high risks. Traditional project management methods remain useful, but they are often not flexible enough for these new challenges. Artificial intelligence (AI) can provide new tools that help improve planning, coordination, and monitoring of industrial policy projects. This research explores how AI can support project management in industrial policies.

The focus is on three main areas: (1) improving forecasting and decision-making, (2) supporting stakeholder coordination and communication, and (3) enabling real-time monitoring and evaluation. In each area, AI technologies offer new opportunities but also raise practical and ethical challenges. These opportunities show how AI can make project management more adaptive in fast-changing environments. At the same time, they highlight the need for careful planning so that new risks are not ignored. To begin with, AI improves forecasting and decision-making by using large datasets and predictive analytics. This allows project managers to anticipate risks such as supply chain disruptions, policy delays, or environmental impacts. AI systems can model alternative scenarios and provide recommendations, which help policy makers select better strategies (Kerzner, 2022). Additionally, AI tools can improve coordination between governments, companies, and society. Automated reporting systems and AI-driven dashboards make it easier for stakeholders to access information and track progress. Natural language processing tools can also help analyze feedback and any kind of inputs. This strengthens accountability and reduces delays caused by poor communication (Marques & Ferreira, 2020). Also, AI enables real-time monitoring and evaluation. Data collected from sensors, enterprise systems, and digital platforms can be processed by AI to detect deviations from project plans. For example, early warnings about cost over-runs or environmental

problems allow corrective action before they become critical. This adaptive feedback loop makes industrial policy projects more resilient (Crawford & Pollack, 2021).

On the other hand, AI adoption also has significant barriers. Poor data quality reduces the reliability of predictions. Many organizations lack digital maturity and skilled personnel to use AI effectively. Ethical challenges such as bias, transparency, and accountability must also be addressed, especially in public policy contexts. High costs of AI systems may further limit adoption in developing countries (Gartner, 2023).

this research proposes a simple framework to support ai integration in project management in industrial policies. The framework includes four elements: improving data infrastructures, investing in digital skills, creating clear governance rules for AI use and encouraging cooperation between public and private companies. Together, these steps can make project management in industrial policies more efficient, adaptive, and sustainable.

In conclusion, AI-driven project management has strong potential to transform the way industrial policy is planned and delivered. While challenges remain, careful adoption of AI can support better forecasting, coordination, and monitoring. This not only improves efficiency but also helps align industrial policy with long-term goals of resilience and sustainability.

Keywords: Artificial Intelligence, Project Management, Industrial Policy, Digital Transformation, Risk Management

Full-Code, Low-Code, No-Code in Supply Chain Management: Critic Analysis in İstanbul

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Abstract

The rapid digital transformation in supply chain management (SCM) has accelerated the adoption of diverse coding paradigms, ranging from Full Code to Low-Code and No-Code platforms. This study investigates the comparative significance of these paradigms in enhancing operational efficiency, flexibility, and decision-making within the SCM ecosystem of İstanbul. Using the CRITIC (Criteria Importance Through Inter-criteria Correlation) method, key evaluation criteria—including implementation cost, integration capability, user adaptability, data security, and innovation potential—are objectively weighted to reveal the most influential factors shaping technology adoption. Data were collected from supply chain professionals and technology practitioners operating in various industries across İstanbul, enabling a robust multi-criteria analysis. The findings provide a quantitative basis for prioritizing coding approaches in SCM, highlighting the strategic roles of low-code and no-code solutions in accelerating digital transformation while maintaining system reliability. This research contributes to both academia and practice by offering a decision-support framework for managers and policymakers seeking optimal technology strategies for future supply chain operations.

Keywords: Full Code, Low-Code, No-Code, Supply Chain Management, Logistics, CRITIC Method, Digital Transformation, İstanbul

Industrial Robots in Digital Transformation: China's Rise in Manufacturing System

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Abstract

Industrial digital transformation refers to the restructuring of production processes through technologies such as automation, artificial intelligence, and data analytics. At the center of this transformation are industrial robots, which provide flexibility, speed, and cost efficiency in operations such as welding, assembly, material handling, and quality control. Today, the use of industrial robots has become not only a driver of productivity but also a strategic factor for global competitiveness.

According to the International Federation of Robotics (IFR), approximately 4.28 million industrial robots were in operation worldwide in 2023. In the same year, 51% of new installations took place in China; this share increased to 54% in 2024. Furthermore, China's manufacturing sector reached a robot density of 246 units per 10,000 employees, reinforcing its leading position in industrial automation. The automotive, electronics, and metal industries are among the sectors with the highest adoption rates of robotic technologies.

China's rapid rise is largely driven by national policies. The "Made in China 2025" strategy and national robotics industry programs have boosted domestic production, raising the local market share from 17% in 2015 to over 30% by 2023. However, China still depends on foreign suppliers for advanced robot components and high-precision sensor technologies. To address this, the country is expanding both R&D investments and international collaborations.

In conclusion, China's development in the field of industrial robotics represents a decisive example shaping the future of digital transformation in manufacturing. High installation rates, state-supported strategic programs, and innovative applications strengthen China's global position. Nevertheless, workforce reskilling, employment risks, and ethical considerations remain critical challenges that must be managed carefully throughout this transformation.

This research examines the rate of industrial robot adoption in industry, the current status in China and globally, and their contribution to the digital transformation of industry.

Keywords: China, digital transformation, industry 4.0, industrial automation, industrial robots production systems

Paradigm Shift in Healthcare Services: Transformative Innovations Enabled by 6G Technology

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Abstract

Healthcare is on the verge of a profound paradigm shift—from a reactive and centralized model toward a proactive, personalized, and ubiquitously accessible ecosystem. The primary catalyst of this transformation is the revolutionary capabilities introduced by sixth-generation (6G) wireless communication technology. This article provides an in-depth examination of how 6G fundamentally redefines healthcare delivery and enables a wide array of transformative innovations. Ultra-reliable low latency communication (URLLC) with sub-millisecond response times eliminates geographical barriers, making telesurgery operations enhanced with haptic feedback a tangible reality. Simultaneously, terabit-level data transmission capacity facilitates the real-time processing of large-scale medical imaging and genomic data, thereby enabling AI-driven instant diagnostics and the development of personalized treatment protocols. The study further explores preventive medicine applications such as the creation of patient-specific digital twins—fed by real-time sensor data—to predict disease progression and simulate treatment responses. By ensuring seamless connectivity across Body Area Networks (BAN) and Internet of Things (IoT) devices, 6G establishes continuous and intelligent health monitoring as a standard practice beyond hospital walls. Ultimately, this study demonstrates that 6G is not merely a tool for improving existing processes; rather, it acts as a fundamental paradigm shifter that decentralizes patient care, reinforces data-driven predictive healthcare, and radically transforms both clinical outcomes and the overall patient experience.

Keywords: Digital Transformation, Cybersecurity and Management, Artificial Intelligence Technologies and Management , Manufacturing Technologies and Digital Transformation

The Impact of Small and Medium Enterprises on Economic Growth and Job Creation in Somalia

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Abstract

This study investigates the critical and complex role of Small and Medium Enterprises (SMEs) in fostering economic growth and employment creation in Somalia. Globally, SMEs are indisputably recognized as essential engines of national economic development, widely acknowledged for their contributions to employment and income generation. In developing economies, formal SMEs account for about two-thirds of total employment and 40% of national income, with the expectation that a very large proportion of new jobs in regions like sub-Saharan Africa will be created by this sector. In the Somali context, despite decades of political instability, civil war, and the devastating collapse of the central government in 1991, SMEs have demonstrated remarkable resilience and are considered central actors in job creation, poverty alleviation, and economic recovery. Entrepreneurship, driven by necessity in the face of insecure traditional employment and limited formal job opportunities, often serves as the only pathway to self-sufficiency and social mobility for young Somalis.

The primary objective of this research is to develop a robust knowledge base to assess the extent to which SMEs impact the national economy. The study aims to answer what the direct and indirect contributions of Somali SMEs are, what main challenges hinder their performance and sustainability, and what factors can improve their growth and efficiency. Given the complex socio-economic context and limited availability of structured national data in Somalia, this investigation adopts a qualitative research approach, utilizing a systematic literature review to synthesize insights from existing theoretical frameworks and empirical research. The theoretical framework is multidimensional, integrating Human Capital Theory, which emphasizes the value of skills and training; Entrepreneurial Orientation, which links innovation and risk-taking to success; Resource-Based Theory, focusing on strategic resource utilization; and Institutional Theory, which addresses structural constraints posed by weak governance.

The synthesized findings confirm that SMEs are vital contributors to job generation, income creation, and poverty reduction, forming the backbone of the local economy. They fill the development gap left by the state, particularly in urban centers, contributing significantly to livelihood generation for the majority of the population. The sector's economic benefits are evident in contributions to GDP and stimulating growth. However, the study reveals that Somalian SMEs face multifaceted, complex challenges that significantly hinder their growth potential. The most pervasive challenge identified in the literature is the lack of capital/access to credit. This is compounded by banks' perceived uncertainty towards the business community, high collateralization requirements by microfinance institutions, and the prevalence of a largely informal economy. Other critical barriers include weak managerial abilities, insufficient managerial skills, poor infrastructure (such as unreliable electricity and transport), strong market competition, security concerns, and limited effective government support.

To unlock the full potential of SMEs for Somalia's economic development and unemployment reduction, the study offers targeted recommendations. Key policy actions include the urgent need to improve access to finance through the development of microfinance programs, simplifying loan processes, and promoting financial inclusion. Furthermore, there is a strategic imperative to invest in human capital by providing vocational and business training focused on financial literacy and innovation management to enhance management capacity. Policy formulation must also focus on creating enabling government policies and regulatory frameworks, streamlining registration procedures, and strengthening critical infrastructure. Ultimately, the advancement of SMEs is a strategic necessity for driving inclusive growth and supporting national stability in Somalia's post-conflict trajectory.

Keywords: Somalia, SMEs, JobCreation, Economic Growth, Entrepreneurship, Informal Sector

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