

Artificial Intelligence, Creative Destruction and Sustainable Industrial Growth: A Schumpeterian Framework for the Digital Economy

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Abstract: Artificial Intelligence (AI) is rapidly transforming industries and organizational structures, representing a new wave of Schumpeterian creative destruction. While AI is recognized as a driver of innovation and productivity, research remains fragmented across productivity, business model innovation, labour markets, and innovation ecosystems. Consequently, the mechanisms through which AI contributes to sustainable industrial growth remain theoretically disconnected. This study develops a Schumpeterian conceptual framework explaining how AI, as a General Purpose Technology (GPT), drives sustainable industrial growth through technological innovation, organizational adaptation, and institutional evolution. Drawing upon Schumpeterian innovation theory, evolutionary economics, GPT theory, dynamic capabilities, business model innovation, and innovation ecosystems, the study synthesizes existing knowledge to identify how AI reshapes industrial systems and competitiveness. The framework integrates four reinforcing dimensions: productivity enhancement, business model innovation, labour market restructuring, and ecosystem reconfiguration. These mechanisms interact through feedback that reshapes firms, industries, and innovation systems. Sustainable industrial growth emerges not from AI adoption alone, but from interactions among technological capabilities, organizational transformation, human capital development, and collaborative innovation ecosystems. Investments in digital infrastructure, absorptive capacity, workforce reskilling, institutional quality, and governance are essential for resilient AI-driven transformation. By extending Schumpeterian innovation theory to the AI era, this study contributes an integrated framework linking AI-driven innovation, creative destruction, and sustainable industrial growth, providing a foundation for empirical research and policy development.

Keywords: Artificial Intelligence, Creative Destruction, General Purpose Technology, Sustainable Industrial Growth, Schumpeterian Theory, Digital Economy, Innovation Economics.

INTRODUCTION

Artificial Intelligence (AI) is transforming production systems, organizational structures, business models, and competitive dynamics by extending automation to knowledge-intensive activities such as decision-making, forecasting, design, and innovation. Its pervasive applications, continuous improvement, and capacity to stimulate complementary innovations increasingly support its interpretation as a General Purpose Technology (GPT) (Bresnahan & Trajtenberg, 1995; Brynjolfsson & McAfee, 2014; Cockburn et al., 2019). Across industries, AI enables new

forms of value creation and competitiveness (Agrawal et al., 2018; Davenport & Ronanki, 2018), while supporting productivity, organizational learning, and human capabilities (Brynjolfsson et al., 2017; Teece, 2018). Its effective integration can consequently strengthen firms' dynamic capabilities and long-term competitive advantage (Teece, 2018; Teece et al., 1997).

However, AI-driven transformation also generates risks related to technological unemployment, labour market polarization, skill obsolescence, and inequality (Acemoglu & Restrepo, 2018; Autor, 2015; Frey & Osborne, 2017), alongside concerns over market concentration, unequal technological access, algorithmic transparency, and ethical governance. Sustainable industrial development therefore depends not only on technological progress but also on human capital, institutional quality, regulation, and inclusive innovation policies.

This combination of disruption and renewal reflects Schumpeterian creative destruction. Schumpeter (1934) identified innovation and entrepreneurial “new combinations” as fundamental drivers of economic development, later conceptualizing capitalism as a continuous process through which innovation replaces obsolete technologies and industries (Schumpeter, 1942). Evolutionary economics extended this perspective through technological paradigms, routines, learning, and industrial evolution (Dosi, 1982; Nelson & Winter, 1982), while endogenous growth theory emphasized creative destruction as a mechanism of technological progress (Aghion & Howitt, 1992). AI represents a contemporary manifestation of these dynamics, combining computational intelligence, data, learning, and digital connectivity to accelerate industrial transformation.

Research remains fragmented. Innovation economics emphasizes productivity and technological change (Brynjolfsson et al., 2017; Cockburn et al., 2019), management studies organizational capabilities and business model innovation (Teece, 2018), information systems research digital transformation and organizational adaptation (Verhoef et al., 2021; Vial, 2019), and sustainability research environmental and social implications (Vinuesa et al., 2020). Consequently, limited attention has been devoted to integrating the mechanisms through which AI simultaneously affects productivity, organizational renewal, labour markets, innovation ecosystems, and sustainable industrial growth.

This study addresses this gap by developing a Schumpeterian framework that conceptualizes AI as a systemic driver of digital creative destruction. Integrating innovation and evolutionary

economics, GPT theory, and research on digital transformation, business model innovation, and innovation ecosystems, the framework identifies four interconnected mechanisms: productivity enhancement, business model innovation, labour market restructuring, and ecosystem reconfiguration.

The study makes three contributions. First, it interprets AI as a contemporary wave of Schumpeterian creative destruction characterized by algorithmic innovation, digital platforms, and data-driven transformation. Second, it integrates fragmented research streams into a systemic explanation of AI-driven industrial evolution. Third, it identifies human capital development, reskilling, institutional quality, and responsible AI governance as complementary conditions for sustainable industrial growth. Section 2 establishes the theoretical foundations and research gap; Section 3 develops the framework; Section 4 discusses its implications and future research directions; and Section 5 concludes.

LITERATURE REVIEW

Schumpeterian Creative Destruction and Industrial Evolution

Schumpeterian theory provides a central foundation for explaining how technological innovation reshapes industrial structures and economic development. Schumpeter (1934) rejected a static interpretation of growth, arguing that entrepreneurial innovation introduces “new combinations” of products, processes, markets, resources, and organizational forms that disrupt existing equilibria. He later conceptualized this dynamic as “creative destruction”, whereby innovation simultaneously creates new economic opportunities and renders existing technologies, capabilities, and industries obsolete (Schumpeter, 1942).

Evolutionary economics extended this perspective by emphasizing organizational routines, cumulative learning, adaptation, and technological trajectories. Nelson and Winter (1982) conceptualize industrial evolution as a process of variation, selection, and learning among heterogeneous firms, while Dosi (1982) explains technological change through paradigms and path-dependent trajectories. Endogenous growth theory similarly formalizes creative destruction as a mechanism through which successive innovations replace existing technologies and sustain long-term growth (Aghion & Howitt, 1992).

General Purpose Technology (GPT) theory complements these approaches by explaining why some innovations generate economy-wide transformations. GPTs combine pervasive applicability, continuous improvement, and complementarities with downstream innovations (Bresnahan & Trajtenberg, 1995). AI displays these characteristics while introducing new forms of machine learning, data analytics, and algorithmic decision-making across industries (Bresnahan & Trajtenberg, 1995). Moreover, AI can transform the innovation process itself as an “invention technology” (Cockburn et al., 2019) and complement human cognitive capabilities in generating new forms of value (Brynjolfsson & McAfee, 2014). AI can therefore be interpreted as a contemporary manifestation of Schumpeterian creative destruction, although existing theoretical traditions remain insufficiently integrated in explaining its simultaneous effects on industrial structures, organizational capabilities, labour markets, and sustainable development.

Artificial Intelligence as a General Purpose Technology

The GPT perspective conceptualizes AI as a systemic rather than sector-specific technological transformation (Bresnahan & Trajtenberg, 1995; Helpman, 1998; Jovanovic & Rousseau, 2005; Lipsey et al., 2005). GPTs generate their broader economic effects through diffusion and complementary investments in human capital, organizational capabilities, infrastructure, and innovation ecosystems (Helpman, 1998; Jovanovic & Rousseau, 2005; Lipsey et al., 2005). AI increasingly meets these conditions through its expanding applications and continuous advances in machine learning, natural language processing, computer vision, and generative AI (Agrawal et al., 2018; Brynjolfsson & McAfee, 2014; OECD, 2023).

AI may nevertheless extend beyond the conventional GPT concept. Cockburn et al. (2019) characterize machine learning as an “invention technology” capable of accelerating experimentation, scientific discovery, and technological development. Agrawal et al. (2018) conceptualize AI as a prediction technology that reduces prediction costs and transforms decision-making and resource allocation, while Brynjolfsson and McAfee (2014) emphasize its potential to complement human creativity, judgment, and experience.

These benefits depend strongly on organizational complementarities. Technological adoption alone rarely produces sustained competitive advantage; firms require absorptive capacity, skills, infrastructure, and organizational adaptation to exploit AI effectively (Cohen & Levinthal,

1990; Helfat & Peteraf, 2003; Teece, 1986). Generative AI reinforces this systemic character: foundation models and Large Language Models provide adaptable capabilities across knowledge production, software, science, education, and creative activities (Bommasani et al., 2021; Bubeck et al., 2023; OpenAI et al., 2023), while simultaneously intensifying challenges concerning governance, intellectual property, transparency, and market concentration (OECD, 2024).

The literature consequently combines optimistic expectations of productivity, innovation, decision-making, and entrepreneurship (Brynjolfsson & McAfee, 2014; Cockburn et al., 2019) with concerns regarding displacement, concentration, algorithmic bias, and technological inequality (Acemoglu, 2024; Acemoglu & Restrepo, 2018; Autor, 2015). AI's long-term effects therefore depend not only on technological capabilities but also on the organizational, institutional, and regulatory conditions governing their diffusion.

Artificial Intelligence, Industrial Transformation and Sustainable Growth

Research identifies several interconnected channels through which AI influences industrial transformation. AI can increase productivity through process optimization, improved resource allocation, predictive capabilities, and data-driven decision-making (Agrawal et al., 2018; Brynjolfsson & McAfee, 2014; OECD, 2023). Evidence also indicates productivity gains in knowledge-intensive activities through faster problem-solving and lower information-processing costs (Brynjolfsson et al., 2023; Noy & Zhang, 2023), although their magnitude depends on complementary organizational capabilities and human capital.

AI facilitates business model innovation by enabling data-driven services, intelligent platforms, personalization, and new mechanisms of value creation, delivery, and capture (Teece, 2018; Verhoef et al., 2021). Third, its labour-market effects involve both substitution and complementarity. While automation may replace routine tasks (Autor et al., 2003; Frey & Osborne, 2017), AI can also augment human capabilities and transform occupational and skill structures (Acemoglu & Restrepo, 2018; Autor, 2015), increasing the importance of education, reskilling, and lifelong learning.

AI increasingly operates through innovation ecosystems connecting firms, universities, technology providers, start-ups, governments, investors, and digital platforms (Adner, 2017; Jacobides et al., 2018). These networks facilitate knowledge diffusion and complementary

innovation but also create governance challenges. Finally, AI can support energy efficiency, circularity, resource management, environmental monitoring, and sustainable manufacturing (OECD, 2024; Vinuesa et al., 2020), while generating potential negative externalities related to energy consumption, digital exclusion, and technological concentration.

AI therefore does not automatically produce sustainable industrial growth. Its contribution depends on interactions among technological innovation, organizational capabilities, human capital, institutional governance, and social inclusion. Building on Sections 2.1 and 2.2, this study conceptualizes these interactions through four mutually reinforcing mechanisms: productivity enhancement, business model innovation, labour market restructuring, and ecosystem reconfiguration.

Research Gap and Development of the Conceptual Framework

Although existing research provides substantial evidence on the individual effects of AI on productivity, business model innovation, labour markets, innovation ecosystems, and sustainability, these dimensions remain largely examined through separate theoretical perspectives (Acemoglu & Restrepo, 2018; Brynjolfsson et al., 2023; Teece, 2018; Verhoef et al., 2021; Vinuesa et al., 2020). Innovation economics primarily emphasizes technological change and productivity, management research focuses on organizational capabilities and business models, while labour and sustainability studies examine employment transformations and broader social and environmental implications. Consequently, limited attention has been devoted to explaining how these mechanisms interact within a unified process of AI-driven industrial transformation and how their interactions ultimately shape sustainable industrial growth.

This fragmentation represents the central theoretical gap addressed by this study. Schumpeterian creative destruction and evolutionary economics provide a foundation for understanding technological disruption, organizational adaptation, and industrial evolution (Dosi, 1982; Nelson & Winter, 1982; Schumpeter, 1934, 1942), while GPT theory emphasizes technological diffusion, complementarities, and economy-wide transformation (Bresnahan & Trajtenberg, 1995; Helpman, 1998). Dynamic capabilities and ecosystem perspectives further demonstrate that technological opportunities must be combined with organizational adaptation, absorptive capacity, and interorganizational relationships to generate sustained competitive

outcomes (Adner, 2017; Cohen & Levinthal, 1990; Jacobides et al., 2018; Teece, 2018). However, these perspectives have rarely been integrated into a single framework explaining the recursive relationships among technological, organizational, human, and institutional change in the context of AI.

The proposed framework addresses this gap by conceptualizing AI-driven industrial transformation as an evolutionary and systemic process rather than a direct technological effect. It integrates four mutually reinforcing mechanisms—productivity enhancement, business model innovation, labour market restructuring, and ecosystem reconfiguration—whose interactions connect firm-level technological adoption with broader processes of industrial and institutional evolution. Sustainable industrial growth is therefore conceptualized as an emergent outcome of these complementarities rather than as an automatic consequence of AI diffusion. Figure 1 illustrates the proposed Schumpeterian framework and the relationships among these four mechanisms.

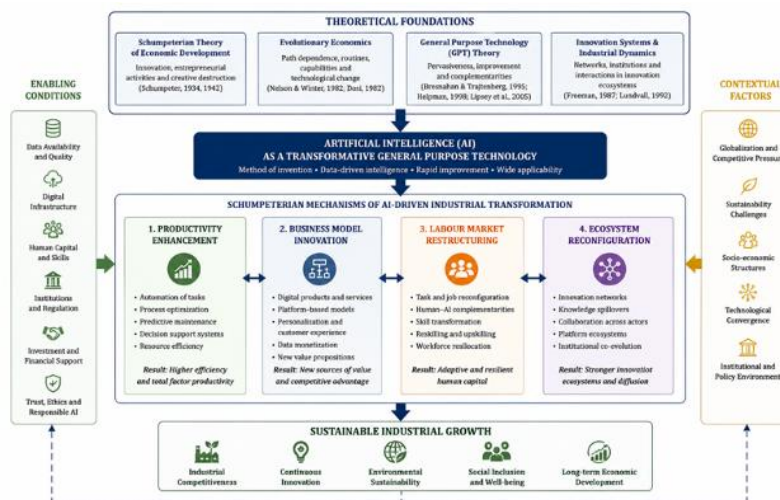


Figure 1. Schumpeterian Framework For Ai-Driven Sustainable Industrial Growth. Source: Author's elaboration.

THE PROPOSED SCHUMPETERIAN FRAMEWORK

Overview of the Proposed Schumpeterian Framework

The proposed framework conceptualizes Artificial Intelligence (AI) as a General Purpose Technology (GPT) driving a new cycle of Schumpeterian creative destruction and sustainable industrial growth (Bresnahan & Trajtenberg, 1995; Schumpeter, 1934, 1942). Rather than treating

AI as a discrete innovation, it adopts a systemic and evolutionary perspective in which technological change continuously reshapes firms, industries, and innovation systems (Dosi, 1982; Nelson & Winter, 1982).

The framework identifies four mutually reinforcing mechanisms: productivity enhancement, business model innovation, labour market restructuring, and ecosystem reconfiguration. They operate through recursive interactions rather than as independent or sequential effects. Their effectiveness is conditioned by digital infrastructure, human capital, absorptive capacity, institutional quality, investment capability, regulation, and sustainability-oriented policies (Cohen & Levinthal, 1990; OECD, 2024; Teece, 2007). Sustainable industrial growth is therefore understood as the cumulative outcome of technological, organizational, human, and institutional adaptation.

Productivity Enhancement

Productivity enhancement represents the first mechanism through which AI promotes industrial transformation. Consistent with creative destruction, technological innovation enables firms to reorganize production and replace less efficient configurations (Schumpeter, 1934, 1942). As a GPT, AI extends these effects beyond conventional automation by embedding intelligence in production, decision-making, and knowledge-intensive activities (Bresnahan & Trajtenberg, 1995; Brynjolfsson & McAfee, 2014).

AI can improve information processing, resource allocation, coordination, and real-time decision-making, thereby strengthening firms' capacity to sense opportunities and reconfigure resources (Teece, 2007, 2018). Productivity is therefore conceptualized not as the final outcome of AI adoption but as an enabling mechanism: efficiency gains expand firms' capacity for experimentation, technological investment, business model innovation, workforce development, and participation in innovation ecosystems. Through these interactions, productivity enhancement initiates cumulative processes of organizational adaptation and industrial renewal.

Business Model Innovation

Business model innovation translates AI-enabled capabilities into new mechanisms of value creation, delivery, and capture. In Schumpeterian terms, technological innovation therefore transforms not only production but also firms' strategic configurations and market positions

(Schumpeter, 1934, 1942). Dynamic capabilities enable organizations to integrate and reconfigure resources in response to these technological opportunities (Teece, 2007, 2018). AI supports new products, services, personalization, data-driven operations, and platform-based models, increasing the strategic importance of digital resources and knowledge. This process is consistent with the conception of business models as architectures of value creation and appropriation (Amit & Zott, 2001) and of business model innovation as their adaptation to technological and market change (Chesbrough, 2010; Foss & Saebi, 2017). These transformations simultaneously generate new skill requirements and interorganizational relationships, linking business model innovation to labour market and ecosystem reconfiguration. AI-driven competitive advantage consequently depends on firms' capacity to combine technological capabilities with continuous strategic renewal.

Labour Market Restructuring

Labour market restructuring represents the human-capital dimension of AI-driven industrial transformation. Technological progress modifies the knowledge, competencies, and organizational routines underlying competitiveness (Nelson & Winter, 1982; Schumpeter, 1934, 1942). Rather than conceptualizing AI exclusively as a substitute for labour, the framework emphasizes human–AI complementarity in decision-making, problem-solving, and knowledge-intensive activities (Acemoglu & Restrepo, 2018; Autor, 2015; Brynjolfsson & McAfee, 2014).

AI adoption shifts demand toward digital, analytical, creative, and interdisciplinary competencies, requiring reskilling, organizational learning, and continuous capability development. These processes reinforce evolutionary learning and dynamic capabilities (Nelson & Winter, 1982; Teece, 2007, 2018). Human capital therefore constitutes an enabling mechanism through which organizations absorb technological innovation, adapt business models, and participate in knowledge-intensive ecosystems. Labour market restructuring is thus not merely a consequence of AI adoption but a condition for translating technological change into sustainable industrial competitiveness.

Ecosystem Reconfiguration

Ecosystem reconfiguration extends AI-driven transformation beyond individual firms. Sustainable industrial growth increasingly depends on networks connecting firms, universities, research institutions, governments, technology providers, and entrepreneurial ventures, through

which knowledge and technological capabilities are created and diffused (Adner, 2017; Jacobides et al., 2018; Nelson, 1993; Schumpeter, 1942).

From a Schumpeterian perspective, AI reconfigures established value chains and industrial relationships into increasingly interconnected digital networks, accelerating spillovers and cumulative technological development (Dosi, 1982; Nelson, 1993). These ecosystem dynamics reinforce productivity, business model innovation, and workforce transformation through collaboration and knowledge exchange. Their effectiveness nevertheless depends on digital infrastructure, regulatory quality, innovation policy, public–private partnerships, education systems, and sustainability-oriented governance (OECD, 2024). Ecosystem reconfiguration therefore connects firm-level innovation with broader processes of institutional and industrial evolution.

Application of the Proposed Schumpeterian Framework to Creative Industries

Creative industries provide a particularly relevant context for applying the framework because their competitiveness depends strongly on knowledge, intellectual capital, creativity, and continuous innovation (Caves, 2002; Florida, 2002; Howkins, 2001; UNCTAD, 2024). AI increasingly operates across music, audiovisual production, publishing, digital media, design, advertising, architecture, fashion, gaming, performing arts, and cultural services as a pervasive enabling technology. Machine learning, generative AI, and Large Language Models expand possibilities for content generation, personalization, prototyping, analysis, and collaborative knowledge production (Agrawal et al., 2018; Bommasani et al., 2021; Bresnahan & Trajtenberg, 1995; Brynjolfsson & McAfee, 2014; Bubeck et al., 2023; OpenAI et al., 2023), reinforcing Schumpeterian processes of industrial renewal (Schumpeter, 1934, 1942).

The framework's four mechanisms are clearly observable in these industries. Productivity enhancement arises from AI-assisted workflows, editing, translation, recommendation systems, virtual production, and decision support (Brynjolfsson & McAfee, 2014; OECD, 2024), strengthening dynamic capabilities (Teece, 2007, 2018). Business model innovation emerges through platforms, subscriptions, creator-economy ecosystems, personalized cultural experiences, virtual performances, and AI-generated products (Amit & Zott, 2001; Chesbrough, 2010; Foss & Saebi, 2017; Teece, 2018; Verhoef et al., 2021). Labour market restructuring increasingly

combines AI with human originality, aesthetic judgment, and cultural interpretation (Acemoglu & Restrepo, 2018; Autor, 2015; Brynjolfsson et al., 2023), increasing the importance of digital literacy, lifelong learning, and absorptive capacity (Cohen & Levinthal, 1990; Nelson & Winter, 1982; Teece, 2007). Finally, ecosystem reconfiguration strengthens collaboration among creators, firms, universities, cultural institutions, platforms, investors, and public organizations (Adner, 2017; Jacobides et al., 2018; OECD, 2024), while creating governance challenges involving intellectual property, transparency, accountability, and cultural diversity (OECD, 2024; UNESCO, 2022). Creative industries therefore illustrate particularly clearly the simultaneous destruction and creation associated with technological change (Schumpeter, 1942). They also provide an appropriate empirical setting for testing the framework through firm-, industry-, or country-level indicators and longitudinal, panel-data, structural-equation, or multilevel approaches.

Integrated Dynamics of the Proposed Framework

The framework conceptualizes sustainable industrial growth as the outcome of recursive interactions among its four mechanisms. As summarized in Figure 2, productivity gains increase resources for innovation; business model innovation changes value creation and skill requirements; labour market restructuring develops complementary capabilities; and ecosystem reconfiguration promotes knowledge diffusion and technological spillovers, which can generate further productivity improvements.

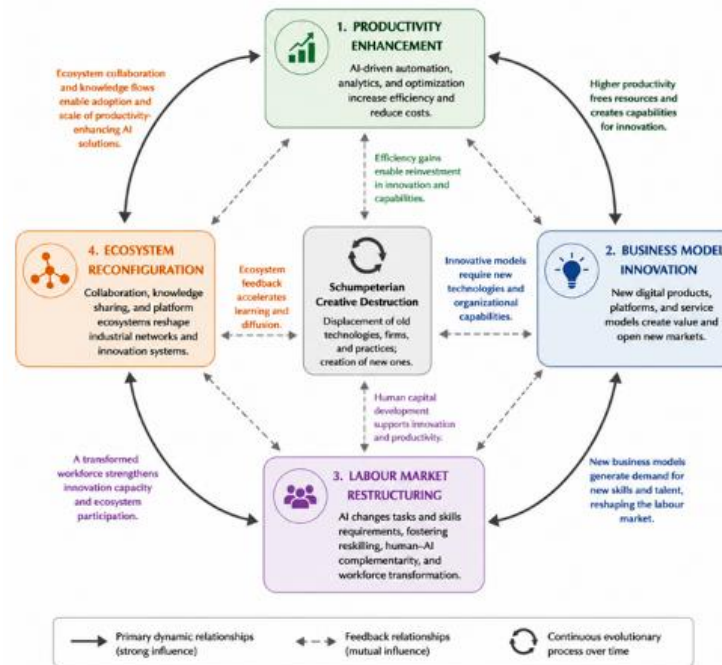


Figure 2. Dynamic Interactions Among the Four Mechanisms of the Proposed Schumpeterian Framework. Source: Author's elaboration.

These feedback relationships capture creative destruction as a continuous evolutionary process rather than a linear sequence of technological shocks (Dosi, 1982; Nelson & Winter, 1982; Schumpeter, 1942). Their intensity and direction are conditioned by digital infrastructure, absorptive capacity, institutional quality, regulation, investment capability, and sustainability-oriented policies (Cohen & Levinthal, 1990; OECD, 2024; Teece, 2007, 2018). AI therefore generates sustainable industrial growth not automatically, but through complementarities among technological innovation, organizational adaptation, human capital, and institutional evolution. Table 1 summarizes the four mechanisms and their contribution to sustainable industrial growth.

Mechanism		AI-Driven Transformation	Primary Outcomes	Organizational Contribution	Sustainable Industrial Growth
Productivity Enhancement		AI automates processes, improves decision-making, and optimizes resource allocation.	Greater efficiency, operational flexibility, and dynamic capabilities.	Higher productivity, technological upgrading, and long-term competitiveness.	
Business Innovation	Model	AI enables new digital products, services, platforms, and data-driven business models.	New value creation mechanisms, strategic renewal, and market expansion.	Sustainable competitive advantage and industrial renewal.	
Labour Restructuring	Market	AI transforms job tasks, promotes human–AI collaboration, and increases demand for advanced skills.	Workforce reskilling, organizational learning, and capability development.	Adaptive human capital supporting continuous innovation.	

Mechanism	AI-Driven Transformation	Primary Outcomes	Organizational Contribution to Sustainable Industrial Growth
Ecosystem Reconfiguration	AI strengthens knowledge sharing, collaboration, and digital innovation networks.	Stronger strategic partnerships, knowledge diffusion.	System-wide innovation and sustainable industrial development.

Table 1. Summary of the Proposed Schumpeterian Framework for AI-Driven Sustainable Industrial Growth

Source: Author's elaboration.

IMPLICATIONS OF THE PROPOSED FRAMEWORK

Theoretical Implications

The proposed framework contributes to AI and industrial transformation research by integrating Schumpeterian creative destruction with the interpretation of AI as a General Purpose Technology. Rather than treating AI as a discrete technological innovation, it conceptualizes it as a systemic driver of industrial evolution operating through four mutually reinforcing mechanisms: productivity enhancement, business model innovation, labour market restructuring, and ecosystem reconfiguration.

This perspective extends existing research in three respects. First, it connects classical innovation theory with contemporary AI-driven transformation. Second, it conceptualizes sustainable industrial growth as an emergent outcome of interactions among technological innovation, organizational adaptation, human capital, and institutional evolution rather than as a direct consequence of AI adoption. Third, it emphasizes complementary conditions—including absorptive capacity, dynamic capabilities, digital infrastructure, regulatory quality, and human capital—as determinants of firms' ability to convert AI into sustainable competitive advantage.

The framework consequently provides a theoretical basis for analysing AI-driven transformation across industries and institutional contexts. Table 2 summarizes its principal theoretical foundations.

Theoretical Perspective	Key References	Contribution to the Proposed Framework
Schumpeterian Creative Destruction	Schumpeter (1934, 1942)	Provides the conceptual foundation for understanding AI as a disruptive force that replaces obsolete technologies and business models while generating new industries, markets, and sources of competitive advantage.
Evolutionary Economics	Nelson and Winter (1982); Dosi (1982)	Explains how firms continuously adapt through learning, routines, and technological change, supporting AI-enabled industrial evolution and long-term competitiveness.

Theoretical Perspective	Key References	Contribution to the Proposed Framework
General Technology Theory	Purpose (GPT) Bresnahan and Trajtenberg (1995); Helpman (1998); Lipsey et al. (2005)	Positions AI as a pervasive enabling technology whose complementary innovations diffuse across sectors, fostering widespread productivity gains and structural transformation.
Dynamic Capabilities Theory	Teece (2007, 2018)	Explains firms' ability to sense opportunities, seize emerging technologies, and continuously reconfigure organizational resources in response to AI-driven change.
Business Innovation	Model Amit and Zott (2001); Chesbrough (2010); Foss and Saebi (2017)	Illustrates how AI enables novel value creation, value delivery, and value capture mechanisms, supporting strategic renewal and sustainable competitive advantage.
Innovation Ecosystem Theory	Adner (2017); Jacobides et al. (2018)	Highlights the role of interorganizational collaboration, digital platforms, and knowledge networks in accelerating AI diffusion and sustainable industrial development.

Table 2. Theoretical Foundations Supporting the Proposed Schumpeterian Framework

Source: Author's elaboration.

Managerial Implications

The framework suggests that managers should approach AI as a strategic capability rather than a stand-alone technological investment. Productivity gains should support broader organizational transformation through reinvestment in innovation, digital capabilities, and experimentation, while AI investments should be aligned with business model renewal and the development of new products, services, and value-creation mechanisms.

Human capital is equally important. Organizations should invest continuously in reskilling, upskilling, interdisciplinary competencies, and human–AI collaboration. At the same time, participation in innovation ecosystems through partnerships with universities, research institutions, technology providers, start-ups, and public organizations can accelerate learning, knowledge exchange, and co-creation.

AI strategy should therefore combine technological capabilities with organizational adaptability, responsible governance, workforce development, and environmental and social sustainability. Sustainable competitive advantage depends on managing these dimensions jointly rather than maximizing technological adoption in isolation.

Policy Implications

For policymakers, AI-driven industrial growth requires institutional and infrastructural complementarities rather than technology diffusion alone. Digital connectivity, cloud and computational infrastructure, and secure data environments are essential for broad and inclusive

AI adoption (OECD, 2024). Education, reskilling, and lifelong learning policies are similarly necessary to address changing occupational structures and strengthen human–AI complementarity.

Innovation policy should also facilitate collaboration among firms, universities, research institutions, technology providers, and public organizations through research funding, technology transfer, public–private partnerships, and support for entrepreneurial ecosystems (Adner, 2017; Nelson, 1993). Regulatory frameworks should simultaneously promote innovation and ensure transparency, accountability, data protection, cybersecurity, and responsible AI (OECD, 2024).

Industrial policy should therefore integrate digital infrastructure, human capital, innovation ecosystems, and responsible governance rather than support isolated technological interventions. Coordinating these dimensions can strengthen technological diffusion, industrial resilience, and sustainable competitiveness. Table 3 identifies the principal research directions arising from these theoretical, managerial, and policy implications.

Research Dimension	Key Research Questions	Potential Research Approaches
AI and Productivity Dynamics	How does AI influence productivity across industries over time? What factors explain heterogeneous productivity outcomes?	Longitudinal studies, panel data analysis, industry-level comparisons.
Business Model Transformation	How do AI-enabled business models evolve during digital transformation? Which organizational capabilities foster successful adaptation?	Multiple case studies, survey research, mixed-method approaches.
Labour Market and Human Capital	How can organizations balance automation with workforce reskilling? Which skills become strategic in AI-intensive industries?	Surveys, organizational case studies, labour market analyses.
Innovation Ecosystems	How does AI reshape collaboration among firms, universities, governments, and digital platforms?	Network analysis, ecosystem mapping, comparative regional studies.
Sustainability and Industrial Growth	Under which conditions does AI simultaneously promote economic competitiveness, environmental sustainability, and social inclusion?	Cross-country analyses, sustainability assessment frameworks, ESG-oriented empirical studies.
Governance Regulation	How do regulatory environments influence AI adoption, innovation, and sustainable industrial development?	Comparative institutional studies, policy analysis, cross-national research.

Table 3. Future Research Directions Emerging from the Proposed Framework

Source: Author's elaboration.

Future Research Directions

The conceptual nature of the proposed framework requires empirical validation across industries, countries, and institutional environments. Future studies should test the relationships among productivity enhancement, business model innovation, labour market restructuring, and

ecosystem reconfiguration through longitudinal panel analysis, Structural Equation Modelling (SEM), multilevel models, and network analysis. Table 4 provides illustrative indicators for operationalizing these mechanisms.

Framework Mechanism	Potential Quantitative Indicators (Proxy Variables)	Illustrative Empirical Methods
Productivity Enhancement	Labour productivity; Total Factor Productivity (TFP); AI adoption intensity; AI investment; operational efficiency	Panel regression; Fixed-effects models; Difference-in-Differences
Business Innovation	Digital revenues; AI-enabled products and services; platform participation; digital transformation intensity; innovation revenues	Structural Equation Modelling (SEM); PLS-SEM; Panel regression
Labour Restructuring	ICT employment; AI-related skills; workforce reskilling expenditure; share of high-skilled occupations; labour productivity growth	Longitudinal panel analysis; Difference-in-Differences; Multilevel models
Ecosystem Reconfiguration	AI patent applications; university–industry collaboration; innovation network density; start-up formation; public and private R&D expenditure	Network analysis; Panel regression; Multilevel analysis

Table 4. Potential Empirical Operationalization of the Proposed Schumpeterian Framework

Source: Author's elaboration.

Future research should also compare different institutional contexts, particularly variations in digital infrastructure, regulatory quality, absorptive capacity, and innovation policy. Further investigation is required into the co-evolution of AI, organizational capabilities, business models, and human capital, especially in response to generative AI and increasingly autonomous systems. Sustainability represents another priority, including the relationships between AI, resource efficiency, circularity, decarbonization, ESG objectives, and inclusive labour-market development. Finally, institutional theory, complexity theory, innovation ecosystem theory, and socio-technical transition approaches could further extend the framework. These directions can empirically test and theoretically refine the proposed explanation of AI-driven industrial evolution.

CONCLUSION

This study develops an integrated Schumpeterian framework explaining how Artificial Intelligence, conceptualized as a General Purpose Technology, contributes to sustainable industrial growth through four mutually reinforcing mechanisms: productivity enhancement, business model innovation, labour market restructuring, and ecosystem reconfiguration. Their recursive

interaction connects technological innovation with organizational adaptation, human capital development, and institutional evolution.

The framework contributes theoretically by connecting classical innovation theory with contemporary AI and digital transformation research and by shifting attention from isolated effects of AI adoption toward systemic processes of industrial evolution. Managerially, it emphasizes complementary investments in organizational capabilities, workforce development, business model innovation, and collaborative ecosystems. From a policy perspective, it highlights the importance of coordinated investments in digital infrastructure, education, innovation ecosystems, and responsible governance.

Figure 3 synthesizes the overall theoretical process through which AI operates as a GPT, activates Schumpeterian creative destruction and the four interconnected mechanisms, and contributes to sustainable industrial growth.

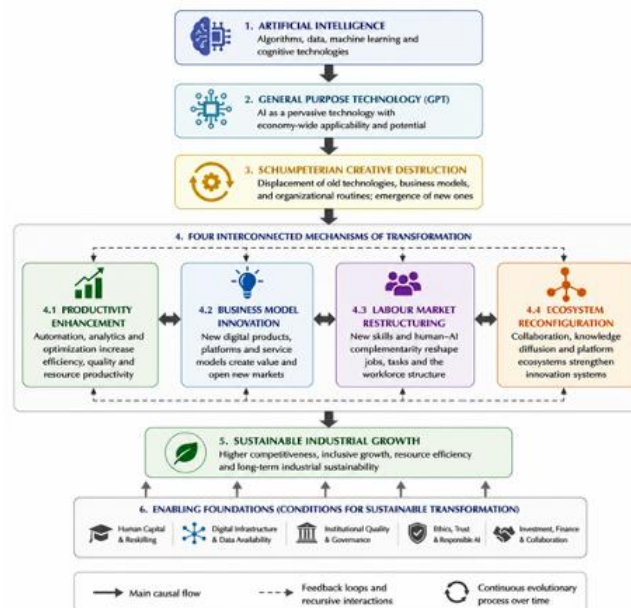


Figure 3. AI-Driven Schumpeterian Industrial Transformation Process: From Technology to Sustainable Industrial Growth. Source: Author's elaboration.

The study nevertheless has limitations. As a conceptual framework, its proposed relationships have not yet been empirically validated. Future quantitative, qualitative, and mixed-methods research should test them across industries, countries, and institutional contexts and

examine how regulatory environments, organizational capabilities, and technological maturity condition AI-driven transformation.

AI should therefore be understood not simply as a technological innovation but as a systemic force whose contribution to sustainable industrial growth depends on continuous interactions among technological progress, organizational innovation, human capabilities, ecosystems, and institutions. The proposed framework provides a foundation for empirically examining these dynamics and informing strategic and policy responses to industrial transformation in the digital economy.

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