

INTERNATIONAL MODELS OF SME SUSTAINABLE DEVELOPMENT: A COMPARATIVE ANALYSIS OF THE EU, THE USA, JAPAN AND REPUBLIC OF MOLDOVA

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Abstract: This article examines international models of sustainable development of small and medium-sized enterprises (SMEs) through a comparative analysis of the European Union, the United States, Japan, and the Republic of Moldova. The research addresses the question of how institutional frameworks, SME classification systems, financial instruments, innovation mechanisms, and sustainability-oriented policies influence the sustainability, resilience, and long-term competitiveness of SMEs in different economic environments. The study is based on a comparative institutional analysis using regulatory documents, international statistical reports, and academic literature. The selected cases represent advanced coordinated economies (EU and Japan), a market-oriented model (USA), and a fragmented transition economy (Republic of Moldova). Methods applied include classification analysis, institutional comparison, value-chain analysis, and qualitative synthesis of empirical data related to economic, social, and environmental dimensions of SME development. The results demonstrate that SME sustainability is achieved where classification systems, financial support mechanisms, innovation policies, and sustainability-oriented institutional frameworks function as an integrated system. The EU model relies on regulatory harmonization, coordinated financial instruments, and green transition policies; the US model emphasizes flexibility, sector-based classification, entrepreneurial competition, and innovation-driven growth; Japan ensures sustainability through SME integration into corporate supply chains, technological modernization, and national innovation networks. In contrast, Moldova exhibits a gap between formal regulatory alignment with EU standards and the actual functioning of SMEs, characterized by limited innovation capacity, weak institutional coordination, and insufficient integration into sustainable value chains. The findings suggest that for fragmented economies, sustainable SME development requires systemic alignment of institutions, finance, innovation, and sustainability-oriented policies rather than the isolated adoption of foreign policy instruments. The study contributes to the literature on SME sustainability and provides implications for policy design in transition economies.

Keywords: SMEs; Sustainable Development; Institutional Models; Innovation Systems; Comparative Analysis; Transition Economies

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Introduction

Small and medium-sized enterprises (SMEs) in all types of economic systems are viewed as a key driver of sustainable economic growth, structural stability, employment generation, and innovation. In the European Union, SMEs account for 99.8% of all enterprises and generate more than 57% of value added, as highlighted in the Annual Report on European SMEs 2022/2023 (European Commission, 2023, p. 12). Similar conclusions are presented by Scarborough & Cornwall (2020), who emphasize that the dynamics of the SME sector is a decisive factor shaping national competitiveness, entrepreneurial resilience, and long-term economic sustainability (Scarborough & Cornwall, 2020, p. 41).

The concept of sustainable SME development is grounded in the integration of economic efficiency, social responsibility, environmental sustainability, and innovative capacity. Contemporary approaches to sustainable development increasingly emphasize green transformation, resource efficiency, digital adaptation, and the integration of SMEs

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into sustainable value chains. Gordon's fundamental work *Economic Analysis* (2004) stresses that "the sustainability of economic actors is impossible without institutional predictability and access to development resources" (Gordon, 2004, p. 67). Research by Jennings & Perren (2015) confirms that sustainability in the SME sector relies on strategic capabilities, innovative potential, and the ability to adapt to changes in the external environment (Jennings & Perren, 2015, p. 118). Recent studies additionally underline that sustainable SME development is increasingly associated with green transition policies, resource efficiency, digital transformation, and the integration of SMEs into sustainable value chains (OECD, 2021; European Commission, 2023).

International SME sustainability models demonstrate substantial institutional differences. The European Union has developed a comprehensive regulatory and financial framework that includes innovation programs, technology-transfer instruments, green transition priorities, and harmonized SME classification criteria (European Commission, 2016, p. 34). The American model is characterized by decentralization and sectoral specificity: SME criteria are defined through SBA standards, while innovation is driven by a mature venture-capital market and entrepreneurial competition (Wang & Qu, 2023, p. 112). The Japanese sustainability model is marked by deep SME integration into supply chains, technological modernization, and long-term industrial coordination, supported by studies of the national innovation system (Levitskaya, 2018, p. 203) and METI data on the role of technological renewal in SME competitiveness.

The Republic of Moldova, as a small open economy with a transitional development profile, faces different institutional and economic conditions. Competitiveness studies indicate weaknesses in the innovation infrastructure, limited SME access to finance, insufficient technological adaptation, and low integration into global value chains (Stucalova, 2014, p. 262). Despite the existence of a regulatory framework harmonized with European standards (LEGE RM nr. 259-XV, 2004), the practical implementation of support mechanisms remains limited. As noted by Levitskaya (2018), "the gap between formal institutions and the actual mechanisms governing SME functioning remains a critical barrier to sustainable development" (Levitskaya, 2018, p. 207).

A comparative analysis of EU, US, and Japanese models makes it possible to identify institutional gaps and outline priority directions for improving SME policy in Moldova. This approach aligns with recommendations of European and international analytical reports, which underscore the need to adapt international best practices to the specific conditions of transition economies (European Commission, 2023, p. 18; OECD, 2021).

The purpose of this article is to conduct a comparative analysis of SME sustainability models in the EU, the US, Japan, and the Republic of Moldova, and to identify the elements of international experience most relevant for strengthening the competitiveness, resilience, and sustainable development of the Moldovan SME sector.

The key objectives of the study include:

- systematising the theoretical foundations of SME sustainability;
- identifying institutional characteristics of international models;

- analysing sustainability-oriented approaches to SME support and development;
- providing a comparative assessment of Moldova's position;
- developing recommendations for adapting international practices.

The scientific contribution of the study consists in integrating institutional, innovation, and sustainability-oriented perspectives into a comparative analytical framework for assessing SME development models in advanced and transition economies. The findings contribute to the theoretical understanding of SME sustainability and provide practical implications for improving SME support policies in the Republic of Moldova.

Literature Review

1.1. Theoretical Approaches to SME Sustainable Development

Research on the sustainable development of small and medium-sized enterprises (SMEs) demonstrates that this category of firms plays a critical role in ensuring structural stability, innovation dynamics, employment generation, and long-term economic growth across different economic systems. According to the European Commission, SMEs generate more than 57% of value added in the European Union and represent a major source of innovation and entrepreneurial activity (European Commission, 2023, p. 12).

Contemporary approaches increasingly interpret SME sustainability as a multidimensional process combining economic efficiency, social responsibility, environmental adaptability, technological modernisation, and institutional resilience. Recent studies emphasise the growing importance of green transition, circular economy practices, digital transformation, and sustainable value-chain integration for strengthening SME competitiveness and long-term resilience (OECD, 2021; European Commission, 2023; Chakraborty, 2025).

The theoretical foundation of SME sustainability is closely linked to institutional conditions, innovation capacity, and enterprise adaptability. Gordon (2004) argues that sustainable development is impossible without institutional predictability and access to long-term development resources (Gordon, 2004, p. 67). Jennings & Perren (2015) additionally note that SME sustainability depends on entrepreneurial flexibility, strategic capabilities, and the ability to adapt to external economic changes (Jennings & Perren, 2015, p. 118). Research on sustainable digital transformation further demonstrates that digital technologies increasingly function as instruments for integrating sustainability principles into SME business models and management systems (Mick, 2024).

The literature also highlights the competitive advantages of SMEs in conditions of economic uncertainty. Scarborough & Cornwall (2020) underline the adaptability of small firms and their ability to respond rapidly to market changes, while Wang & Qu (2023) emphasise that SMEs in developing and transition economies remain vulnerable to financial instability, technological limitations, and weak institutional support.

A significant contribution to the understanding of SME sustainability in transition economies has been made by Moldovan researchers. Stucalova (2014) stresses that the stability of the SME sector is essential for strengthening national competitiveness in small and fragmented economies. Aculai, Stratan and Novac (2018) additionally highlight the importance of institutional coordination, innovation infrastructure, and effective entrepreneurship support policies for ensuring sustainable SME development in the Republic of Moldova.

Levitskaya (2018) identifies substantial institutional constraints affecting Moldovan SMEs, including weak innovation infrastructure, limited access to finance, insufficient technological adaptation, and low integration into international supply chains. Although Moldova's legal framework is formally harmonized with European standards (LEGE RM nr. 259-XV, 2004), the practical implementation of SME support mechanisms remains limited.

Methodologically, contemporary studies increasingly apply comparative institutional approaches to analyse differences in SME sustainability models across countries and economic systems. Such approaches make it possible to assess the interaction between institutional regulation, innovation systems, financial instruments, and sustainability-oriented policies in shaping SME competitiveness and resilience.

Overall, the literature demonstrates that sustainable SME development is a multidimensional process based on the interaction between innovation potential, institutional support, social responsibility, environmental adaptation, and integration into global economic processes. In advanced economies these elements operate as coordinated mechanisms, whereas transition economies continue to face structural and institutional gaps that require the adaptation of international sustainability practices to national economic conditions.

Methodology

The research methodology is based on a comparative institutional analysis of four national models of SME sustainable development – the European Union, the United States, Japan, and the Republic of Moldova. The selection of cases reflects substantial differences in institutional regulation, innovation systems, financial support mechanisms, and sustainability-oriented development policies affecting SME competitiveness and long-term resilience (European Commission, 2023; Wang & Qu, 2023; Levitskaya, 2018).

The comparative framework is structured around several analytical dimensions, including SME classification systems, institutional support mechanisms, financial instruments, innovation capacity, and technological adaptation, integration into regional and global value chains, sustainability-oriented policies, as well as structural constraints and vulnerabilities. These dimensions make it possible to identify the differences between coordinated, market-oriented, and transition economy models of SME sustainable development.

The study draws on three groups of sources: regulatory documents, statistical and analytical reports, and academic literature. The regulatory framework includes EU SME definition guidelines (European Commission, 2016; 2023), US SBA standards, Japanese

METI sectoral criteria (Nishiguchi, 1994; Sako, 1992), and Law No. 179 of 21 July 2016 on Small and Medium-Sized Enterprises of the Republic of Moldova. Statistical and analytical materials include the Annual Report on European SMEs, OECD SME Outlook reports, and national statistical data from the EU, the US, Japan, and the Republic of Moldova. The theoretical and analytical basis of the study relies on the works of Jennings & Perren (2015), Gordon (2004), Levitskaya (2018), Stucalova (2014), as well as recent sustainability-oriented SME research.

The methodological approach combines classification analysis for comparing SME criteria, comparative institutional analysis for assessing support systems, and regulatory analysis of SME policy frameworks, functional value-chain analysis, particularly relevant for the Japanese model, and qualitative synthesis and triangulation of institutional, statistical, and academic sources.

The selected methodology ensures analytical consistency and allows for a systematic comparison of SME sustainability models across different economic and institutional environments, contributing to a more comprehensive understanding of sustainability mechanisms in advanced and transition economies.

Results and Discussion

4.1. Comparative Classification and Institutional Approaches to SMEs in the EU, the US, Japan, and the Republic of Moldova

International experience demonstrates that the sustainable development of SMEs does not emerge spontaneously but results from targeted public policy, institutional design, and the specific characteristics of national markets. Even the criteria used to classify enterprises as SMEs vary significantly across countries. These differences not only complicate direct international comparisons but also reflect the institutional priorities and sustainability mechanisms embedded within each economic model (European Commission, 2023; Wang & Qu, 2023; Jennings & Perren, 2015).

The literature emphasises that classification criteria possess not only statistical but also institutional significance, since they determine access to support programmes, subsidies, preferential financing, innovation instruments, and participation in public procurement systems (Scarborough & Cornwall, 2020; Wang & Qu, 2023). The European Union applies a unified system of criteria, whereas the United States and Japan rely on sector-specific and more flexible approaches.

For the purposes of this study, the main classification parameters can be summarised in a comparative framework (Table 1). The comparison demonstrates that the EU and the Republic of Moldova formally employ similar structural classification schemes, while the United States and Japan rely more heavily on sectoral differentiation and flexible institutional criteria. These differences substantially affect the scale of enterprises included in national support systems and their access to financial, innovation, and sustainability-oriented instruments. In the United States, firms that would be classified as large enterprises

under EU standards may still qualify as SMEs and benefit from support mechanisms. In Japan, sector-specific thresholds are closely connected with industrial coordination and supplier-integration systems. In contrast, the Republic of Moldova continues to be characterised by the dominance of micro-enterprises, limited financial capacity, and weaker institutional support, which constrain the long-term sustainability and competitiveness of SMEs (Stucalova, 2014; Levitskaya, 2018).

Table 1. Comparative Classification Criteria for SMEs in the EU, the US, Japan, and the Republic of Moldova

Country	Basic criteria	Employment-based classification	Distinctive features
EU	Number of employees, annual turnover, balance-sheet total (EU SME definition) (European Commission, 2023)	Micro: 1-9; small: 10-49; medium: 50-249	Unified thresholds for all EU member states; criteria linked to access to support programmes
US	Number of employees and/or annual revenue, depending on industry (Wang & Qu, 2023)	In most industries: up to 500 employees; in capital-intensive industries: up to 1,500	SBA sectoral standards; a “small” enterprise may be very large by EU standards
Japan	Number of employees and capital size (by sector) (Levitskaya, 2018 - analysis of Asian models)	Manufacturing: up to 300; services: up to 100; retail: up to 50	Strong sectoral and capital-based classification; criteria integrated into subcontracting and supplier-support systems
Republic of Moldova	Number of employees, turnover, balance-sheet total (LEGE RM nr. 259-XV, 2004)	Broadly aligned with the EU model: micro, small, medium	Formally European model; in practice-low turnover thresholds and limited access to support programmes (Levitskaya, 2018; Stucalova, 2014)

Source: compiled by the author

The following sections analyse the institutional, financial, innovation, and sustainability-oriented characteristics of SME development models in the EU, the United States, Japan, and the Republic of Moldova.

4.1.2. The European Model of SME Sustainable Development

The European Union views SMEs as the “backbone” of the economic structure, linking regional markets, innovation, and employment (European Commission, 2023). EU SME reports underline that the sector’s sustainability is ensured through a combination of three elements:

1. Institutional unification

A core principle of EU SME policy is institutional coherence. The sustainability mechanism is built on:

- unified SME classification criteria (micro, small, medium) covering employment, turnover, and balance-sheet indicators;
- harmonised reporting requirements, ensuring cross-country comparability of data;
- the Think Small First principle, embedded in the Small Business Act, prioritising SME interests in regulatory policymaking.

Such unification creates a common institutional environment where SMEs gain access to uniform regulatory standards, reducing administrative barriers and increasing business predictability (European Commission, 2016).

2. *Financial Architecture: Access to Structural Funds, Guarantee Schemes, EIF Instruments, and National Support Programmes.*

Financial support for SMEs in the EU is multi-layered and combines:

- structural fund resources (ERDF, ESF, Cohesion Fund) aimed at regional development and reducing socio-economic disparities;
- guarantee instruments of the European Investment Fund (EIF), ensuring SME access to credit;
- preferential SME loans implemented through the financial institutions of member states;
- grant and subsidised programmes focused on innovation, digitalisation, and the green transition;
- national support programmes integrated into the broader EU policy framework.

Scarborough & Cornwall (2020, p. 53) argue that SME sustainability in Europe is ensured precisely through the combination of credit-guarantee tools and grant support, which together form a “stable financial ecosystem.”

3. *Innovation Ecosystem*

The EU places strong emphasis on strengthening the innovation capacity of SMEs:

- SMEs participate actively in Horizon Europe, transnational research and technological projects, technological alliances, and clusters.
- Digital Innovation Hubs and R&D infrastructures provide SMEs with access to knowledge, technologies, and modern equipment.
- Technology transfer is supported across countries, regions, and sectors, fostering the diffusion of innovation.

In recent years, EU innovation policy has increasingly focused on sustainable technologies, digital transformation, resource efficiency, and environmentally adaptive business models aimed at strengthening SME competitiveness and resilience. Levitskaya (2018, p. 204) stresses that the European model treats SMEs as active participants in innovation processes rather than passive technology consumers.

4. *Regional Dimension of Sustainability*

EU SME policy is closely integrated into regional development policy and aims to:

- reduce territorial disparities;
- support SME development in rural and peripheral regions;

- strengthen local economic systems;
- increase employment and regional economic resilience.

Particular attention is also given to sustainable regional development, including support for local entrepreneurship, digital infrastructure, and sustainability-oriented territorial cohesion. Stucalova (2014, p. 263) notes that SMEs represent a key element of regional economic self-organisation, ensuring local market resilience and employment generation.

To systematize the European model of SME sustainable development, its structural components are summarized in Table 2.

Table 2. Key Elements of the European Model of SME Sustainable Development

Component	Content	Sources
Classification	Unified criteria (micro, small, medium based on employment, turnover, and balance-sheet total)	European Commission (2016, 2023)
Institutional framework	Small Business Act, EU support programmes for SMEs, legislative harmonisation	European Commission (2016)
Financial instruments	Structural funds, guarantee schemes, EU-backed loans, partial grants	European Commission (2023); Scarborough & Cornwall (2020)
Innovation	SME participation in transnational projects, access to R&D infrastructure, clusters	Levitskaya (2018)
Sustainability orientation	Green transition initiatives, digitalisation programmes, resource-efficiency measures, ESG-oriented business adaptation mechanisms	European Commission (2023)
Regional dimension	Support for SMEs in less-developed regions, reduction of territorial disparities	Stucalova (2014)

Source: developed by the author

Thus, the European model of SME sustainable development is characterised by a high degree of system coherence, institutional maturity, and internal logical consistency. Each component - classification, institutional framework, financial instruments, innovation, and the regional dimension - forms an integrated mechanism that strengthens SME sustainability at all stages of the business life cycle.

Unlike the US and Japan, where criteria and support instruments depend on sectoral structures, the EU relies on the principle of universality and harmonisation, ensuring uniform rules and access to support mechanisms for all member states. This makes the European model particularly effective for small, fragmented economies (European Commission, 2023; Stucalova, 2014).

In conclusion, the European model represents a balanced combination of regulatory unification, financial support, innovation integration, and regional cohesion, creating conditions for long-term sustainable growth of the SME sector and its high adaptability to economic shocks.

4.1.3. *The American Model of SME Sustainable Development*

The American model of SME sustainable development differs fundamentally from the European approach in terms of institutional organisation, regulatory philosophy, and mechanisms of market coordination. In the United States, SMEs are viewed primarily as a space for entrepreneurial experimentation, market competition, technological innovation, and business scalability rather than as an object of unified administrative regulation. As emphasised by Wang & Qu (2023, p. 44), US SME policy is based on the principle of “letting the market define the boundaries of growth,” whereby the state provides institutional guarantees for access to credit and contracts without imposing strict universal standards.

This philosophy shapes the overall architecture of the American model, including enterprise classification systems, institutional support mechanisms, financial instruments, and innovation-oriented development policies.

1. Sector-Based Classification

Unlike the EU’s unified classification system, the United States applies differentiated SBA (Small Business Administration) standards based on industry-specific characteristics. SME thresholds vary depending on the number of employees and annual revenue, allowing high-tech and capital-intensive firms with relatively large workforces to remain within the “small business” category and retain access to preferential programmes.

Typical thresholds include:

- up to 500 employees in most manufacturing, trade, and service industries;
- up to 1,500 employees in capital-intensive sectors;
- annual revenue thresholds ranging from USD 7.5 million to USD 47 million, depending on the industry.

As a result, enterprises that would be classified as large firms under EU standards may still qualify as SMEs in the United States. This flexibility supports the competitiveness of firms operating in technology-intensive sectors where larger operational scale is economically necessary.

2. Institutional Framework: The SBA as the Key Intermediary

The United States does not operate a centralised SME policy system comparable to the European model. Instead, SME support is organised through a multilayered institutional structure in which the Small Business Administration serves as the principal coordinating intermediary (Wang & Qu, 2023).

The SBA performs several key functions:

- guaranteeing SME loans;
- administering federal contracting programmes;
- coordinating recovery and business-support initiatives;
- providing educational and advisory support for entrepreneurs.

Rather than replacing market mechanisms, the SBA adjusts their functioning by improving SME access to financial and institutional resources that would otherwise remain inaccessible to smaller firms.

3. Financial Mechanisms of Sustainability

Financial sustainability in the American model is supported primarily through guarantees, investment mechanisms, and procurement access rather than through direct subsidies.

The main instruments include:

- SBA loan guarantee programmes such as 7(a) and 504 Loans;
- access to federal procurement programmes;
- private venture capital and startup financing mechanisms.

The federal government may cover up to 85% of lender risk within SBA programmes, significantly improving SME access to financing. In addition, federal agencies are required to allocate approximately 23% of procurement contracts to small businesses annually.

A distinctive feature of the American model is the highly developed venture capital market, which supports the rapid expansion of innovative SMEs. According to Scarborough & Cornwall (2020), the United States possesses one of the most advanced venture capital ecosystems globally, particularly in technology-intensive industries.

4. Innovation Focus and Technological Dynamics

American SMEs represent one of the central drivers of technological innovation and entrepreneurial dynamism in the national economy. SMEs generate up to 50% of patents and more than 40% of technological innovations, especially in biotechnology, digital technologies, robotics, and aerospace industries.

Scarborough & Cornwall (2020, p. 148) note that SMEs in the United States demonstrate “a higher innovation return per unit of capital” than large corporations. Wang & Qu (2023) additionally show that small firms frequently serve as channels for introducing new technologies, business models, and organisational practices.

In recent years, US innovation policy has increasingly supported sustainability-oriented entrepreneurship, particularly in green technologies, digital transformation, clean energy solutions, and resource-efficient production systems.

5. Regulatory Philosophy and Economic Context

According to Gordon (2004), the American economic model is oriented toward minimising administrative barriers, stimulating entrepreneurial initiative, and accepting risk as a driver of economic development.

Unlike the European model, where SME sustainability is largely supported through institutional harmonisation and coordinated public mechanisms, the American approach relies more heavily on market flexibility, private investment, entrepreneurial competition, and technological dynamism. The principle of “freedom first – support second” allows SMEs to adapt rapidly to economic and technological changes without operating within a highly standardised regulatory environment.

Table 3. Features of the American Model of SME Sustainable Development

Element	Characteristics	Source
SME criteria	Sector-based SBA standards for employment and revenue	Wang & Qu (2023)
Institutional framework	SBA, federal and state-level SME support programmes	Wang & Qu (2023)
Financial mechanisms	Loan guarantees, access to federal procurement, venture capital	Scarborough & Cornwall (2020)
Innovation role	High share of innovations produced by small firms, especially in high-tech industries	Wang & Qu (2023); Scarborough & Cornwall (2020)
Sustainability orientation	Market-driven innovation, green entrepreneurship, digital transformation initiatives	OECD (2021); Wang & Qu (2023)
Regulatory philosophy	Flexibility, encouragement of entrepreneurial initiative, acceptance of risk	Gordon (2004)

Source: developed by the author

Thus, the American model demonstrates that SME sustainability is achieved primarily through entrepreneurial flexibility, innovation-driven competition, private investment mechanisms, and adaptive market institutions. The combination of technological dynamism and relatively limited administrative regulation enables SMEs to respond rapidly to economic and technological changes, particularly in innovation-intensive sectors.

4.1.4. The Japanese Model of SME Sustainable Development

The Japanese model of sustainable development for small and medium-sized enterprises is one of the most coordinated and institutionally structured in the world. Its foundation is built on the close integration of SMEs into the production chains of large corporations (keiretsu), a highly developed subcontracting system, and deep linkages between the state, science, and industry. Levitskaya (2018) notes that the Japanese experience is often viewed as a benchmark of coordination between government, business, and the research sector.

Key elements of the Japanese model

1. Classification model: sector-based and capital-based principles

The SME classification system in Japan is flexible yet strictly structured. It is based on two parameters: number of employees, amount of capital, which differ across economic sectors: manufacturing: up to 300 employees; wholesale trade: up to 100 employees; retail trade: up to 50 employees; services: 50–100 employees depending on subsector.

This approach enables the state to fine-tune support instruments by considering technological complexity, capital intensity, and process requirements in each industry.

A key feature of the Japanese classification is its link to the structure of industrial cooperation. Classification functions not as a statistical formality but as a practical regulatory mechanism defining resource allocation and supply-chain quality standards.

Unlike the EU model, where classification serves mostly statistical purposes, in Japan the size of the enterprise determines:

- its role in production chains;
- access to support programmes;
- quality requirements and technological expectations.

For example, if a firm is considered “small” in manufacturing (up to 300 employees), this signals that the enterprise:

- can be admitted into supply chains of Toyota, Mitsubishi, Panasonic;
- may participate in METI technological modernisation programmes;
- must comply with strict supply standards (quality, timing, precision);
- gains access to consulting, subsidies, and cooperation centres.

Thus, SME classification functions as a practical mechanism for resource distribution, integration into subcontracting networks, and regulation of supply quality. The size of the enterprise effectively determines what contracts it can execute, the technological level it must meet, and the degree of responsibility it carries within corporate supply chains.

This functional classification is a core component of Japan’s sustainability model because it ensures stable demand, compliance with quality standards, and technological advancement of SMEs.

2. *Subcontracting and clusters*

Subcontracting is a central pillar of the Japanese model. Most SMEs operate as:

- component suppliers;
- developers of technological modules;
- producers of specialised parts;
- providers of auxiliary technological processes.

Horizontal and vertical cooperation ensures stable order distribution and shields SMEs from market volatility. Jennings & Perren (2015) note that this model creates “systemic resilience” based on multilayered interfirm relationships.

Key benefits of Japan’s subcontracting system include:

- stable demand;
- technological support from large corporations;
- improved product quality;
- long-term employment guarantees.

As a result, the Japanese SME sector is not autonomous but embedded in the industrial ecosystem.

3. *Innovation integration*

The Japanese model is embedded in the National Innovation System (NIS), where SMEs perform applied and technological roles rather than peripheral ones. Levitskaya

(2018) emphasises that Japan demonstrates one of the deepest levels of SME integration into national scientific and technological progress.

Studies by Nishiguchi (1994) and Sako (1992) show that SMEs' role is to adapt, refine, and commercialise technologies created in corporate research centres and sector laboratories. Unlike the US model, where SMEs often generate radical innovations, in Japan innovation progresses through "continuous improvement without disruption."

Key elements of innovation integration include:

- applied innovations aimed at improving product quality;
- adaptation of existing technologies to supply-chain requirements;
- participation in sectoral research consortia funded by METI;
- institutional support through technoparks, cooperation centres, and regional NIS hubs.

Innovation in SMEs is thus embedded in vertically coordinated structures that ensure sustainable development through continuous modernisation.

In recent years, Japanese SME policy has increasingly incorporated sustainability-oriented industrial modernisation, energy-efficiency measures, and digital manufacturing technologies within industrial supply chains. Innovation in SMEs is therefore embedded in vertically coordinated structures that support long-term competitiveness and continuous technological renewal.

4. *Systemic resilience as a result of cooperative architecture*

Jennings & Perren (2015) introduce the concept of systemic resilience, which manifests particularly strongly in Japan.

Unlike the US and EU, where SME sustainability depends on individual firm competitiveness, the Japanese model relies on collective resilience across the entire production and innovation system, including:

- large corporations;
- small suppliers;
- sectoral institutions;
- government bodies (METI, JETRO);
- regional cooperation networks.

The main source of resilience is the multilayer subcontracting system, which provides:

- stable SME demand;
- reduced market risks through long-term contracts;
- continuous technological assistance from large firms;
- employment guarantees;
- coordinated standards of quality, timing, and technological requirements.

According to Nishiguchi (1994), this creates a "shock absorber effect" that helps SMEs survive crises, demand fluctuations, and technological disruptions due to support from larger firms.

Thus, SME sustainability in Japan is not the result of isolated small-firm strategies but the outcome of coordinated production–innovation architecture.

5. Incremental innovation

A defining feature of Japanese SMEs is their innovation behaviour. Unlike US SMEs, which often drive radical innovations (Wang & Qu, 2023), Japanese SMEs focus on incremental innovations-systematic, small, but continuous improvements of processes and products.

This approach reflects the concept of kaizen, which emphasises constant operational refinement. SMEs embedded in supply chains implement dozens of micro-improvements daily, ensuring stable quality growth and minimising production risks.

6. Technological adaptation

Japanese SMEs excel in technological adaptation: rather than creating technologies from scratch, they refine and tailor existing technologies to meet the demands of production chains. This makes them key suppliers of specialised components and technological solutions for corporations such as Toyota, Panasonic, and Mitsubishi (Nishiguchi, 1994; Sako, 1992).

7. Integration into research networks of sectoral institutions

Innovation activity also relies on SME integration into research networks of industry institutes, universities, and regional technology centres. Levitskaya (2018) notes that this coordination creates a synchronised national innovation system in which SMEs act as applied research actors, not as isolated developers.

This leads to constant quality improvement rather than abrupt technological leaps, reducing risks and enhancing resilience. The Japanese model can be summarised in Table 4.

Thus, the Japanese model demonstrates that SME sustainability is achieved through deep institutional coordination, technological adaptation, and long-term integration into vertically organised production and innovation systems. Unlike the American model, which prioritises entrepreneurial flexibility and market dynamism, the Japanese approach relies on coordinated industrial stability, continuous modernisation, and collective adaptation mechanisms that strengthen the long-term resilience and competitiveness of SMEs.

4.1.5. The Model of SME Sustainable Development in the Republic of Moldova

The model of SME sustainable development in the Republic of Moldova has evolved under the conditions of a transition economy, limited financial resources, structural vulnerability, and high dependence on external markets. Formally, Moldova's regulatory framework is harmonised with European approaches: Law No. 179 of 21 July 2016 on Small and Medium-Sized Enterprises defines SME classification based on employment, turnover, and assets, largely reflecting the EU model. However, Levitskaya (2018) emphasises that alignment of formal criteria does not mean alignment of sustainability models, since institutional, financial, and innovation infrastructures remain significantly weaker than in EU countries (Levitskaya, 2018, p. 207).

Table 4. Structural Features of the Japanese Model of SME Sustainable Development

Model element	Content	Sources
SME classification (sector-based + capital-based)	Manufacturing: ≤300 employees; wholesale: ≤100; retail: ≤50; services: ≤50–100. Classification is based not on formal reporting but on the firm's role in production chains and its capital level.	Levitskaya (2018); METI Standards
Functional role of classification	Firm size determines access to corporate supply chains, contract types, quality requirements, and eligibility for METI programmes. Classification = instrument of resource allocation and quality regulation.	Nishiguchi (1994); Sako (1992)
Integration into keiretsu and subcontracting	SMEs act as suppliers of components, units, and auxiliary processes for Toyota, Mitsubishi, Panasonic. Subcontracting creates multilevel cooperation and stable demand.	Jennings & Perren (2015)
Clusters and regional industrial cooperation	Formation of production groups, technology centres, and regional cooperation networks providing technological support to SMEs.	Levitskaya (2018)
Innovation integration (NIS)	SMEs participate in the National Innovation System: applied research, technology implementation, process modernisation, cooperation with universities and sector institutes.	Levitskaya (2018); Gordon (2004)
Incremental innovation and kaizen	Main mechanism of resilience: daily micro-improvements; absence of radical leaps; orientation toward stable quality enhancement.	Sako (1992); Nishiguchi (1994)
Technological adaptation	SMEs do not create radical innovations; they adapt and refine existing technologies according to supply-chain requirements.	Nishiguchi (1994)
Government support via METI	Programmes for technological upgrading; standardisation; subsidies; advisory centres; support for supplier innovation and modernisation.	METI; Levitskaya (2018)
System resilience	Ensured through long-term contracts, quality standardisation, stable demand, and continuous technological guidance from large corporations.	Jennings & Perren (2015)
Sustainability orientation	Energy efficiency, technological modernisation, digital manufacturing technologies within industrial supply chains	METI; Levitskaya (2018)

Source: developed by the author

1. Classification and real SME structure

Formally, Moldova uses a three-tier European scheme: micro, small, and medium enterprises defined by workers, turnover, and assets. In practice, the sector is dominated by microenterprises oriented toward survival, small retail activities, low-tech services, and simple processing.

Stucalova (2014) notes that SMEs in Moldova remain “locked” in low-productivity segments, limiting their contribution to productivity growth and innovation (Stucalova, 2014, p. 263). Unlike the EU, where SMEs create value added in manufacturing, high-tech

industries, and export-oriented sectors, Moldovan SMEs are weakly integrated into global supply chains and rarely serve as suppliers to international corporations.

2. *Institutional and regulatory framework*

Moldova's institutional model emerged under the influence of European practices and includes:

- Law No. 179 of 21 July 2016 on Small and Medium-Sized Enterprises and related regulations on business activity, taxation, and innovation;
- entrepreneurship-support institutions (ODIMM, ministerial divisions under the Ministry of Economy);
- the Agency for Innovation and Technology Transfer (AITT), responsible for financing technology-transfer and innovation-implementation projects;
- elements of the national innovation system described by Levitskaya (2018), including research institutions, universities, and a limited number of technology parks.

Levitskaya (2018) underlines that despite the formal presence of several institutions, coordination remains weak and mechanisms for science-business-government cooperation are fragmented (Levitskaya, 2018, p. 204). SMEs often do not perceive state institutions as real partners in sustainability and innovation.

3. *Financial architecture and access to resources*

Moldova's financial support model differs sharply from the EU and US:

- the banking system is conservative; credit is expensive; collateral requirements are high;
- venture capital and business-angel activity are nearly absent;
- guarantee schemes and risk-sharing mechanisms are underdeveloped;
- grant support largely comes from international donors, EU programmes, and global institutions.

AITT was one of the few attempts to establish innovation-oriented financing. Between 2005–2010, it funded 181 projects, prioritising agricultural biotechnology, soil fertility, and food security (107 projects), with others in biomedicine, pharmaceuticals, energy efficiency, new materials, and nanotechnologies. However, Levitskaya (2018) notes that funding volumes were limited and SME capacity to commercialise results remained low (Levitskaya, 2018, p. 205).

4. *Innovation potential and international competitiveness*

According to World Economic Forum indicators cited in Levitskaya (2018), Moldova ranks below the top 100 countries in innovation and competitiveness, evidencing weak national innovation capacity. In this environment, SMEs:

- have limited access to modern technologies;
- are rarely initiators of applied research;
- participate minimally in long-term innovation projects;
- rely on imported ready-made solutions rather than their development.

This contrasts sharply with Japanese and American models, where SMEs are core innovation drivers (Nishiguchi, 1994; Wang & Qu, 2023).

5. *Sustainability transformation and integration challenges*

In recent years, the Republic of Moldova has increasingly incorporated sustainability-oriented priorities into national development strategies and SME-support policies, particularly within the framework of European integration and alignment with EU economic standards. However, the practical implementation of sustainability-oriented transformation remains limited.

The main challenges include:

- low SME participation in green-transition programmes;
- insufficient digitalisation of business processes;
- limited implementation of circular-economy practices;
- weak integration into sustainable value chains;
- restricted access to financing for green and technological modernisation.

At the same time, EU-supported initiatives and national development programmes create opportunities for strengthening SME sustainability through energy-efficiency measures, digital transformation, innovation support, and integration into regional cooperation networks.

The transition toward sustainability-oriented SME development in Moldova therefore requires not only formal regulatory harmonisation but also the creation of effective institutional and financial mechanisms capable of supporting technological adaptation, innovation integration, and long-term competitiveness.

6. *Territorial and structural dimension*

Geographically, the Moldovan SME sector:

- is concentrated in cities and peri-urban zones;
- is weakly represented in rural, remote, and depopulating regions;
- plays a limited role in regional cluster formation.

Stucalova (2014) notes that regional SME-support policy is weakly institutionalised, and SMEs contribute little to reducing territorial disparities (Stucalova, 2014, p. 262). Unlike the EU, SMEs in Moldova do not fully function as instruments of regional cohesion.

7. *Summary characteristics of Moldova's sustainability model.*

The core elements can be condensed into Table 5. Thus, unlike the EU, the US, and Japan, where SME sustainability models rely on strong institutional, financial, and innovation infrastructures, the Moldovan model is characterised by:

- formal borrowing of classification and regulatory approaches;
- limited practical implementation of support mechanisms;
- low innovation and export capacity of SMEs;
- structural dependence on survival-oriented microbusinesses.

Table 5. Key Characteristics of the SME Sustainable Development Model in the Republic of Moldova

Component	Content	Sources
Classification	Formally aligned with EU model (micro, small, medium by employment, turnover, assets); dominance of microenterprises	LEGE RM nr. 259-XV (2004); Levitskaya (2018)
Institutional framework	ODIMM, AITT, Ministry of Economy, elements of national innovation system; weak coordination and policy fragmentation	Levitskaya (2018); Stucalova (2014)
Financial support	Limited credit access; high borrowing costs; weak guarantee mechanisms; limited innovation funding through AITT	Levitskaya (2018)
Innovation component	Low SME innovation activity; weak commercialisation; limited participation in international projects	Levitskaya (2018); WEF (as cited in Levitskaya)
Regional dimension	SME concentration in few centres; weak role in reducing regional disparities; absence of strong clusters	Stucalova (2014)
Sustainability orientation	Early-stage integration of green transition, digitalisation, and EU-supported sustainability initiatives; limited practical implementation	Moldova European 2030; OECD (2021)
International integration	Low participation in global value chains; weak export potential; dependence on imported technologies	Levitskaya (2018)

Source: developed by the author

At the same time, the focus on European integration and the adaptation of EU best practices creates a potential window of opportunity for transforming the model – strengthening financial mechanisms, developing innovation programmes, increasing the role of SMEs in regional policy, and integrating them into international value chains.

Conclusion

The comparative analysis of SME sustainable development models in the European Union, the United States, Japan, and the Republic of Moldova demonstrates that SME sustainability depends on the interaction between institutional architecture, innovation integration, and financial-support mechanisms. Classification parameters and regulatory environments additionally influence differences in growth potential, competitiveness, and the ability of firms to withstand external shocks.

The EU, US, and Japanese models demonstrate different but internally coherent approaches to SME sustainability. The European model is based on institutional harmonisation, coordinated financial instruments, and integration into sustainability-

oriented programmes. The American model relies on entrepreneurial flexibility, technological innovation, and market competition. The Japanese model ensures SME sustainability through long-term industrial coordination, subcontracting systems, and integration into vertically organized production and innovation networks.

In contrast, the Republic of Moldova demonstrates a significant gap between formal regulatory convergence with European standards and the actual functioning of the SME sector. Moldovan SMEs continue to face limited financial access, weak innovation infrastructure, insufficient integration into international value chains, and structural dependence on low-productivity microenterprises.

The study confirms that sustainable SME development cannot be achieved through isolated policy instruments but requires coherent institutional coordination between regulatory systems, innovation infrastructure, financial mechanisms, and long-term development priorities. In advanced economies, sustainability emerges where institutional support, innovation systems, financial mechanisms, and long-term strategic coordination operate as an integrated institutional ecosystem. For transition economies such as Moldova, the key challenge remains the transformation of fragmented support mechanisms into a coherent sustainability-oriented development system.

From a practical perspective, the findings indicate several priority directions for strengthening SME sustainability in the Republic of Moldova:

- development of green-transition and energy-efficiency programmes for SMEs;
- expansion of digitalisation and technological-modernisation instruments;
- support for SME participation in sustainable value chains and regional cooperation networks;
- strengthening innovation-oriented financing and guarantee mechanisms;
- integration of sustainability criteria into national SME-support policies.

At the same time, the research has several limitations. The study is based primarily on comparative institutional and qualitative analysis and does not include econometric modelling or large-scale quantitative assessment of SME sustainability indicators. In addition, the article focuses on selected international models and therefore does not cover the full diversity of SME development systems in other economic contexts.

Future research may further examine the impact of digital transformation, green-transition policies, circular-economy practices, and sustainability-oriented innovation mechanisms on SME development in transition economies, including the Republic of Moldova.

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