Transforming persistent failures into public value

Policy design for innovation oriented to the common good

Martha L. Silva-Flores
PhD, Doctor in Scientific-Social Studies, Full Professor and Researcher in the Department of Economics, Management, and Marketing
ITESO, Jesuit University of Guadalajara
https://orcid.org/0000-0003-0343-8959

Álvaro R. Pedroza-Zapata
PhD, Postdoctoral in Administration, Professor in the University Center for Economic and Administrative Sciences (CUCEA)
University of Guadalajara
https://orcid.org/0000-0002-9877-4957

Ariel Vázquez-Elorza
PhD, Doctor in Agro-industrial Economic Problems, Researcher at the Department of Food Processes and Chemistry, Biotechnology Area
Technological University of the Toluca Valley
https://orcid.org/0000-0002-6710-8935

Transforming persistent failures into public value: Policy design for innovation oriented toward the common good

Martha L. Silva-Flores, Álvaro R. Pedroza-Zapata, and Ariel Vázquez-Elorza

Abstract

This article examines public sector innovation as a complex and intentional process that addresses persistent structural challenges through the articulation of institutional frameworks, regulatory mechanisms, and collaborative structures oriented toward the common good. Using a combined qualitative and bibliometric methodology, the study identifies two persistent failures within innovation systems: low profitability—associated with high R&D costs—and limited benefit appropriation—linked to insufficient capabilities and weak social capital. Despite decades of academic recognition, these barriers continue to undermine the social and environmental impact of innovation, particularly in middle-income countries.

The article contributes to the field of public sector innovation by offering an accessible, structured framework for designing policies that integrate ethical, institutional, and systemic considerations. It is especially useful for policymakers and public sector leaders who may not be specialists in innovation theory but seek practical strategies to enhance inclusive and sustainable development.

Methodologically, the study employs a combined qualitative and bibliometric approach to analyze trends in sustainable innovation and identify persistent structural barriers, based on a curated dataset of 2,241 Scopus sources processed with R® software. The findings reveal long-standing failures with ethical and institutional dimensions. The article proposes a policy agenda that promotes organizational adaptability, social inclusion, and value-oriented innovation systems. It calls for the design of policies that respond not only to technical inefficiencies but also to deeper systemic inequalities, thus laying the foundation for innovation in the service of the common good.

***Keywords*:** Design of policies, innovation policies, market failures, systemic failures, innovation systems

Introduction

Middle-income countries such as Mexico offer fertile ground for the implementation of innovation policies, given the range of social challenges they face, including environmental degradation, uncontrolled urbanization, structural poverty, and educational deficits, among others. However, there is a notable lack of innovation policies that effectively address these challenges (Silva-Flores and Murillo, 2022). This article aims to propose key elements for the

design of innovation policies oriented toward the common good, based on an analysis of trends in sustainable innovation using a qualitative and bibliometric approach to identify failures within the innovation system and the market. This approach seeks to promote sustainable development and value creation in an economy such as Mexico's.

The findings of this research enhance decision-making for policymakers involved in the development and implementation of innovation policies, by providing insights derived from the analysis of market and systemic failures. The relevance of this type of study is twofold. First, market and systemic failures represent significant obstacles to innovation in regions, countries, and firms. Second, analyzing these failures generates valuable insights into the specific challenges faced by those regions, countries, or firms, thus enabling the design of targeted policies that foster innovation for the common good.

The originality of this study lies in its interdisciplinary approach, which incorporates ethical and social principles from the common good into innovation policy. This perspective aligns with promoting equitable and sustainable development. The main limitation of this research is the lack of specific empirical studies validating the application of these policies in contexts similar to that of Mexico. Nevertheless, the practical implications of this work are significant: it proposes an inclusive policy framework oriented toward the common good, fostering collaboration among actors in the innovation system and strengthening local capacities and social capital to address complex societal challenges in Mexico.

The article is structured as follows: it begins with an introduction and a review of conceptual innovation models. It then describes the methodology used for the bibliometric analysis, including the characteristics of the baseline data obtained from the Scopus database. The results of the study are presented, followed by an analysis of market failures using the taxonomy of Woolthuis et al. (2005), and systemic failures in terms of capabilities, coordination, and the role of institutions. The article also identifies key obstacles to innovation policy design and develops the proposed key elements, concluding with a discussion and final remarks.

Framework

In this section, a review is conducted of the various stages through which Innovation and Technological Development (R&D) has evolved, starting from linear models of innovation within a neoclassical paradigm of science and technology for economic development to systemic models based on the paradigm of innovation systems.

Within the neoclassical model, the rationale for a policy specifically promoting innovation has been the subject of extensive social, academic, and political debate. Initially, the discussion was dominated by the neoclassical stance, which argued that the unrestricted market operation was the formula to maximize the general welfare of society. In this context, the role of the government is limited almost exclusively to ensuring the free operation of the market, as any public intervention distorts it and, consequently, results in a suboptimal outcome that reduces general welfare.

However, this stance has led to market failures, namely, circumstances in which the market produces suboptimal results, thus warranting corrective government intervention. A paradigmatic example is environmental issues caused by business activities, where the market alone is unable to assign a price to the costs of environmental damage. Another classic example is R&D activities, as the nature of these activities leads to suboptimal outcomes when the agents' behavior is solely market-driven[1].

This situation largely arises from the idiosyncratic nature of knowledge (the primary resource for invention and innovation) as a non-rival good in consumption. This means that, unlike most goods, multiple individuals can "consume" the same knowledge without reducing the amount available to others. Additionally, it is generally a non-excludable good, as preventing others from accessing it is difficult. Due to these conditions, economic theory considers knowledge generated through basic research as a "public good" that the market cannot efficiently produce.

Taking these characteristics of knowledge into account, Arrow (1962) identifies three factors that hinder the existence of a perfectly competitive knowledge market, thus necessitating public funding for research so society can fully benefit from it:

1. *Indivisibility* – each new piece of knowledge is a compact block that cannot be divided into parts (a fragment of knowledge has no practical utility).
2. *Inappropriability of research-derived benefits* – it is nearly impossible to keep new knowledge secret due to researchers' fundamental freedoms: to publish their work and to change jobs. Arrow (1962) viewed new knowledge as an externality benefiting the entire industry, where private costs generate social benefits.
3. *Uncertainty* – due to the high financial risk associated with research activities, companies tend to avoid them or, at best, invest a suboptimal amount.

These three factors, which preclude a perfectly competitive market for knowledge, discourage its commercialization, as any buyer can apply it without limits, achieving economies of scale and capturing the benefits for themselves. In such circumstances, the rational behavior of an inventor of new knowledge would be restricting its use, forming a monopoly. However, this solution is inefficient from a social standpoint and may also be suboptimal for the inventor, who may be unable to exploit their innovation efficiently (Vahabi, 1997).

In this neoclassical paradigm, it is typical for basic scientific research to be conducted at universities and fully funded by the state. In contrast, activities more directly aimed at commercial applications are financed by the private sector, except in areas of higher financial risk or significant spillover potential, where mixed public-private funding is frequent.

One of the primary reasons justifying state intervention in public-private financing is the sunk costs associated with research and technological development activities. Considering these ideas, neoclassical economic models regard knowledge as an exogenous factor, attributing the following assumptions to it:

[1] The theoretical foundation of market failures in research and development activities and, therefore, of the need for state intervention begins with the classic articles by Nelson (1959) and Arrow (1962).

- *Generic nature* – the same knowledge can be applied across various companies within a sector or even across different sectors of activity.
- *Codified* – it is recorded in a format that allows its complete transmission.
- *Accessible* – it is available to any company at a low cost or, in any case, without differential costs for accessing and applying it in production.
- *Context-independent* – any company has the same opportunities to transform specific knowledge into productive capacity.

Within this neoclassical economic framework, new advances in growth theory have deepened our understanding of the role of knowledge. Specifically, knowledge spillovers or externalities are no longer viewed solely as a factor inhibiting private investment in R&D; instead, their role as input for the innovation processes of other companies is emphasized (Smith, 2000).

In response to the limited realism of neoclassical assumptions regarding knowledge generation and the limitations of the linear innovation model, various authors since the 1980s have developed the innovation systems paradigm[2]. Within this paradigm, public intervention is justified as a response to so-called systemic failures. These systems encompass the actors and institutions involved in innovation processes, including framework conditions such as regulation, the efficiency of the financial system, etc. They draw inspiration from some classics of economic thought, such as the Marxist view of technological change as an endogenous factor for companies and a driver of economic growth and development[3]. This view surpasses the neoclassical approach, which focuses almost exclusively on competition. However, its primary influence is Schumpeter's thesis on innovation and its diffusion as the engine of "creative destruction" inherent in capitalism, a dynamic that strengthens the economy[4] and goes beyond the neoclassical conception of economic dynamics as a tendency toward static equilibrium.

Another difference in this school of thought compared to the neoclassical tradition is that it views innovation as an economic phenomenon and emphasizes its nature as a social construct, focusing on the complexity and non-linear nature of innovation processes. Therefore, if innovation is endogenous to the economic system and interacts with many elements, promoting it through science, technology development and innovation policies becomes relevant[5].

Moreover, the concept of innovation systems is notably influenced by evolutionary economics, which pays special attention to the behaviors of individuals and agents and the

[2] This school of thought begins with the analysis of Freeman (1987), Lundvall (1992) and Nelson (1993) who later developed the concept of "national innovation system".

[3] A critical review of Marx's thought regarding technological change in Roth (2010).

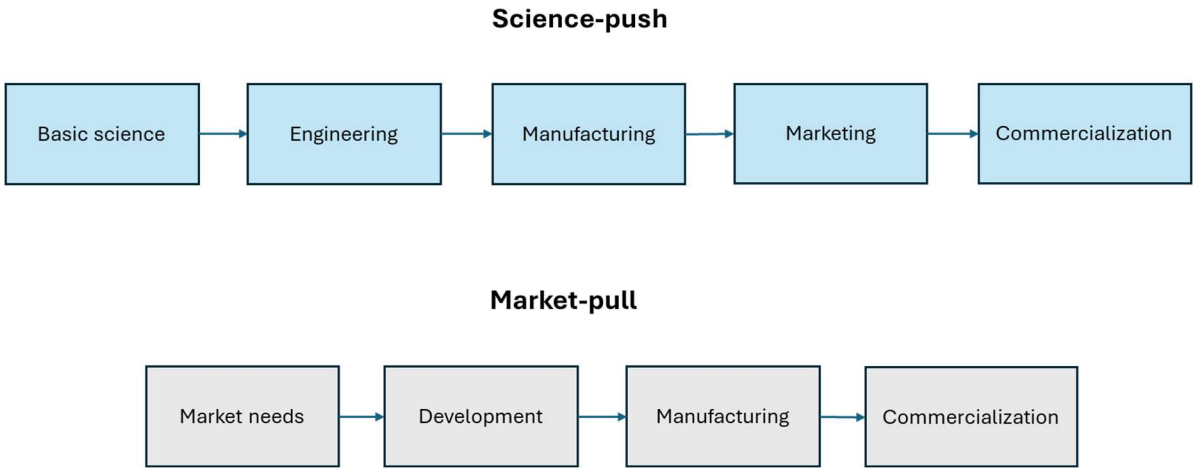
[4] Schumpeter in *Capitalism, Socialism and Democracy* (1942) coins the term "creative destruction." A succinct review of Schumpeter's contribution to understanding the innovation phenomenon is provided in Śledzik (2013).

[5] In fact, many of the authors who first formulated the innovation systems paradigm were part of the OECD team of experts on science policy and the development of science and technology statistics.

interactions among them[6]. Contrary to the neoclassical school's assumption of rational economic behavior, evolutionary economists argue that, at the level of the individual firm, information is imperfect and incomplete, and even available data is not fully assimilated. In this regard, a firm's learning capability is as important as access to information—a cumulative process based on experience. This means that much of the knowledge results from an individual learning process on the part of each firm and worker, and therefore, its tacit nature complicates knowledge transfer. Thus, contrary to the neoclassical assumption, knowledge is not always generalizable; it can also be specific to a firm or sector (Grant, 1996).

Another important influence on the concept of the innovation systems paradigm is research itself into the factors that drive innovation. Initially, the literature was dominated by the linear technology-push model. In the 1960s, a new wave of researchers emphasized the role of demand and the market in stimulating innovation, which led to the demand-pull model. In this model, the market supplies new ideas to companies' R&D departments, which respond to this demand[7].

Figure 1: Linear models of innovation



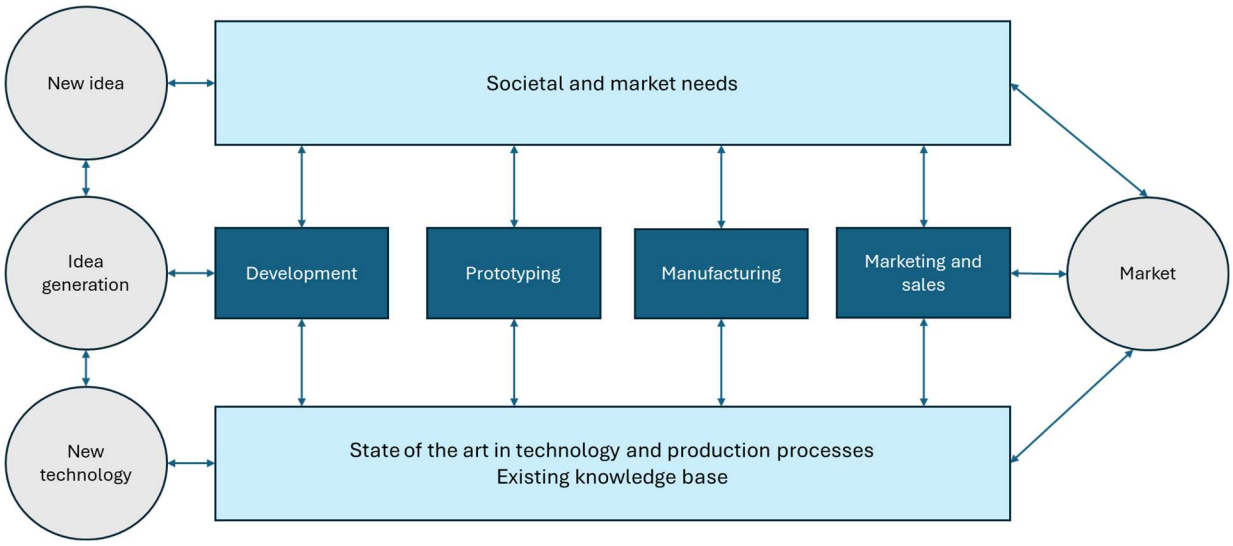
Source: Adaptation of Myers and Marquis (1969)

One of the main weaknesses of both models is the lack of clarity regarding how the successive stages of the innovation process are linked, as this process generally does not unfold directly and in a planned way within a company, as suggested by the linear model (Rothwell, 1994). On the contrary, based on empirical experience, authors like Von Hippel (1976) and Teubal (1987) describe the innovation process as an activity involving producers, suppliers, and users. Building on this, Rothwell (1994) developed the interactive model of innovation (the coupling model), which emphasizes the coupling of science, technology, and the market as an explanatory factor in innovation.

[6] The first application of evolutionary theories to economics was by Veblen (1998). Cyert and March later systematized the ideas of evolutionary economics.

[7] The demand-pull model had its first expression in Carter and Williams (1957), and was consolidated with the contributions of Schmookler (1966) and Myers and Marquis (1969).

Figure 2: Interactive innovation model



Source: Adaptation of Rothwell (1994)

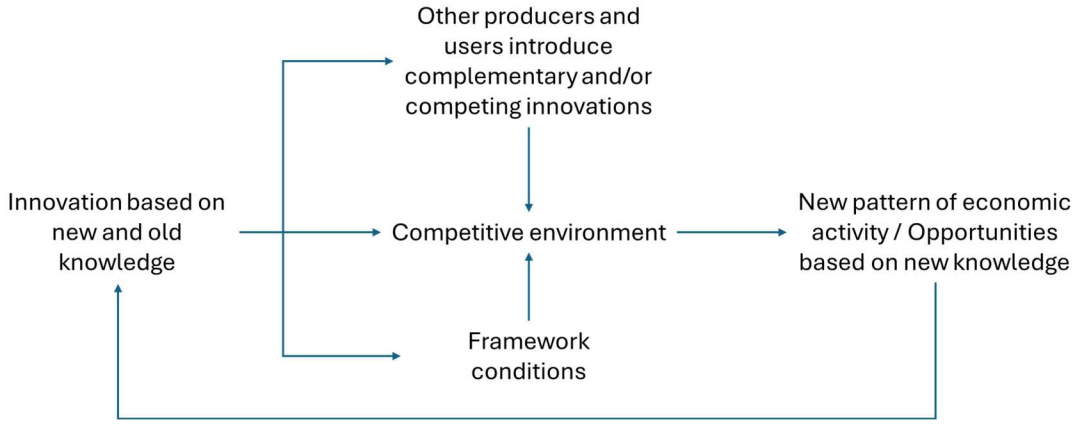
The influence of cluster literature on innovation theories and policies is also worth noting—an idea present since the 19th century in the work of Alfred Marshall. Marshall's original conception of "industrial districts" referred to the spatial concentration of competing companies within the same sector, allowing them to share the same labor market and access strategic inputs, specialized infrastructure, and educational centers. This resource agglomeration generates intensified competition that enhances the competitiveness and creativity of the companies in these districts and, therefore, innovation. More recently, Porter (1998) developed this concept to propose a new thesis on cluster competitiveness, which has powerfully influenced local and regional economic development policies. Specifically, Porter complements Marshall's thesis on the advantages of supply-side agglomeration by emphasizing the importance of relationships between producers and users along the supply chain for competitiveness.

The latest development in the debate on local development policies is the "smart specialization" approach[8], which focuses on the interaction of activities within a cluster with the state's and other institutions' role in developing infrastructural conditions that enhance its competitiveness. In fact, smart specialization represents the territorial expression of a highly developed local or regional innovation system.

A final influence on the genesis of the innovation systems paradigm is systems theory itself, which is strongly marked by a methodological approach based on interdisciplinarity, as it adopts tools from multiple disciplines (Popa et al., 2015). In this sense, innovation system theorists use sets of ideas associated with innovation systems to understand the phenomenon and design innovation policies.

[8] Originally developed by Foray and Van Ark (2007), members of "Knowledge for Growth", a group of European Union experts on public policy proposals to promote knowledge and innovation in strategic sectors.

Figure 3: Evolutionary perspective of innovation in the innovation systems approach



Source: Adaptation of Metcalfe (2000)

From this framework, another key element of the innovation systems paradigm emerges: innovation is not limited to technological change, but results from a complex interaction between technology and other factors, where the reuse and/or recombination of existing knowledge becomes as important as the generation of new knowledge.

Building on this view, public sector innovation can be understood as a complex and intentional process that goes beyond technological novelty. It is embedded within institutional, social, and organizational dynamics aimed at transformative change. From this perspective, innovation involves not only the introduction of new ideas, but also their adoption, implementation, and diffusion across the public system, through institutional frameworks, regulatory mechanisms, and collaborative structures aligned with the principles of equity, sustainability, and the common good. In line with Glor (2025; 2007), public innovation requires organizational will, continuous learning, and internal capacities to adapt to complex and dynamic contexts—features that distinguish true innovation from incremental adjustments or superficial changes.

Methodology

Methodologically, this article is based on a systematic analysis of the literature on market and systemic failures in innovation, documented since the 1960s by leading scholars such as Nelson (2000), Freeman (1974), and Lundvall (1992). This analysis identifies and categorizes persistent types of failures, such as low profitability associated with the high costs of research and development (R&D) activities, and low appropriability, linked to a lack of capacities and social capital within firms. The findings are structured to offer both theoretical and practical contributions, aimed at strengthening connections among institutional actors and promoting inclusion and equity, thereby fostering the implementation of innovation policies aligned with the common good.

In addition, the methodological approach included a bibliometric analysis of trends in innovation for sustainability, due to its close relation with value-oriented innovation, as well as qualitative analyses aimed at identifying market and systemic failures in innovation. The study of bibliometric networks—such as co-authorship networks, bibliographic coupling, and co-citation networks—has a long history in bibliometric statistics, with early work dating back to the 1960s and 1970s (Perianes-Rodríguez, Waltman and Van Eck, 2016). Acosta-Tzin, Raudales-Garcia and Aguilar-Hernández (2023) also highlights the importance of applying biostatistical techniques to analyze scientific outputs related to business innovation, including social innovation, which was included in this study as a descriptor alongside sustainability, focusing on trends centered on the values of the common good.

To construct the bibliometric dataset, data were retrieved from the Scopus database, including citations and bibliographic references from scientific documents and publications. A keyword filter was applied, using terms such as innovation and sustainability, systemic market asymmetry (market failures), policy, and values, as these align closely with the analytical framework and objectives of this research. The data were retrieved as of January 2025 and exported in CSV format for processing using R®, an open-source software environment.

The resulting dataset covers the period 1992–2025 and includes a total of 2,241 data sources, spanning a broad range of publications such as journals, books, and other document types. The dataset comprises 3,299 publications, with an annual growth rate of 5%. The mean document age is 5.59 years, with an average of 34.3 citations per document. The average number of citations per year is 4.461, indicating a moderate citation rate for the studies and articles included in the analysis.

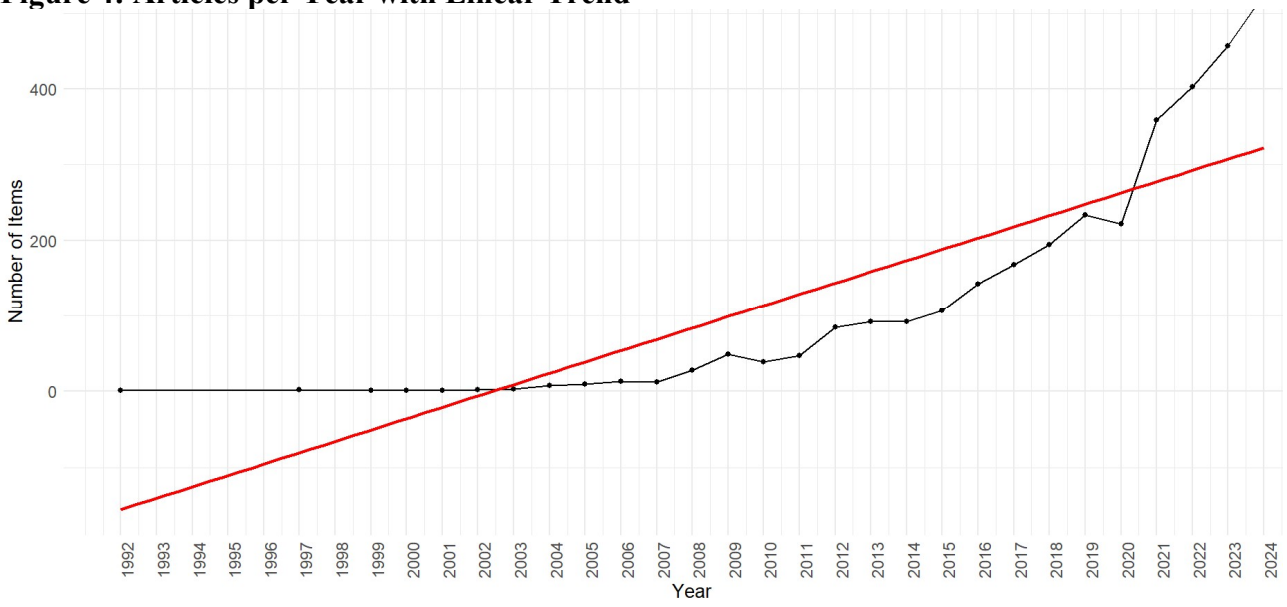
The baseline dataset includes 1,595 journal articles, 1,155 books, 195 book chapters, 276 reviews, and 23 conference papers. This diverse corpus offers a comprehensive view of the research landscape related to the themes of this study, encompassing not only full-length journal articles but also focused contributions in books and other academic publications. The documents feature 6,241 keywords and 7,458 author-provided keywords. Among the analyzed documents, 1,059 were single-authored, while the overall average was 4.36 co-authors per publication.

Additionally, 31.8% of the documents involved international collaboration, highlighting the global nature of research on innovation, sustainability, systemic market asymmetry (market failures), policy, and values. This further underscores the significance of these concepts within both scientific communities and broader societal contexts.

Results

The trend in the results is illustrated in Figure 4. The number of articles produced per year is plotted against a linear trend line (in red). It can be observed that the number of articles remained very low until the year 2000. After 2000, the number of articles began to increase steadily through 2019, followed by an exponential growth between 2020 and 2021. The red trend line underrepresents the actual increase in the number of articles over time.

Figure 4: Articles per Year with Linear Trend

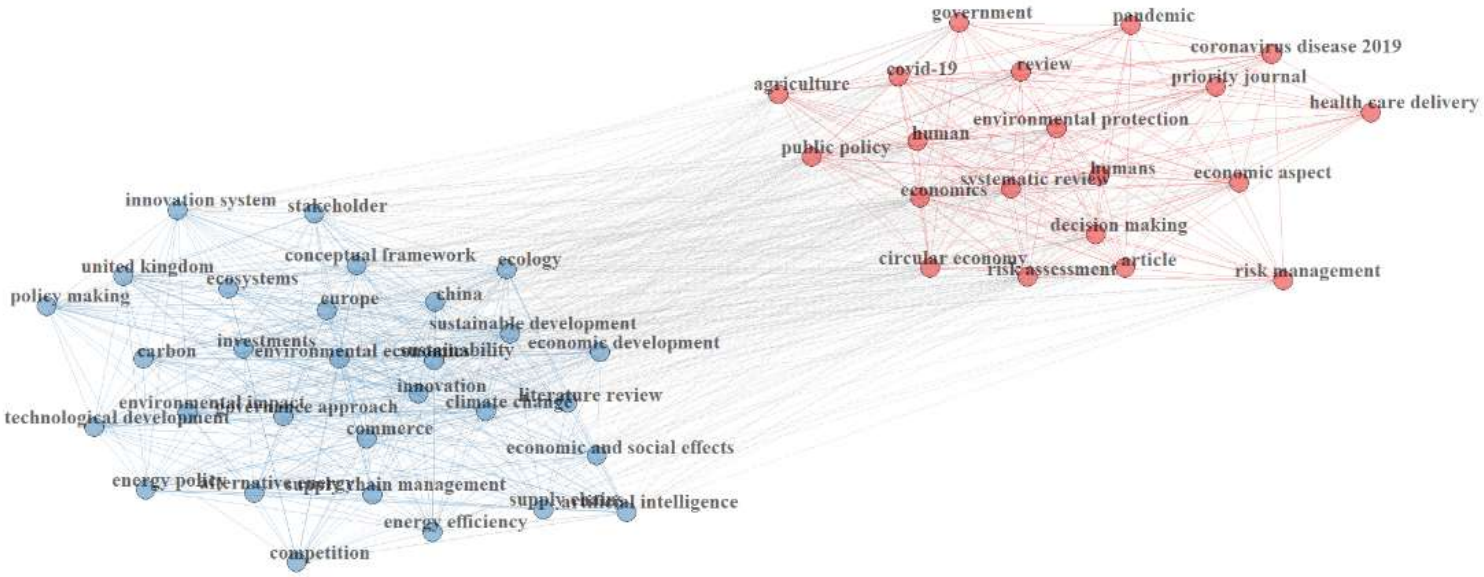


Source: Own elaboration with data from Scopus and bibliometric analysis of words: innovation and sustainability, systemic market asymmetry, politics, and values.

The evaluation of scientific publications focused on innovation and sustainability, systemic market asymmetry (market failures), policy, and values revealed a high number of journals related to sustainability, innovation, and technology policy. Other relevant journals include Technological Forecasting and Social Change (45 articles), Environmental Innovation and Societal Transitions (42 articles), and Research Policy (29 articles). These findings highlight the current importance placed on innovation and social change. Additionally, knowledge transfer to society is reflected in publications such as Agricultural Systems (18 articles) and the Journal of Business Research (17 articles), underscoring the connection between business research and agricultural systems. Lastly, journals such as Technovation (17 articles), Energy Policy (16 articles), and Energy Research & Social Science (16 articles) demonstrate growing interest in energy policy and the social dimensions of energy research.

It is important to note that the baseline bibliography includes a strong conceptual foundation based on the principal theories and key authors introduced at the beginning of this study. Figure 5 presents the top 50 keywords associated with the publications in the baseline dataset.

Figure 5: Keyword network



Source: Prepared by the authors using Scopus data and bibliometric analysis of words: innovation and sustainability, systemic market asymmetry, politics, and values.

To deepen understanding of how innovation-related concepts are articulated in the literature, a conceptual structure map was generated from the baseline dataset. This bibliometric analysis aimed to uncover semantic relationships and thematic clusters through multiple correspondence analysis, allowing us to visualize the underlying structure of the research field and detect conceptual convergences. These patterns provide a foundation for the interpretation of innovation as a systemic process and help identify key barriers that persist in the field.

Building on this conceptual groundwork, the next section analyzes market failures using the taxonomy proposed by Woolthuis, Klein and Gilsing (2005), which classifies different types of failures in innovation systems into four categories. These categories were further enriched through a targeted literature review on obstacles to innovation development, providing an applied framework for informing public policy design.

Findings: Market failure analysis

Based on the conceptual patterns identified in the bibliometric analysis, this section addresses market failures as key barriers to the development of innovation. To structure this discussion, the taxonomy proposed by Woolthuis, Klein and Gilsing (2005) is employed, which categorizes market failures into four types: infrastructure failures, institutional failures, interaction failures, and capabilities failures. These categories serve as an analytical lens to identify how systemic deficiencies hinder innovation processes, particularly in contexts marked by inequality and weak institutional coordination.

Nature of Science and Technology Activities (Market Failure)

At times, innovations rely on knowledge that requires a very prolonged gestation period and a significant resource investment, putting them beyond companies' typical planning horizon

or financial capabilities. Furthermore, those innovations that heavily depend on knowledge yet to be generated carry a high degree of uncertainty, making it impossible to calculate the financial risks involved. A paradigmatic example of such difficulties is research into generating electricity through fusion energy, which has yet to yield adopt despite starting in the early 20th century.

Market Power (Market Failure)

A fundamental principle of modern economic theory is that when free competition is constrained, resources are distributed inefficiently, as agents can extract more significant profits than they would in a more competitive market. However, at the other extreme, in a fully liberalized context, economies of scale and scope can also lead to a few firms monopolizing market power, hindering technological change and innovation. Therefore, moderating this monopolistic trend through some form of regulation (such as price controls) without creating inefficiencies represents one of the most complex challenges of policy-making.

In a literature review, Aghion et al. (2005) and Peneder (2012) conclude that the relationship between market power and innovation largely depends on the level of competition: in less competitive markets, the relationship is inverse; that is, high market power leads to low innovation, so an increase in competition fosters innovation.

Externalities (Market Failure)

In innovation analysis, the most relevant externalities are those goods or services whose characteristics make it challenging to enforce property rights, generally related to knowledge production. In this regard, when companies cannot fully capture the benefits of innovation, the incentive to conduct R&D activities decreases, leading investment in this area to fall below the optimal level. To address this, the two main options are public funding for innovation and the creation of an effective mechanism for transferable property rights, as exemplified by the patent system.

Spillovers are the most common externality in this area, with two predominant types. First, knowledge spillovers are incidental knowledge transfers among individuals through various channels such as research publications, researcher mobility, or training activities. The second primary type is spillovers to consumers, which occur when consumers derive a benefit more significant than the price of the good or service. This is known as consumer surplus, typically illustrated by the continuous improvement in product quality.

Another analytical classification of spillovers divides them into horizontal, usually involving knowledge transfers between companies in the same sector, and vertical, operating along the supply chain. Moreover, these spillovers easily cross international borders, allowing open economies to benefit more from them (Coe and Helpman, 1995).

Asymmetric Information (Market Failure)

Economists have extensively analyzed the phenomenon of asymmetric information since Akerlof's (1970) pioneering study on "lemons" in the used car market. Assuming that used car sellers have much more information about vehicle quality than potential buyers, it logically follows that buyers are only willing to pay low prices as they assume the used car market is filled

with "lemons." This, in turn, drives good car owners out of the market since they cannot get a fair price, preventing multiple mutually beneficial sales.

This problem arising from asymmetric information is especially acute in innovation projects, as potential investors often lack sufficient information to verify an entrepreneur's or innovator's claims, especially in the early stages of technological development. Consequently, the expected return on such investments tends to be undervalued, which depresses private financing for innovation.

Findings: Systemic failure analysis

The knowledge of systemic failures that hinder innovation is presented in this article with a classification attributable to different seminal authors such as Cohen and Levinthal (1990), Smith (1999), Carlsson and Jacobson (1997), among others.

The first three failures are essentially systemic, as they are related to the poor functioning of institutions, and the fourth is an infrastructural failure, because it is a form of institutional failure where a deficient policy affects critical institutions for the innovation system, both formal and informal.

Insufficient Capabilities (Systemic Failure)

The failure of insufficient capabilities results from poor performance by firms due to inefficient management, technological incompetence, or lack of learning. A common deficiency in companies is a low absorptive capacity, meaning an inability to understand and apply external knowledge in R&D activities (Cohen and Levinthal, 1990). While a neoclassical perspective might argue that this phenomenon does not justify public intervention, as such companies would be driven out of the market, the evolutionary perspective positively values measures that generate behavioral additionality in firms regarding innovation. Examples include the dissemination of information, business training, or the creation of support infrastructures, like technology transfer centers.

However, regarding technological skills and abilities within firms, it is essential to distinguish between insufficient capabilities and infrastructure since the latter causes are different, although they manifest similarly. In cases of insufficient capabilities, companies lack the ability to identify and adopt relevant knowledge available in the market. This deficiency might stem from a shortage of qualified personnel in the labor market, indicating the socio-technical system's structural failure in educational provision. Therefore, insufficient capabilities are classified as a systemic failure.

Articulation Problems (Systemic Failure)

In the field of innovation, the most common coordination problem lies in the lack or insufficiency of collective mechanisms to gather, analyze, and disseminate information for innovation. To address this need, solutions can range from informal mechanisms for information exchange to institutionalized alliances that structure and promote the use of such information.

This deficiency often originates from entrenched social, institutional, and business arrangements that fail to evolve in line with a changing environment. It may also result from the rigidity of firms' internal capabilities or the limitations of external system infrastructures on which they depend. Even though authors such as Eleanor Glor (2007) have emphasized that an organization's performance and survival depend directly on its ability to adapt to dynamic and challenging environments, public policies must not only foster favorable external conditions but also create incentives and institutional frameworks that internally strengthen organizational change capacity.

This is particularly critical in strategic sectors such as sustainable mobility and clean technologies, where technical, regulatory, and social challenges intersect, requiring innovative, resilient, and common-good-oriented responses.

Institutional Failure (Systemic Failure)

This type of failure can be identified in both formal institutions (hard institutions) and informal institutions (soft institutions). In the case of hard institutions, the problem lies in the design or performance of formal institutions within the innovation system that become obstacles to innovation. These obstacles include regulatory frameworks governing business activities, technical standards, labor legislation, safety regulations, and other rules hindering innovation (Smith, 1999).

As for informal institutional deficiencies, systemic failures can arise from cultural elements that erode mutual trust in business relationships (Carlsson and Jacobson, 1997). These include factors like the degradation of social norms and values, a low willingness to share resources with other actors (Franke and Shah, 2003), a lack of entrepreneurial spirit in firms and the general population (Blanchflower et al., 2001), or an excessive aversion to risk (García-Granero et al., 2015).

Infrastructural Failure (Systemic Failure)

The literature uses the term infrastructural failure to refer to the state's inability to address other systemic or market failures through effective policy. For example, low investment in basic science not only impacts a country's innovation capacity by limiting new knowledge generation but also restricts the formation of highly specialized personnel, which companies need to assimilate and apply knowledge generated elsewhere (insufficient capabilities).

In this regard, Borrás (2004) identifies five general functions of the state concerning innovation systems: reducing uncertainty, managing conflict and collaboration among system agents, providing adequate incentives for innovation, building necessary competencies, and defining the boundaries of the innovation system. Consequently, the inability to perform any of these functions would indicate the presence of infrastructural failure.

Discussion

Understanding market and systemic failures in innovation reveals two broad categories of challenges. These categories represent not only obstacles but also opportunities for the design of innovation policies that promote the common good and address social needs.

Low Economic Profitability

This category includes those obstacles that limit the economic return on innovation investments. Such obstacles foster inertia within the economic system, including barriers to competition, lack of cooperation among key actors, and cultural norms that are hostile to change. This category also encompasses factors such as insufficient capacities, whether in terms of qualified human capital or adequate infrastructure. These elements represent systemic failures that hinder the fair and equitable distribution of the benefits of innovation.

In this regard, innovation policies grounded in social justice and the common good can aim to strengthen collaboration among actors within the innovation system, promoting values of cooperation and reciprocity over isolated competition (Silva-Flores and Murillo, 2022). This can be achieved through the development of collaborative networks that bring together the public and private sectors, along with civil society organizations.

In addition, investment in the education and training of human capital is essential, particularly in underserved areas. Such investment fosters greater equity in access to innovation opportunities and helps build capacities across all regions, not just in the most developed ones.

In this context, Eleanor Glor (2025) warns that government structures often adopt the rhetoric of innovation without a genuine commitment to change. That is, they may adopt the language of being "innovative" while continuing to operate within conservative frameworks. This phenomenon—which Glor identifies as a superficial appropriation of the concept of innovation—reinforces systemic inertia by masking continuity as if it were transformation. As a result, the transformative potential of genuine innovation, when conceived to challenge and redesign the institutional status quo, is lost.

Low Appropriability of Returns

This category includes obstacles that limit the fair distribution and appropriation of innovation benefits, such as externalities in R&D investment and governance failures—particularly the lack of stable intellectual property protection and weak institutional coordination. From a common-good perspective, it is essential to ensure that the outcomes of innovation remain accessible to society as a whole. This aligns with the goal of preventing the concentration of advantages among a few actors and fostering equitable access to the social and economic value generated through innovation.

To address these challenges, policies should promote stable and transparent regulatory frameworks that enable long-term planning and prevent arbitrary changes that generate uncertainty. Such environments support the development of innovation projects with positive

social and environmental impacts and encourage broader participation from organizations genuinely committed to transformative change. Moreover, drawing on Glor (2025; 2007), it is crucial to distinguish between innovations that truly transform—emerging from new ideas or actors dedicated to change—and those that merely represent incremental improvements or late-stage adoption of existing practices. This distinction is vital for designing innovation policies oriented toward the common good, as it helps prevent initiatives from reproducing conservative mechanisms under the guise of "innovation." As Schiuma and Lerro (2008) emphasize, the most effective remediation policies strengthen capacities in education and infrastructure through partnerships with the private sector and develop institutions that foster systemic articulation and genuine transformation within the innovation system.

Key elements for innovation policy design with a focus on common good values

The two categories of obstacles—low economic profitability (including competition barriers, lack of cooperation, and infrastructure deficits) and low appropriability of returns (related to the lack of incentives and mechanisms to protect innovation-derived benefits)—provide a foundation for structuring policies that address both technical challenges and the ethical and social principles of equity and sustainability.

Based on this, it is possible to propose elements for designing innovation policies rooted in common-good values, with particular emphasis on systemic failures affecting appropriability. These obstacles—stemming from regulatory gaps, preferential treatment of certain actors, and volatility in public policies—indicate the need for transparent and stable regulatory mechanisms. Transparent mechanisms are understood as those that build trust among innovation actors and minimize legal uncertainty. Stable and transparent policies can foster an environment that prioritizes the common good and facilitates the inclusive participation of new actors in the innovation system.

However, beyond regulatory conditions, organizations themselves must also be structurally prepared to face transformation and discontinuity. As Glor (2007) warns, in contexts of high uncertainty and nonlinear change, sustained organizational adaptability becomes a strategic imperative. It is not merely a matter of responding to a single disruptive event, but of cultivating internal capacities for ongoing adaptation to changing conditions. This perspective emphasizes that innovation policies should not only aim to correct market or systemic failures, but also strengthen organizational change capacity as an essential component for achieving effective, sustainable, and common-good-oriented innovation.

In this regard, moving beyond conventional innovation policies—such as funding corporate R&D or creating venture capital funds—an innovation strategy centered on internal organizational capabilities and social justice values is characterized by four elements that can be strengthened through specific policies that integrate principles of equity and service:

A skilled and socially committed workforce

A workforce with strong knowledge and appropriate skills is essential not only for generating innovative ideas but also for applying them to address social challenges. Achieving this requires reforms in education and workforce training systems, with a focus on developing

key competencies across all segments of the active population—thus fostering a skills base that benefits both individuals and society. In addition, a policy strategy oriented toward the common good should aim to increase representation in Science, Technology, Engineering, and Mathematics (STEM) fields, without neglecting the importance of the humanities and social sciences, which are critical for the ethical development of technology and innovation. The international mobility of talent should also be managed in an inclusive and ethical manner, ensuring that the demand for skilled labor is met without causing displacement or talent drain in vulnerable communities (Kuznetsov, 2006).

An inclusive and common-good-oriented business environment

An environment that fosters investment in technology and experimentation with new business models must include policies that not only facilitate the entry of new actors but also encourage participation by those whose values and projects are aligned with the common good. Structural reform of goods, services, and labor markets is essential, but must be designed to optimize access to resources and support higher-risk innovation activities with positive social and environmental impacts. International integration in this context allows for the leveraging of global knowledge, while maintaining a reciprocal approach that benefits local communities and promotes fair and sustainable development (OECD, 2015a).

A knowledge generation and diffusion system oriented toward equity

An effective system for generating and disseminating knowledge should emphasize both equity in access and the social relevance of the knowledge produced. Strengthening networks of universities and research centers, along with mechanisms that foster interaction with other social and economic actors, is key. In this context, policy should encourage technology transfer and the creation of knowledge markets that include small enterprises and local communities—broadening the impact of innovation beyond the corporate sector to address local and global social and environmental issues.

Specific activities that feed the innovation process with social impact

Overcoming barriers to innovation in each region, sector, or technological domain requires the deliberate design of policy instruments explicitly oriented toward the common good. This can be achieved through a balanced combination of tax incentives, subsidies, and awards that recognize social and environmental contributions, together with cooperative policies that encourage partnerships among diverse actors—such as alliances between the public sector, private enterprises, and nonprofit organizations. Equally important are demand-side policies that help shape an inclusive and sustainable innovation market, where informed consumers actively support products and services that respect the environment and promote social well-being (Edler and Georghiou, 2007; Jansson, Marell, and Nordlund, 2010). In this sense, consumer protection and information policies can act as indirect mechanisms that stimulate and reward responsible business practices.

Beyond these core elements for strengthening innovation policy design, it is essential to systematically evaluate their outcomes. This involves assessing how each component contributes to collective well-being and social value creation. Moreover, innovation policies operate within dynamic and complex systems; thus, continuous monitoring is vital to enable timely adjustments and ensure their relevance amid evolving social and technological conditions. Periodic

evaluations—grounded in evidence and guided by ethical principles—will help ensure that innovation policies remain adaptive, equitable, and aligned with the pursuit of social justice and the common good.

Conclusion

The relevance of this research lies in the systematization and accessibility of knowledge that, although documented for over seven decades, has yet to be fully integrated into the design of public innovation policies. Market and systemic failures that limit the social and environmental impact of innovation persist, despite extensive analysis in the specialized literature. This article contributes to the ongoing debate by organizing that evidence in a clear and actionable way for decision-makers who may not be specialized in innovation studies. Through a combined qualitative and bibliometric approach, it identifies key elements for advancing toward more effective policies that realistically address contemporary challenges—namely, connecting business sustainability with community well-being by leveraging existing, underutilized knowledge.

Within this framework, innovation functions as a bridge between enterprises and their broader environment—local, regional, and national—since it requires interaction with other actors and the support of appropriate infrastructure. The systemic approach used in this analysis offers an opportunity to design innovation policies grounded in the lessons derived from market and systemic failures, which opens the way toward policy designs that not only promote innovation but are also aligned with the common good and the stewardship of our "common home".

The analysis identified two major categories of innovation obstacles arising from market and systemic failures: low profitability and limited appropriability of innovation benefits. Low profitability is linked to the high costs of research and technological development (R&D). In various contexts, the State has assumed a central role in supporting basic science and developing educational and research infrastructure. This has been considered essential for counteracting negative externalities and fostering environments where the benefits of innovation are widely shared. In contrast, limited appropriability reflects a lack of capabilities or social capital. Therefore, efficient policy must include capacity-building strategies, particularly through public–private partnerships focused on infrastructure and education.

To design innovation policies guided by the values of the common good, it is crucial to analyze market and systemic failures through an ethical lens. In particular, the market bias toward dominant technologies—often resistant to inclusive change—poses a challenge that requires policy interventions to overcome this resistance. This can be achieved by promoting a diversity of sustainable technological alternatives that deliver tangible benefits to society as a whole, rather than only to those with pre-existing competitive advantages.

Moreover, the shortage of human resources and social capital constrains the development of inclusive innovation. Innovation policies must therefore aim to strengthen social capital through public–private partnerships and collaborative projects that support infrastructure

grounded in cooperation and community engagement. Remediation policies should also focus on building capacities and infrastructure that make innovation accessible in underserved and less developed communities, thus aligning with a social justice approach.

It is important to acknowledge that each country, region, or firm faces a unique combination of barriers to innovation, and it is not possible to formulate a universal theory or policy solution applicable across all contexts. Nevertheless, the analysis of market and systemic failures makes it possible to identify a set of key elements that can guide the design of innovation policies aligned with the common good.

These key elements include strengthening the capacities and knowledge base of a skilled workforce; promoting technological investment to foster inclusive and sustainable business environments; and generating and disseminating socially relevant knowledge that helps build a more equitable, efficient, and collectively oriented innovation system. The current challenge lies in translating these elements into contextually relevant actions that produce concrete transformations with meaningful social and environmental impact.

About the Authors:

Martha L. Silva-Flores, Ph.D. in Socioeconomics and a member of the National System of Researchers in Mexico (SNII), graduated with honors from the Ph.D. program in Social Scientific Studies at ITESO, a recognized program within the National Postgraduate System. She holds a master's degree in Cognitive Processes from ITESO, a Master's degree in Knowledge Management from ILO in Turin, Italy, and a bachelor's degree in computer science from UNAM. She is a researcher at the ITESO Business School, where she coordinates Research, Development, and Innovation for the postgraduate business programs. She was the founder of the Center for High-Impact Social Innovation in the State of Jalisco (CISAI). Her research focuses on social innovation and sustainable business development. Martha L. can be reached at: pamcar@iteso.mx

Álvaro R. Pedroza-Zapata, Ph.D. in Business Administration and Postdoctoral Fellow in Administration, is a Professor at the University Center for Economic and Administrative Sciences (CUCEA) of the University of Guadalajara. He is a member of the National System of Researchers in Mexico (SNII). His academic and research work focuses on organizational strategy, corporate governance, and sustainable business models. Dr. Pedroza-Zapata has published in national and international peer-reviewed journals and actively participates in research networks that promote innovation, competitiveness, and responsible business practices in Latin America. Álvaro R. can be reached at: alvaro.pedroza@cucea.udg.mx

Ariel Vázquez-Elorza, Ph.D. in Agro-industrial Economic Problems, is a researcher at the Department of Food Processes and Chemistry, in the Biotechnology area, at the Technological University of the Toluca Valley. His academic and research work centers on the economic and technological dynamics of agro-industrial systems, with particular emphasis on innovation, value chain development, and sustainability. Dr. Vázquez-Elorza has contributed to interdisciplinary projects that integrate biotechnology and economic analysis to enhance

productivity and competitiveness in the agricultural and industrial sectors. He is a member of the National System of Researchers in Mexico (SNII). Ariel can be reached at: ariel.vazquez@utvtol.edu.mx

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