Environmental externalities associated with the expansion of industrial facilities in the Bajío region of Guanajuato, driven by nearshoring.[1]

Susana Suárez Paniagua[2]

Abstract

This study aims to examine the negative environmental externalities generated by industrial parks and warehouses in the Bajío region of Guanajuato, Mexico, resulting from their expansion driven by nearshoring. The methodology employed includes a review of theoretical approaches regarding globalization, nearshoring, and environmental externalities; data collection on industrial parks and facilities; and the application of a direct valuation method for environmental externalities. This method utilizes data on land-use changes, soil degradation, overexploitation of water resources, water pollution, and hazardous waste generation. The analysis indicates that the industrial dynamism driven by nearshoring has altered the natural environment of the region's population, affecting their well-being and resulting in a loss of positive environmental externalities. It is observed that the current economic growth model—characterized by a prevailing economic rationality and a focus on industrial development and process relocation—fails to prevent environmental degradation or avoid generating negative environmental externalities for local populations, even with technological advancements; in other words, it does not contribute to sustainable development.

Introduction

There is no doubt that industrial development forms the foundation of economies worldwide; its production logic is driven by the pursuit of economic returns, a dynamic that has fostered the excessive use of natural resources and the degradation of ecosystems. Indeed, industrial activities have caused adverse environmental impacts—such as air pollution, deforestation, soil degradation, surface and groundwater contamination, natural habitat alteration, and climate change. These

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[2] Full-time Career Professor at the National Autonomous University of Mexico (ENES-León)

negative environmental impacts resulting from industrial activities manifest as negative environmental externalities—that is, adverse effects on individuals who do not directly participate in these economic activities and receive no compensation for the consequences, as noted by Pigou (1920).

Thus, the location of industries is significant, as the inhabitants of the areas where these industries are established—or those living nearby—are the ones directly affected by environmental damage or degradation resulting from industrial operations. This highlights the current prominence of a strategy employed by large transnational corporations: the relocation of productive capital to nearby locations—known as "nearshoring"—through which they seek to reduce transportation costs and ensure the smooth functioning of production chains.

The drive to attract foreign direct investment to the country has led to an accelerated and growing pace in the installation of industrial parks and facilities, which offer their infrastructure and services to a wide range of companies—from large corporations to the small and medium-sized enterprises that make up value chains. This trend of nearshoring, accompanied by the proliferation of industrial parks and facilities, has not occurred evenly across Mexico; rather, it has been concentrated in specific regions—such as the Bajío area of Guanajuato—thereby transforming the region into a pivotal hub within the dynamics of capital accumulation.

This work examines whether the new trend of nearshoring has led to negative environmental externalities externalities driven by the expansion of industrial parks and facilities in the Bajío region of Guanajuato, Mexico, during the 2018–2025 period. The chapter is organized into three sections. The first addresses the relationship between the new nearshoring trend and environmental externalities. The second section examines nearshoring and the expansion of industrial parks and facilities in the country, particularly in the Bajío region of Guanajuato. Finally, the third section analyzes the environmental externalities resulting from the installation of industrial parks and facilities in the Bajío region of Guanajuato—spurred by nearshoring—and their repercussions for local communities and the region's sustainable development.

Methodology

A review of the scientific literature on globalization, nearshoring, and environmental externalities was conducted. Based on this review, theoretical-conceptual propositions were formulated to address the relationship between industrial relocation—along with the expansion of industrial parks and facilities—and the generation of environmental externalities.

Units of analysis were defined based on the concentration of industrial parks and facilities; specifically, the municipalities of Apaseo el Alto, Celaya, Irapuato, Salamanca, Silao, and León in the state of Guanajuato, which together form an economic region. A geographic area of influence for these facilities (a 10 km radius around them) was also established, given that proximity to such infrastructure and its operations is a determining factor in the extent to which nearby communities are affected—that is, the degree to which they are exposed to environmental externalities.

It is important to note that while various methods exist for evaluating externalities, this study takes as its starting point the perspective proposed by David Harvey regarding an individual's degree of accessibility and proximity to natural resources—factors observable through the enjoyment or loss of positive environmental externalities (Harvey, 1988). Based on this approach, the study employed the direct valuation method for externalities (as outlined by Mejía, 2016) and the impact pathway method (Delacámara, 2008). These procedures consider variables such as changes in land use, changes in productivity, and the loss of welfare or benefits (specifically regarding accessibility and proximity to natural resources—that is, the loss of positive environmental externalities) resulting from changes in environmental quality.

For this study, the following variables were established: land-use change, land rental prices, soil degradation, overexploitation of water resources, surface and groundwater pollution, and hazardous waste generation. It is important to note that the scope of this work was limited to considering welfare losses, without addressing their monetary valuation or associated economic costs. Furthermore, variables such as health issues, economic losses from agricultural and livestock activities, and the risk of loss of assets or property were excluded due to a lack of baseline data, particularly at the municipal level.

Documentary information regarding the established variables was gathered, and databases were created. A Geographic Information System (GIS) was used to capture data and correlate variables—specifically, the relationships between parks, industrial facilities, and environmental externalities—in order to present geospatial data. Subsequently, the information was analyzed based on the theoretical-conceptual framework, results were developed, and finally, conclusions were formulated.

Nearshoring and Environmental Externalities

The process of globalization has evolved over time, giving rise to new strategies that allow large corporations to continue accumulating capital. In recent years, nearshoring has emerged as a major trend in the reconfiguration of global value chains. This shift is driven by two main factors: first, the COVID-19 pandemic caused supply chain

disruptions that stalled production and commercialization, prompting companies to prioritize mitigating risks related to the availability of inputs and products—or, in other words, safeguarding the operation of global production chains. Second, relocating operations closer to parent companies aims to cut transport costs and streamline the movement of goods; these factors have led multinational corporations to adopt nearshoring as a key strategic approach.

Large corporations certainly consider several factors when relocating productive capital to nearby locations; among the most important are: a degree of integration between the local manufacturing industry and value chains (typically involving the provision of supplies); the availability of infrastructure and investment in research and development; high-quality infrastructure to facilitate logistics and industry- and commerce-related public services; a skilled workforce; and access to efficient energy. (BANOBRAS, 2025)

Industrial relocation—along with associated processes such as the development of infrastructure, industrial parks, and transport services—is undoubtedly causing negative environmental externalities in the locations where companies establish themselves; consequently, these negative environmental externalities are generated across different locations and in an unequal manner. According to Harvey, the effects of externalities are localized—a category that encompasses not only positive externalities (such as economic opportunities, housing, transport networks, and infrastructure) but also negative ones—and he highlights that these externalities are linked to hidden mechanisms of income redistribution that also manifest spatially (1988, p. 86).

Consequently, the relocation of productive activities entails the generation of—generally negative—environmental externalities in the areas where this transfer of productive capital occurs. This is because the industry utilizes the natural capital available at its location—such as land, water, forest resources, minerals, and hydrocarbons—which are required for its industrial processes; yet, it is widely acknowledged that this natural capital is not factored into production costs, nor is sufficient attention paid to its conservation. These industries tend to locate precisely where the necessary operational resources are available, a trend that has recently driven the development and operation of industrial facilities and parks in such areas.

Indeed, when companies relocate their investments and productive capacities to nearby locations, they prioritize the availability of infrastructure to support production, logistics, administration, and distribution; this has led to increased investment in industrial parks and facilities.

Certainly the implementation of nearshoring has been accompanied by the development and expansion of industrial facilities within industrial parks, as companies' production and distribution processes for goods and services require facilities adaptable to various uses. Industrial facilities are recognized as playing a pivotal role in attracting foreign investment; consequently, numerous companies in the industrial real estate sector offer investment opportunities in these spaces across various regions, such as Mexico.

Clearly, the expansion of industrial facilities is linked to the generation of environmental externalities, as the construction and operation of these installations drive land-use changes, consume local natural capital, alter the natural landscape, utilize or overexploit natural resources (such as water and timber), reduce vegetation cover, degrade the soil, discharge toxic and non-toxic solid and liquid wastes, emit dust and chemicals into the atmosphere, diminish ecosystem services, and generate environmental pollution (affecting air, water, soil, and noise levels). Consequently, it is essential to identify the environmental externalities caused by these industrial facilities in their respective locations in order to understand their impact on the social well-being of local populations.

In this regard, we believe that Harvey's definition of real income—viewed not merely as the amount of money an individual can count, but as the degree of accessibility to and proximity of natural and artificial resources available to that individual, as evidenced by the enjoyment or loss of positive environmental externalities—enables us to gauge the loss of well-being experienced by individuals or social groups due to negative environmental externalities (Harvey, 1988).

It is observed that negative environmental externalities translate into problems regarding the use of natural resources, because those carrying out economic activity do not pay the cost associated with the loss of access to and enjoyment of natural resources previously available to local populations; for Harvey, this constitutes a malfunction of the market price mechanism, since those generating the externalities do not pay for the loss of well-being suffered by others—there is no compensation.

It is widely held that the loss of well-being experienced by populations due to environmental externalities generated by industrial activities is not taken into account by business owners or real estate investors; furthermore, the affected residents have no say in whether or not they wish to endure such impacts. Delacámara (2008) even notes that, even if the population were financially compensated for the harm suffered, the externality itself would not be eliminated; that would only occur if measures were actually taken to prevent the externality from being generated in the first place.