A Systematic Review on the Socioeconomic Impacts of Industrial Innovation Parks in Developing Countries

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ABSTRACT

This research investigates the socioeconomic impact of Industrial Innovation Parks (IIPs) in developing countries. IIPs, encompassing science parks, technology parks, and innovation districts, aim to foster innovation, attract investment, and drive economic growth. This study systematically reviews existing literature, analyzing research on the impact of IIPs on key socioeconomic indicators, including job creation, economic growth, and regional development. The review examines the role of various factors influencing IIP success, such as government policies, infrastructure development, access to finance, and the availability of skilled labor. Findings indicate that IIPs have the potential to stimulate economic growth, create high-value jobs, and promote technological advancement in developing countries. However, challenges such as potential social inequities, the need for strong public-private partnerships, and the importance of context-specific approaches are also highlighted. Furthermore, this research develops a conceptual model of the socioeconomic impact of IIPs, highlighting key inputs, processing activities, and key socioeconomic indicators as outputs**.** This review contributes to a better understanding of the multifaceted nature of IIPs and provides valuable insights for policymakers and practitioners seeking to maximize the socioeconomic impact of these initiatives in developing economies.

Keywords: Industrial Parks, Innovation, Socioeconomic, Standard of Living

INTRODUCTION

Industrial innovation parks, also known as science parks, technology parks, or research parks, have become crucial tools for driving economic development, technological progress, and innovation, especially within developing economies (Castells & Hall, 1994). These parks play a multifaceted role in fostering development. They are instrumental in promoting innovation and facilitating technology transfer by creating ecosystems that encourage the exchange of knowledge and technology between academic institutions, research centers, and the private sector (OECD, 1999). By clustering these entities, they stimulate collaboration, knowledge dissemination, and the commercialization of research outcomes, a critical aspect for developing nations often facing limited access to cutting-edge technologies and expertise (World Bank, 2010).

Furthermore, innovation parks act as incubators for entrepreneurship and the formation of new businesses. They provide a supportive environment for startups and SMEs, offering incubation programs, business support services, access to funding, and networking opportunities, empowering entrepreneurs to cultivate their ideas, expand their ventures, and contribute to job creation (Etzkowitz & Leydesdorff, 2000). This is particularly important in developing countries, where entrepreneurship can be a significant catalyst for economic growth and social advancement.

Attracting foreign direct investment (FDI) is another key function of these parks. By constructing attractive environments for technology-driven enterprises, they can draw in FDI (Dunning, 2000). International companies are often attracted by the availability of a skilled workforce, robust research infrastructure, and enabling business environments. FDI can introduce new technologies, specialized knowledge, and capital, thus accelerating the growth of local industries.

The development of a skilled workforce is also a priority. Many innovation parks maintain close relationships with universities and training institutions, promoting skill development (Saxenian, 1994). They frequently offer training schemes, internships, and collaborative research projects that equip local workers with the necessary skills to participate in high-tech sectors. This is essential for developing countries aiming to move up the value chain and compete effectively in the global marketplace.

In addition, innovation parks can serve as regional economic development hubs by creating clusters of high-tech industries, attracting skilled professionals to the region, and generating positive spillover effects for local businesses (Porter, 2000). They can contribute to the diversification of regional economies, lessen dependence on traditional industries, and promote balanced development across various regions.

Finally, by promoting innovation, technology transfer, and entrepreneurship, innovation parks contribute to enhancing the competitiveness of both national and regional economies. They assist businesses in adopting new technologies, improving productivity, and developing innovative products and services, enabling them to compete more effectively in global markets.

In the context of developing countries, industrial innovation parks are particularly significant for bridging the technological divide, facilitating access to and adaptation of advanced technologies from developed nations, thereby accelerating technological progress. They can also promote sustainable development by encouraging the development and adoption of environmentally friendly technologies and sustainable business practices, addressing environmental challenges and promoting sustainable economic growth. IIPs have the potential to create high-skilled, high-paying jobs in knowledge-intensive sectors, contributing to poverty reduction and improved living standards.

However, the success of innovation parks in developing countries is contingent on various factors, including government policies, infrastructure development, access to finance, and the availability of a skilled labor pool. A systematic review can be instrumental in understanding the elements that contribute to their success and identifying best practices for their implement

Industrial innovation parks (IIPs) are touted as crucial for economic growth in developing countries, but their actual impact remains debated. While research on IIPs in developed economies is abundant, studies in developing countries are scarce, fragmented, and often contradictory. This review aims to systematically synthesize existing evidence on the socioeconomic impact of IIPs in developing countries, considering their unique challenges and opportunities.

Industrial Parks Vs Industrial Innovation Parks

Industrialization is a critical component of economic growth and poverty reduction (Kniivilä, 2007). It is widely recognized as a key strategy for structural transformation (UNDP, 2017). Industrial parks, in particular, play a significant role in driving economic growth by stimulating innovation, attracting investment, and creating jobs. They also contribute to technological advancement, environmental protection, and the integration of local economies into global value chains (UNIDO, 2019; Xueyi & Meyer, 2011). However, the success of industrial parks varies across countries.

Industrial Parks (IPs) and Industrial Innovation Parks (IIPs) are both designated areas for industrial activity, but they differ significantly in their focus and objectives.

Industrial Parks (IPs) are traditional industrial areas that primarily focus on manufacturing and warehousing. They provide essential infrastructure such as roads, utilities, and transportation networks to facilitate industrial operations. The core of industrial parks is manufacturing facilities, where products are manufactured. Warehouses store raw materials, finished goods, and inventory. Distribution centers handle the distribution of goods to markets. Essential services like water, electricity, and gas are provided through utilities. Roads, railways, and ports connect the park to markets and suppliers.

Industrial Parks play a crucial role in job creation, economic growth, export promotion, and infrastructure development. They create direct and indirect employment opportunities in manufacturing, logistics, and support

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services. By stimulating industrial production and attracting investment, they contribute to GDP growth. They facilitate exports by providing a conducive environment for manufacturing and logistics. Additionally, industrial parks often drive the development of infrastructure in surrounding areas.

Industrial Innovation Parks (IIPs), on the other hand, are a more advanced form of industrial park that focuses on innovation, technology development, and knowledge sharing. They often include research institutions, incubators, and accelerators to support startups and emerging businesses. Research and development centers conduct research to develop new technologies and products. Incubators and accelerators support startups and emerging businesses by providing mentorship, funding, and resources. Technology transfer centers facilitate the transfer of technology between academia and industry. Shared facilities, such as laboratories, workshops, and office spaces, can be shared by multiple businesses.

Industrial Innovation Parks play a crucial role in innovation and technology development, high-value job creation, economic diversification, regional development, and global competitiveness. They foster innovation by providing a conducive environment for research and development. They create high-value jobs in technology, engineering, and research. They can help diversify the economy by attracting knowledge-intensive industries. They can drive regional economic development by attracting investment and creating jobs. Additionally, they can enhance a country's global competitiveness by fostering innovation and technology development.

While Industrial Parks focus on production and manufacturing, Industrial Innovation Parks prioritize innovation, research, and the development of new technologies and industries. Both types of parks play crucial roles in economic development. Industrial Parks are essential for manufacturing and industrial production, while Industrial Innovation Parks are vital for driving innovation, creating high-value jobs, and enhancing a country's global competitiveness. Table 1 shows the differences between IPs and IIPs.

Table 1: Key Differences between Industrial Parks and Industrial Innovation Parks

Feature	Industrial Parks (IPs)	Industrial Innovation Parks (IIPs)
Focus	Manufacturing and warehousing	Innovation, research, and technology development
Infrastructure	Basic infrastructure for industrial activities	Advanced infrastructure, including research facilities and incubators
Job Creation	Mainly blue-collar jobs	Both blue-collar and white-collar jobs, especially in R&D and technology
Economic Impact	Contributes to economic growth through manufacturing	Drives economic growth through innovation and high-value industries

Concept of Industrial Innovation Parks

The term "industrial innovation park" encompasses a range of related concepts, including:

Science Parks/Research Parks

Cadorin *et al* (2021) identified Science Parks, also known as Research Parks or Technology Parks, as planned areas designed to foster innovation and economic growth by bringing together research institutions, universities, and businesses. According to Saleh *et al* (2020), these collaborative environments facilitate knowledge transfer, technology commercialization, and the incubation of startups. Khan & Emon (2024) stated that science parks contribute significantly to regional economic growth and development by attracting investment, developing a skilled workforce, and promoting innovation. However, Joseph *et al* (2021) and Guzman *et al* (2024) outlined that challenges such as maintaining competitiveness, ensuring equitable access to benefits, and creating vibrant innovation ecosystems require careful consideration. As Science Parks evolve, they are increasingly specializing in specific sectors, integrating sustainability principles, and leveraging digital technologies to enhance their impact. (Lescrauwaet et al.2022; Omol, 2024).

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Technology Parks

Asadi *et al* (2023) sees Technology Parks as specifically designed areas that prioritize the commercialization of technology and the growth of technology-based businesses. They often provide specialized infrastructure and services, such as high-speed internet, advanced research facilities, and incubation spaces, to support the development and innovation of technology-driven companies (Entringer and Da2020).

Innovation Districts

These are larger, urban-scale developments that integrate research institutions, businesses, startups, and residential areas. They aim to create vibrant ecosystems that foster innovation and entrepreneurship. They aim to create dynamic ecosystems where collaboration, knowledge exchange, and entrepreneurial activity thrive. By fostering close proximity and interaction between different stakeholders, Innovation Districts aim to accelerate innovation, drive economic growth, and enhance the quality of life for residents. This concept has been extensively explored in literature, with prominent examples like Kendall Square in Cambridge, Massachusetts (Florida, 2002).

Industrial Parks with a Focus on Innovation

These are more traditional industrial parks that have incorporated elements to promote innovation, such as incubation centers, technology transfer offices, or collaborative spaces. Industrial parks are primarily centered on manufacturing and warehousing activities, providing core infrastructure like transportation networks, utilities, and dedicated production spaces (UNIDO, 2020). These parks are characterized by manufacturing facilities as their primary function, complemented by warehouses for storage and distribution centers for market access, all supported by essential utilities and connectivity infrastructure (OECD, 2022). Consequently, IPs play a significant role in fostering economic development by generating direct and indirect employment across manufacturing, logistics, and related service sectors (ADB, 2021). Furthermore, they stimulate industrial output and attract investment, contributing to GDP growth and facilitating exports through enhanced production and logistical capabilities, while also often driving infrastructure development in their surrounding regions (World Bank, 2023).

Key Components of Industrial Innovation Parks

Industrial Innovation Parks (IIPs) are specially created to foster innovation, draw investment, and boost economic development. They typically comprise a diverse range of facilities and services, including research and development centers, incubators and accelerators, technology transfer centers and shared facilities. These components work together to create an ideal environment for businesses to flourish, cooperate, and innovate. Figure 1 shows the key components of IIPs.

Research and Development

Research and Development (R&D) centers are a crucial component of Industrial Innovation Parks (IIPs). These specialized facilities play a pivotal role in driving innovation, technological advancement, and economic growth.

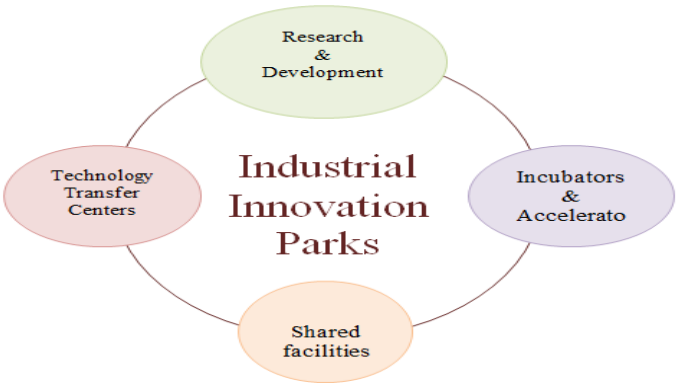

Figure 1: Key components of Industrial Innovation Parks

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R&D centers within IIPs are dedicated to conducting cutting-edge research to develop new technologies and products. They bring together scientists, engineers, and researchers to collaborate on groundbreaking projects. By fostering a culture of innovation and experimentation, these centers contribute to the creation of novel solutions to complex problems. The focus of R&D centers can vary widely, depending on the specific industry and technological focus of the IIP. Some centers may specialize in specific areas such as biotechnology, nanotechnology, or artificial intelligence. Others may focus on broader areas like materials science or energy technology.

The impact of R&D centers on IIPs is significant. They attract talented researchers and scientists, fostering a knowledge-based economy. By developing new technologies and products, these centers can help companies to gain a competitive edge in the global market. Additionally, R&D centers can contribute to the development of new industries and create high-value jobs.

R&D centers are essential components of IIPs. They drive innovation, create new technologies, and contribute to economic growth. By investing in R&D, IIPs can position themselves as leaders in their respective industries and contribute to the overall development of the region and the nation.

Incubators and Accelerators

Incubators and accelerators are vital components of Industrial Innovation Parks (IIPs), playing a crucial role in nurturing and supporting early-stage startups. These programs provide a range of resources and services to help entrepreneurs transform their innovative ideas into successful businesses.

Incubators offer a nurturing environment for startups, providing them with physical workspace, mentorship, and access to essential resources. They often provide office space, meeting rooms, and shared facilities, reducing the initial costs of setting up a business. Mentors, who are experienced entrepreneurs and industry experts, offer guidance and advice on various aspects of business, such as business planning, marketing, and finance.

Accelerators, on the other hand, focus on high-growth potential startups. They provide intensive, short-term programs that help startups accelerate their growth. Accelerators typically offer a combination of mentorship, funding, and networking opportunities. Mentors provide guidance and support, while funding can be in the form of equity investments or loans. Networking opportunities allow startups to connect with potential investors, customers, and partners.

By providing these essential services, incubators and accelerators help startups to overcome common challenges, such as securing funding, attracting talent, and navigating regulatory hurdles. They also contribute to the development of a thriving entrepreneurial ecosystem within the IIP.

Incubators and accelerators are essential components of IIPs that foster innovation and economic growth. By supporting early-stage startups, these programs contribute to the creation of new businesses, jobs, and technologies.

Technology Transfer Centers

Technology Transfer Centers (TTCs) are crucial components of Industrial Innovation Parks (IIPs), playing a pivotal role in bridging the gap between academia and industry. These centers facilitate the transfer of technology and knowledge from research institutions to businesses, fostering innovation and economic growth.

TTCs serve as intermediaries between universities, research institutions, and industry. They identify innovative technologies developed in academic settings and work to commercialize them. This process involves a range of activities, including intellectual property management, licensing, and technology commercialization.

One of the primary functions of TTCs is to identify promising technologies with commercial potential. They evaluate the market potential of technologies, assess their intellectual property rights, and develop strategies for their commercialization. TTCs also assist in the formation of spin-off companies to commercialize technologies developed within universities or research institutions.

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TTCs provide a range of services to both academic institutions and industry. For academic institutions, they offer support in intellectual property protection, licensing, and technology commercialization. They also help to identify potential commercial partners for academic research. For industry, TTCs provide access to cutting-edge technologies, expertise, and talent. They can also help businesses to identify technology solutions to specific problems.

By facilitating the transfer of technology between academia and industry, TTCs contribute to the development of new products, services, and industries. They help to bridge the gap between research and commercialization, accelerating the pace of innovation. Additionally, TTCs can help to attract investment, create jobs, and enhance a region's economic competitiveness.

Shared facilities

Shared facilities as a component of Industrial Innovation Parks (IIPs), offers a range of resources and services that can be accessed by multiple businesses. By providing shared infrastructure and equipment, IIPs can reduce costs, improve efficiency, and foster collaboration among businesses.

Laboratories within IIPs are equipped with state-of-the-art equipment and instrumentation, enabling businesses to conduct research and development activities. By sharing these facilities, businesses can reduce the significant upfront costs associated with setting up their own laboratories. Additionally, shared laboratories can provide access to specialized expertise and equipment that may not be feasible for individual businesses to acquire.

Workshops are another essential component of shared facilities. These workshops are equipped with tools and machinery that can be used for prototyping, testing, and manufacturing. By sharing workshops, businesses can reduce costs and improve their time-to-market. Additionally, shared workshops can facilitate collaboration between businesses, leading to the development of innovative products and services. Shared office spaces provide flexible and affordable workspace solutions for businesses of all sizes. By sharing office space, businesses can reduce overhead costs, such as rent and utilities. Additionally, shared office spaces can foster a collaborative environment, enabling businesses to network and share ideas.

In conclusion, shared facilities play a vital role in the success of Industrial Innovation Parks. By providing access to essential resources and infrastructure, these facilities can help businesses to reduce costs, improve efficiency, and foster innovation. By promoting collaboration and knowledge sharing, shared facilities can contribute to the overall economic development of the region.

REVIEW OF LITERATURE

The socioeconomic impact of Industrial Innovation Parks (IIPs) in developing countries is a multifaceted phenomenon, influenced by a complex interplay of factors. Research in this area has evolved significantly, offering valuable insights into the mechanisms through which IIPs can contribute to regional development, while also acknowledging the challenges and limitations.

Early studies, such as Williams (2013), emphasized the potential of science parks to foster the growth of technology-based firms and facilitate knowledge transfer. However, this research also highlighted the inconsistencies in their effectiveness, emphasizing that the mere establishment of an IIP does not guarantee successful outcomes.

Ugur & Mitra (2014) further underscored the complex relationship between innovation and economic development. Their work emphasized the inherent uncertainty surrounding the impact of innovation on employment dynamics and economic growth, highlighting the need for nuanced analyses that consider the specific context of each IIP. Wasim (2014) delved into the planning and implementation aspects of science parks, acknowledging the potential of IIPs to stimulate regional innovation and job creation while emphasizing the lack of a one-size-fits-all model.

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More recent research has expanded the scope of inquiry to include broader social and economic considerations. Chan (2018) explored the potential social implications of innovation districts, drawing attention to the risk of gentrification and displacement of low-income residents. This research highlights the importance of considering the social equity dimensions of IIP development. Ciarli et al (2018) proposed a framework for understanding the relationship between innovation and structural change, emphasizing the crucial role of context-specific factors in determining the success of IIPs. Mkwanazi (2018) stressed the critical need for effective public-private partnerships to ensure the sustainable development and long-term viability of industrial parks.

Oliveira Paula & Ferreira da Silva (2019) reinforced the significance of innovation as a key driver of economic growth, even in less developed regions. This research provides a strong foundation for understanding the potential of IIPs to contribute to economic development in developing countries. Ying Tan & Taeihagh (2020) focused on the unique challenges faced by developing countries in implementing smart city initiatives, including the development of IIPs. Their research emphasizes the critical role of effective governance structures and institutional frameworks in ensuring the successful implementation and sustainability of these initiatives.

Cortes et al (2021) provided a comprehensive analysis of the fragmented research landscape on innovation and sustainability in the Global South. This study revealed significant advancements in countries like China and India, while also highlighting the need for further research to better understand the specific challenges and opportunities faced by different developing countries. Lane (2021) advocated for more precise and targeted research that evaluates the effects of sectoral targeting in developing countries. This research emphasizes the importance of evidence-based approaches to policymaking and the need to tailor IIP development strategies to the specific needs and priorities of each sector.

Oikonomaki & Belivanis (2023) introduced a data-driven methodology to assess innovation performance in urban neighborhoods, highlighting the crucial role of socioeconomic factors, such as access to education, infrastructure, and social networks, in influencing entrepreneurial activity and innovation. This research provides valuable insights into the micro-level factors that can significantly impact the success of IIPs.

METHODOLOGY

This systematic review adopted the “Preferred Reporting Items for Systematic reviews and Meta-Analyses” (PRISMA) checklist (Tan et al., 2023).

Search Strategy and Selection

A comprehensive literature search was conducted using scholarly databases like Google Scholar, Elsevier, ScienceDirect, IEEE Xplore, Springer, Research-Gate, EconLit, Scopus, and Web of Science. The following keywords were used: "industrial innovation parks”, "socioeconomic impacts", "standard of living", “job creation” and "GDP growth”. Studies published in English between 2013 and 2024 were included. Areas of interest or outcome were economic, social and environmental impacts of industrial innovation parks in developing countries. Studies that did not focus on the socioeconomic impacts of industrial innovation parks in developing countries were excluded.

Data Extraction

Data were extracted from each included study using a standardized data extraction form. The following information was extracted: study design, sample size, machine learning algorithm, dataset used, performance metrics, and key findings. The quality of the included studies was assessed using the PRISMA checklist.

Quality Assessment/Risk of Bias Assessment

To ensure the reliability of the evidence, the study will critically appraise the quality of each included study utilizing the Mixed Methods Appraisal Tool (MMAT). This rigorous assessment will evaluate aspects such as the study design, data collection methods, and the potential for bias, ensuring that only high-quality evidence is

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considered in the analysis. By identifying and addressing potential biases, the study aims to enhance the credibility and trustworthiness of its findings.

Data Synthesis and Analysis

The study will employ a mixed-methods approach to synthesize the findings, combining narrative synthesis with potential meta-analysis where appropriate. Data will be extracted from each study, focusing on key outcomes such as job creation, economic growth, and social impacts, allowing for a comprehensive understanding of the multifaceted effects of IIPs.

RESULTS AND DISCUSSION OF FINDINGS

Results

Figure 2 shows the flowchart (PRISMA) illustrating the screening and selection of studies used in this review.

Table 2 presents a comprehensive overview of recent studies exploring the multifaceted nature of Industrial Innovation Parks (IIPs) in developing countries.

Figure 3 shows a conceptual model of the socioeconomic impark of industrial innovation parks highlighting key inputs, processing activities and key socioeconomic indicators as outputs.

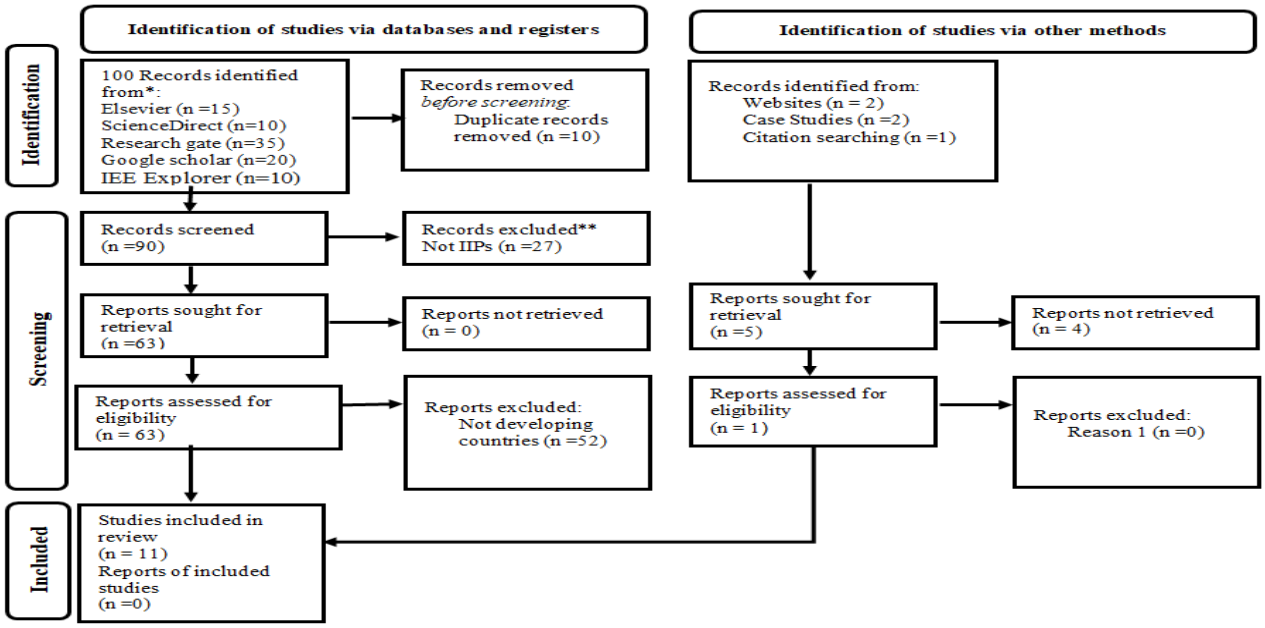

Figure 2: PRISMA 2020 flow diagram for the study which included searches of databases, registers and other sources. (Source: Page et al., 2021)

Table 2: Overview of related studies reviewed exploring the multifaceted nature of Industrial Innovation Parks (IIPs) in developing countries

Author(s)	Year	Key Findings
Williams	2013	Science parks can help tech companies grow and share knowledge, but just building one doesn't always guarantee success, hence the need for careful planning and execution.
Ugur & Mitra	2014	The impact of innovation on jobs and the economy is complicated and unpredictable, hence the need to carefully study how each park works in its own unique situation
Wasim	2014	Industrial Innovation parks can boost innovation and jobs in a region, but there's no single best way to plan and build them.

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Chan	2018	IIPs can have unintended social consequences, such as gentrification, which must be carefully considered during their development to ensure fairness.
Ciarli et al	2018	The success of IIPs depends heavily on the specific circumstances and factors in each location.
Mkwanazi	2018	Successful industrial parks need strong cooperation between the government and businesses.
Oliveira Paula & Ferreira da Silva	2019	Even in poorer areas, innovation can drive economic growth, and science parks can play a big role in this.
Ying Tan & Taeihagh	2020	Smart city projects, including science parks, in developing countries need strong leadership and clear rules to succeed.
Cortes et al	2021	Research on the impact of IIPs in developing countries should be context-specific
Lane	2021	Research on IIPs should be target based to ensure evidence-based decision making
Oikonomaki & Belivanis	2023	The success of a industrial innovation park depends heavily on its location and the surrounding community, including things like access to education, raw materials, social network and good infrastructure.

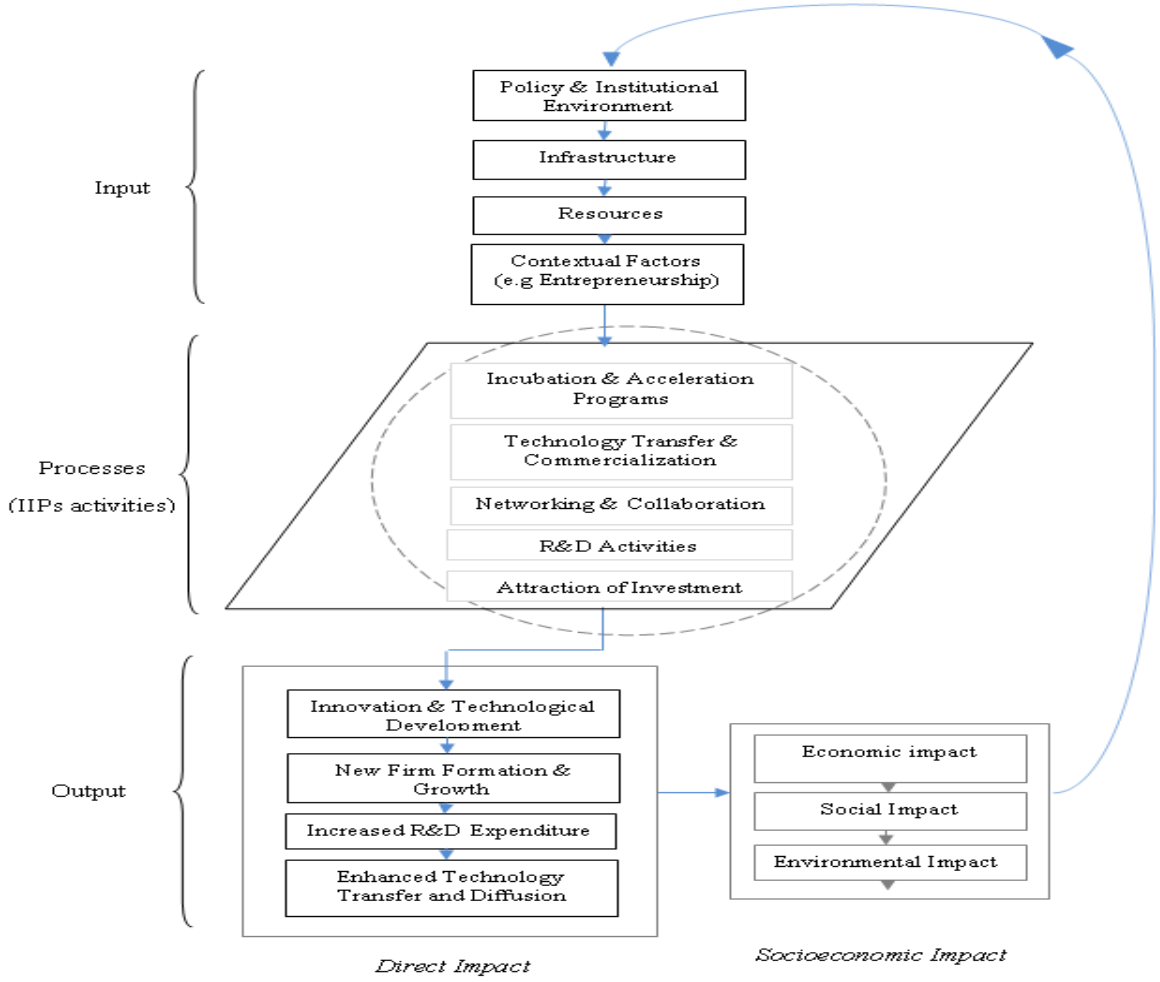

Figure 3: IIP's Socioeconomic Impact Mode.

DISCUSSION OF FINDINGS

Socioeconomic Impact of IIPs in Developing Countries

The result presented in Table 2 highlights the multifaceted nature of Industrial Innovation Parks (IIPs) in developing countries, emphasizing both their potential and the complexities surrounding their impact on

socioeconomic development. While the findings support the notion that IIPs can foster innovation, drive economic growth, and create jobs, they also underscore the critical need for careful planning, context-specific approaches, and strong collaboration between stakeholders to maximize their benefits and mitigate potential negative consequences.

The studies by Oliveira Paula & Ferreira da Silva (2019) and others affirm the potential of IIPs to stimulate economic growth in developing countries. By fostering innovation, attracting investment, and creating new businesses, IIPs can contribute to job creation, increased productivity, and improved living standards. IIPs can directly create jobs through the establishment of new companies and research facilities within their boundaries. Additionally, they can indirectly generate employment opportunities in related sectors such as construction, logistics, and support services. IIPs serve as hubs for research, development, and innovation, facilitating knowledge transfer between academia, industry, and government. This can lead to the development of new technologies, products, and services, enhancing the competitiveness of local industries. By attracting investment and fostering innovation, IIPs can contribute to regional development by revitalizing local economies, reducing regional disparities, and improving infrastructure.

However, the research also highlights potential challenges and considerations. As highlighted by Chan (2018), IIPs can lead to unintended social consequences, such as gentrification and displacement of low-income residents. This can exacerbate existing inequalities and hinder inclusive development. The success of IIPs is highly dependent on the specific context, including the local economic conditions, social factors, and the surrounding environment. A one-size-fits-all approach is unlikely to be effective, emphasizing the need for tailored strategies that address the unique challenges and opportunities of each location. Effective governance structures and strong collaboration between the public and private sectors are crucial for the successful implementation and sustainability of IIPs. The table emphasizes the need for further research to better understand the impact of IIPs in developing countries. This research should be context-specific, targeted, and evidence-based to inform effective policy decisions.

The findings align with the concept of Regional Innovation Systems (RIS), which emphasizes the importance of interactions between various actors (universities, businesses, government) within a specific geographic region. IIPs can play a crucial role in strengthening these interactions and fostering innovation within the RIS. The socioeconomic impacts of IIPs can be analyzed within the framework of the Sustainable Development Goals (SDGs), particularly those related to economic growth, decent work and economic growth, innovation and infrastructure, and reduced inequalities. The findings support the Triple Helix model, which emphasizes the importance of collaboration between academia, industry, and government in driving innovation and economic development. IIPs can serve as platforms for these interactions.

IIPs Socioeconomic Impact Model

The model in Figure 3 offers a comprehensive framework for understanding the socioeconomic impacts of Industrial Innovation Parks (IIPs) in developing countries. It highlights the intricate interplay of various inputs, processes, and outputs that shape the success and impact of these initiatives.

Inputs

The model emphasizes the critical role of several key inputs in shaping the success of IIPs. A conducive policy and institutional environment, characterized by favorable regulations, supportive government policies, and effective governance structures, is essential. This aligns with the findings of Ying Tan & Taeihagh (2020), who stressed the importance of strong leadership and clear rules for the successful implementation of smart city initiatives, including IIPs, in developing countries. Adequate infrastructure, including physical infrastructure like transportation networks and energy supply as well as digital infrastructure like high-speed internet access, is crucial for facilitating the operations and growth of businesses within the IIP. This resonates with the findings of Oikonomaki & Belivanis (2023), which underscored the significance of socioeconomic factors, such as access to infrastructure, in influencing entrepreneurial activity and innovation. The availability of resources, such as financial capital, human capital (skilled labor), and natural resources, is another critical input. Access to funding

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for research and development, as well as a skilled workforce, are essential for driving innovation and attracting investment to IIPs. This aligns with the findings of Lane (2021), which emphasized the importance of sectoral targeting and the need for evidence-based approaches to policymaking to ensure that IIPs are effectively utilizing available resources. Finally, the model acknowledges the importance of contextual factors, such as the level of entrepreneurial activity in the region, the competitive landscape, and the social and cultural environment, which can significantly influence the success of IIPs and their ability to attract and retain talent. This resonates with the findings of Ciarli et al. (2018), which emphasized the crucial role of context-specific factors in determining the success of IIPs.

Processes

The model outlines several key processes that drive the development and impact of IIPs. These include incubation and acceleration programs that provide support to startups and early-stage companies, facilitating their growth and success, aligning with the findings of Williams (2013). Technology transfer and commercialization processes play a vital role in bridging the gap between research and development and market application, enabling the translation of new ideas and technologies into commercial products and services. This is supported by the findings of various studies, including Williams (2013), which emphasized the importance of knowledge transfer for the success of IIPs. Networking and collaboration platforms within IIPs foster interactions among businesses, researchers, and investors, facilitating the creation of new partnerships and collaborations. R&D activities conducted within IIPs, often housed in research and development facilities, drive innovation and attract leading researchers, aligning with the findings of Oliveira Paula & Ferreira da Silva (2019), which reinforced the significance of innovation as a key driver of economic growth. Finally, the attraction of investment from both domestic and foreign sources is a crucial function of IIPs, contributing to economic growth and development.

Outputs

The model identifies several key outputs of IIPs. Economic impacts include job creation, both directly within IIP companies and indirectly in supporting industries, increased economic activity, and regional development. These findings align with those of Wasim (2014), which acknowledged the potential of IIPs to stimulate regional innovation and job creation. Social impacts encompass improvements in human capital development, such as skills training and education, social inclusion, and community well-being. This aspect is closely linked to the findings of Chan (2018), which highlighted the potential social implications of IIPs, including the risk of gentrification and displacement. Environmental impacts are also considered, with a focus on promoting environmentally sustainable practices and mitigating potential negative environmental impacts, such as pollution and resource depletion.

CONCLUSION AND RECOMMENDATIONS

IIPs have the potential to make significant contributions to the socioeconomic development of developing countries. However, their success hinges on careful planning, context-specific approaches, strong collaboration, and a focus on equity and sustainability. By addressing the challenges and capitalizing on the opportunities, policymakers and stakeholders can harness the power of IIPs to drive innovation, create jobs, and improve the lives of people in developing countries. We also developed an IIPs Socioeconomic Impact model that provides a comprehensive framework for understanding the socioeconomic impacts of IIPs in developing countries. By considering the interplay of these inputs, processes, and outputs, policymakers and stakeholders can develop and implement effective strategies to maximize the benefits of IIPs while mitigating potential negative consequences.

To maximize the positive socioeconomic impact of Industrial Innovation Parks (IIPs) in developing countries, tailored strategies are crucial. These strategies should address local contexts, prioritize key sectors, and ensure social equity while establishing strong governance and long-term commitment. Operationally, fostering collaboration between academia and industry, supporting startups, investing in infrastructure, and developing relevant skills are essential. Finally, context-specific research and data-driven evaluations are needed to inform effective policy and maximize IIP contributions to sustainable and inclusive development.

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