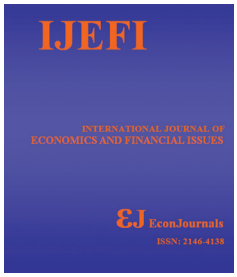

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Evaluation of the Economic Effects of Special Economic Zones, Free Trade Zones and Port Quality

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ABSTRACT

This paper highlights the territorial importance of the presence of SEZs (Special Economic Zones) and FTZs (Free Trade Zones), the effects generated in macroeconomic terms, and the relevance of some contextual variables. Some research questions were asked regarding how relevant the presence or absence of SEZs/FTZs is for the purposes of attracting Foreign Direct Investments, the consequent income generated by them, the impact on foreign trade, and on the "quality of exports." These elements are investigated to detect the magnitude of the importance of the presence of SEZs/FTZs, along with a positive and welcoming context represented by variables like GDP (Gross Domestic Product), population, taxation burden, and port endowment, which are sometimes taken for granted and not quantified jointly econometrically.

Keywords: Special Economic Zone, Free Trade Zones, Transport Accessibility, Foreign Direct Investment
JEL Classifications: R42, F10, P45

1. INTRODUCTION

In recent decades, academic literature has defined SEZs as an economic policy tool to attract productive activities to a limited geographical area, exploit local economies, and reduce transaction costs, thereby creating vertical and horizontal agglomeration (Hamada, 1974; Ge, 1999). They are widely used as economic policy instruments to attract productive investment, stimulate economic growth, and promote international trade. The planning/design of the area's infrastructure and the management of foreign direct investment (FDI) are usually coordinated by a management committee (Zeng, 2012).

A characteristic feature of SEZs is that although they are physically located within the national customs territory, they are considered to be areas outside the national customs territory. This principle is enshrined in the Kyoto Protocol (United Nations, 1998), which defines a free zone as a part of the territory of a contracting party where goods brought in are generally considered to be outside customs territory in terms of import duties and taxes. This general concept has evolved into several zones with differing in their objectives, target markets and permitted activities. The Free Trade Zone (FTZ), also known as Commercial Free Zone and Free Zones, is a type of demarcated area that provides storage facilities, distribution, exchange, transhipment, re-export operations, and other trade-related activities. These zones are usually located in the main ports of entry to the countries and are separated from the rest of the national customs territory by the construction of fences to delimit customs free zones. In addition, an Export Processing Zone (EPZ) is a type of industrial area that offers facilities, services, and special incentives for manufacturing and related activities, especially production. The goods produced in the EPZs are intended exclusively for the export market and cannot be resold either within the zone itself or in the host country market. EPZs are divided into two subtypes: traditional EPZs, in which only companies that have a licence to produce in the zone are

allowed and whose production is exclusively for export markets, and hybrid EPZs, which are divided into two areas: one regulated as a traditional EPZ (not necessarily delimited by borders) and the other in which non-enterprises can operate under the EPZ regime, which also allows them to sell their products in markets other than the export market. EPZs are currently the most widespread zones in the world.

Based on the scientific literature, it can be said that it is not possible to give a unique connotation to SEZ (Special Economic Zones), considering that they are defined in different ways (Zeng, 2015). Abdusharipovich (2018) considers Special Economic Zones (SEZs) as possible instruments of structural transformation and industrialisation. They are included in the Economic Zones defined by the OECD (2010) as ring-fenced enclaves that enjoy special regulatory, incentive and institutional frameworks that differ from the rest of the economy. Economic zones include free trade, export processing, special economic zones and specialised zones. Based on the OECD (2010) definition, SEZs are "Special Larger Estates" and could be considered cities in their own right. They typically cover all industrial and service sectors and target both foreign and domestic markets. They offer a range of incentives, from tax incentives to regulatory incentives. They also allow on-site residency. Although the first known European SEZ was established at Shannon Airport (Ireland) in the late 1950s, the real success of these SEZs exploded in the 1980s in China and all emerging and transition economies. The best known is Shenzhen, near Hong Kong, and its success can be gauged by the fact that it has been called the "Shenzhen miracle" because of the significant contribution it has made to the growth of the country's GDP, thanks to investment by foreign-owned enterprises (Zeng, 2010). Substantial foreign direct investment (FDI), increased employment, and exports are not the result of a miracle but rather a mix of success factors that an SEZ must rely on. These include efficient transport infrastructure; administrative, customs and tax incentives; investments in research and development (R&D); and advanced technologies such as electronic data interchange (EDI) and information and communication technology (ICT) systems. The location of an SEZ is also important for crossroads and international trade corridors (Zeng, 2010). Although there are many examples of success around the world, there are also many examples of failure, mostly in Africa and India, due to the high cost of services (water rather than electricity) and poor infrastructure connectivity. Thus, the location and accessibility of SEZs are prerequisites for successful SEZs. Little attention has been paid to the transport literature that provides insights into infrastructure accessibility as a key factor in the success of an SEZ. In our analysis, we pose some research questions regarding the relevance of the presence or absence of SEZs and FTZs for the purpose of attracting FDI and the consequent income generated by it, including the impact on foreign trade and the "quality of exports." These elements were studied to determine the extent to which SEZs are important, which is sometimes taken for granted and not quantified econometrically. At the same time, the extent to which the "quality of ports" can influence international trade and exports, especially those with high technological content, will also be examined. Their success therefore depends not only on the existence of fiscal and regulatory incentives, but also on contextual factors such as the quality of transport infrastructure, in particular port infrastructure. These infrastructure nodes play a crucial role in ensuring the accessibility and operational efficiency needed to compete in global markets. Essentially, our analysis aims to highlight, through applied case studies with econometric insights, the impact of the quality of port infrastructure on the success of Special Economic Zones (SEZs) and Free Trade Zones (FTZs) in promoting foreign direct investment (FDI), trade and high-tech exports.

2. LITERATURE REVIEW

This section presents a literature review of the main topics that are relevant to this paper. This paper outlines previous experiences with SEZs worldwide, reports a summary of studies on transport accessibility methodologies, and explores the literature review on the economic effects of SEZs. Soon after, descriptive case studies on the evolution of SEZs are presented, followed by an overview of econometric methodologies applied to the issues of SEZs and FTZs and our contribution with new models.

2.1. Special Economic Zones (SEZs): A Worldwide Overview

The number of SEZs is increasing worldwide. At the end of the 1990s, there were 845 SEZs globally; today, there are another 4300 in 135 countries, mostly concentrated in Asia and the Pacific (SRM, 2017).

Establishing an SEZ does not necessarily mean developing of an area. There are many successful examples (Tanger Med, Poland, Latvia, Ireland, South Korea), equally numerous are the examples of failure, mostly due to the high price of water and electricity and the excessive distance to the main connexion nodes (Zeng, 2015).

Despite the growing popularity of SEZs, there is a lack of internationally comparable data on their actual performance. Therefore, it is difficult to provide a general assessment of their effectiveness. A World Bank study (2017) conducted over a 5-year period (2007-2012) on a sample of 346 SEZs in 22 countries revealed that sustaining SEZ growth is challenging. This study reports on the elements of the success of SEZs in the regional and national economic contexts in which they arise, as well as their proximity to developed markets, pointing out that this success, in general terms, is rather evident in the first years of implementation of SEZs, and then stabilises and shows economic performance similar to that of surrounding areas. According to McKinsey and Company (2019), there are five crucial steps that increase the chances of SEZs success and contribute to economic growth. These steps include developing an integrated SEZ strategy, reducing barriers to doing business, providing incentives, attracting key investors and related industries, developing necessary infrastructure, and creating a thriving community.

Based on a study by Zeng (2015), among others, the potential drivers of a SEZ are strong government commitment and support as well as technology learning, innovation, upgrading, and strong links with the domestic economy, innovative cultures,

and location advantages, while the actions to be avoided for circumventing failures could be mushroom approach at the local level and high-level overlaps at the later stage, unbalance between industrial development and social dimensions, and environmental degradation. The multiple success factors from the analysis of the Chinese and African SEZs show that they only work if they act together and in a coordinated manner, in concert with all the public and private actors involved.

SEZs have been extensively studied internationally - e.g. China (Zeng, 2010; 2012; 2016), India (Aggarwal, 2005; 2006; 2007), and Africa (Farole, 2011; Bernsein, 2012; Zeng, 2016), but few of these studies have focused on the success factor related to accessibility. The one developed by Frick et al. 2019, although analysing the transport aspect, does not present any quantitative analysis that could emphasise the strategic role of location (Madani, 1999; Asian Economic Integration Report, 2015).

The paper by Buonocore et al. (2023), with respect to the results of the analyses carried out on the accessibility of the areas, reports interesting results on the quantitative analysis of the accessibility that characterises the SEZs established in the Campania Region. The results of this study represent an important starting point for supporting different levels of territorial stakeholders in accessibility analysis.

2.2. Literature Review of Quantitative Analysis of Transport Accessibility

In terms of quantitative analyses of transport accessibility, since the early 1950s, geographers, transport researchers and planners have demonstrated the importance of accessibility analysis tools in improving transport systems.

Theoretical and empirical studies have defined accessibility as a key concept for quantifying the synergies between human activity and transport systems (Martìnez, 1995).

A seminal paper by Hansen (1959) defined accessibility as the opportunity for people living in a local context to perform activities outside their local context. Bertolini et al. (2005) considered accessibility as a key concept for integrated transport and land-use planning. They defined it as 'the ease with which people can reach activities or destinations. Inturri et al. (2017) stated that accessibility is a measure of sustainability from social, economic, and environmental perspectives.

Accessibility measures are extensively used to evaluate the performance of transportation infrastructures and systems. Literature discussed extensively accessibility measurement methods (Linneker and Spence, 1992; Geurs et al., 2001; Kasraian et al., 2023; Afandizadeh et al., 2024), introducing mathematical measures of accessibility (Morris et al., 1979; Koenig, 1980; Weibull, 1980). Other accessibility measures based on Data Envelopment Analysis (DEA) and Principal Component Analysis (PCA) have also been used to evaluate railway accessibility (Martìn et al, 2004; Martìn and Reggiani, 2007). In urban contexts, two accessibility indices have been developed: the infrastructure and opportunity accessibility index. The first approach is based on infrastructural endowment, while the second approach is based on distance-based approach (Mitropoulos et al., 2023).

Freitas and Blum (2024) proposed a methodology for evaluating the accessibility of European rail networks. The concept of perceived accessibility has been introduced as an impact factor on the choice of public transportation services (Vojtek et al., 2024; Watthanaklang et al., 2024).

In many transportation plans, little attention has been devoted to accessibility. This may seem surprising, given the relevance of the concept. As noted in a review by Boisjoly and El-Geneidy (2017), which focused on several transportation plans in Europe, Asia, North America, and Australia, most of these plans did not include accessibility assessment.

In this study, we refer to accessibility as the characteristic of a local area connected to (active accessibility) or reached by (passive accessibility) other local areas. Our study contains an accessibility analysis to evaluate synergies between transport networks and SEZs.

3. THEORY

3.1. Literature Review of the Economic Effects of SEZs

Most theoretical papers confirm the positive effects of SEZs on employment and investment (House and Shapiro, 2006; Edge and Rudd, 2010). However, the literature focuses on externalities and the attraction of new companies that use more advanced technology or process superior know-how (as in the case of FDIs) (Markusen, 1997). The methodologies used to estimate the effects of SEZs can be grouped in different ways and are sometimes classified according to the administrative-territorial level with respect to which the effects are evaluated. In any case, relevant in this regard are the studies conducted by Sadia and Fitrady (2023), which presented a methodological classification based on counterfactual analyses and articles written by Abadie and Gardeazabal (2003) and Abadie et al. (2010; 2015), using the synthetic control.

Some researchers have asked whether the presence or absence of SEZs and FTZs is relevant for attracting Foreign Direct Investments, and the consequent income generated by them, the impact on foreign trade and on the "quality of exports." These elements were investigated to detect the magnitude of the SEZ importance, which is sometimes taken for granted and not quantified econometrically. In parallel, the idea is also to verify how much the "quality of ports" can influence international trade and exports, especially those with high technological content. Curiosity arose from the contributions of Cheon et al. (2018), Cullinane et al. (2002), and Haralambides (2002), who specifically dealt with the relationship between competition and port performance.

Through SEZs, governments focus on expanding and exporting, maintaining border protection to create jobs, and regulating new policies. The research carried out by scholars can be divided according to the hypothesised and generated effects, some of which

are concentrated on the inflow of financial resources in the form of FDI, others on international trade and, others on the effectiveness of SEZs on the economy in general. Hamada (1974) attempted to identify a model by focusing on the reasons for investors' financial decisions. Instead, based on international trade theories, other models have been developed (see among others, Young and Miyagiwa, 1987; Miyagiwa, 1986). These studies were developed on the basis of the effects of functioning zones in some countries, including China and the United States.

Another model, designed by Warr (1989), is based on a real cash flow account. In this case, the influence of various micro and macroeconomic factors that can determine capital accumulation in countries that organise SEZs is considered. By exploiting this model, Warr (1989) and Warr and Menon (2016) demonstrated that the area in Cambodia where the SEZ is located provides benefits to the national economy and serves as an instrument of economic policy. Other studies have considered the relationship between SEZs and Foreign Direct Investments (FDIs) in the context of investors' decision-making motivations. According to this approach, investments in SEZs significantly influence economic development, attracting FDI and having spillover effects in high-tech industries. The main contributions can be attributed to Willmore (2004) who analysed the Caribbean SEZ, Kung (1985), Ge (1999) and Park (1997) who performed a detailed analysis of the SEZ in China and Rolfe and Woodward (2004) who studied operational privileges in the Kenyan SEZ. Aggarwal et al. (2008), Aggarwal (2005), and Shah (2009) performed comparative analysis of the operating conditions of SEZs in India, Sri Lanka and Bangladesh, respectively. Devereux (2007) examined the extent to which tax reliefs impact investment localisation. Litwack and Qian (1998) developed the theory of transition economies, such as China, where the development strategy is based on SEZs.

Thus far, the empirical findings have analysed in a fragmented manner the impact of the presence of SEZs or FTZs on trade performance, economic growth, and the attraction of FDIs (Siroën and Yücer, 2014). Nonetheless, these effects are supported by a lower tax burden normally applied when SEZs and/or FTZs are present. Therefore, the empirical literature to date provides results that highlight the individual effects of independent_ variables, neglecting their independencies and relationships, as occur in the real world. Instead, the co-presence of various elements, both contextual and specific linked to SEZs and FTZs can contribute more to the attraction of FDIs, foreign trade, and specific types of products traded. From a political perspective, SEZs can be considered a tool, part of an overall global economic growth strategy, for increasing the competitiveness of the region and attracting foreign direct investment (FDI). Nonetheless, to the best of our knowledge, no studies have adopted this perspective and tested the hypothesis that the co-presence of different forms and areas of free trade can further strengthen these effects and that the presence of appropriately equipped ports is the driving force for trade, investments, and economic growth. Therefore, we developed some innovative models that control for the combined effect of different driving forces at stake according to the dependent variable considered, thus filling a not negligible gap in the literature.

3.2. Experiences of SEZs at the International Level

The literature presents numerous case studies with reference to the different geographical areas under analysis. Certainly, among the most significant, at the country level, Poland is worth mentioning, given the high number of SEZs present. However, there is also copious literature referring to China and more recently to the African area to which we will refer in this review with the awareness of having only extrapolated some realities compared to the significance of other geographical areas on a global level.

3.2.1. Poland

Polish SEZs are designed to provide industrial, logistics, manufacturing, and warehousing facilities to international Clients. SEZs are good options for setting up trading companies due to (i) Their proximity to important transportation centres and (ii) Their one-stop shop industrial sites with modern infrastructure. Łukaniszyn-Domaszewska et al. (2023) presented the benefits arising from the existence of SEZs, as well as to analyse the effects that SEZs have on regional development in emerging countries, such as Poland. This article highlights the specificity of cooperation within clusters in particular economic zones in Poland and focuses on identifying the positive aspects associated with the functioning of SEZs and analysing the impact of these zones on a specific region.

In general, these SEZs allow certain incentives, including (i) up to 50% corporate income tax, (ii) property tax exemption; (iii) space for business development and (iv) assistance with obtaining public funding of up to €9 million.

The most notable SEZs in Poland are as follows:

- The Katowice SEZ – is used by companies that wish to benefit from i) corporate income tax relief; ii) a beneficial location in the South of Poland, and iii) a cluster of automotive companies
- Pomeranian SEZ – is used by companies operating in high-tech electronics, construction parts and pharmaceutical industries. Other companies operating in the biotechnology, energy, and ICT sectors can find in that area a favourable environment
- Krakow Technology Park SEZ – Generally used by companies operating in the IT, chemicals, business process outsourcing and automotive sectors.

In addition, Poland boasts more than 40 Industrial Technology Parks (ITPs) that support the development of research and development facilities. The mission of all ITPs is to promote the following activities: (i) development of specific automotive businesses; (ii) R&D innovations in the industry; and (iii) cooperation between business and academic institutions.

Notable ITPs include the following:

- Krakow Life Science Park – This park is generally used by pharmaceutical companies to develop new medical products and conduct clinical trials;
- Bukowice Industrial Park – Generally used by companies for developing chemical products and exporting them to other parts of European countries;

- Technopark Pomerania – Generally used by companies in the Information and Communication Technology sectors.

3.2.2. Africa

SEZs in Africa are <10 years old. The recent proliferation of SEZs on the continent has rendered the need to ensure that SEZs deliver on their objectives more compelling, given the often-non-negligible opportunity costs associated with SEZ development. Case studies from Ethiopia, Morocco, and South Africa suggest that those African SEZ programmes that have a well-targeted strategic focus, institutional collaboration, and a proactive approach to create linkages with the local economy are more likely to succeed (Rodríguez-Pose et al., 2022). According to Rodriguez-Pose et al. (2022), Africa is experiencing an unprecedented proliferation of zones in both countries with high and low levels of development. While the trend may favour industrial diversification and specialisation across Africa and, perhaps, lead to innovation and technological leapfrogs, the proliferation of SEZs carries non-negligible opportunity costs. It also diverts public resources from other policy areas that equally demand significant capital outlays and are necessary for economic development in Africa. Second, and relatedly, the risk of having a growing army of underperforming zones looms large over the continent and is rendered even more real by the fact that the performance of most African SEZs to date has fallen short of expectations.

Furthermore, the Handbook on Special Economic Zones in Africa (UNCTAD, 2021) identified several good practises through the analysis of case studies that reflect a variety of critical aspects and representing the specificity of diverse African regions. Relevant lessons, ranging from the strategic focus and locational advantages to heightened attention to enhanced environmental and social standards, are presented. The Handbook provides a response to the needs of African policymakers through a set of policy recommendations stemming from the latest research and international best practise on Special Economic Zones. Looking ahead, the issues highlighted by the Handbook remain instrumental to creating sustainable, holistic, and adaptive Special Economic Zone policies that can capitalise on existing opportunities and overcome future challenges in Africa.

3.2.3. China

China has experienced rapid economic growth in the past 40 years. One of the reasons for China's high economic growth is its establishment of Special Economic Zones (SEZs). Since the establishment of the first four SEZs (Shenzhen, Zhuhai, Shantou, Xiamen) in the 1980s, different types of SEZs have played an important role in China's international trade, industrialisation and urbanisation. Because innovation is the fundamental driving force of economic growth, we evaluated whether SEZs positively affect innovation (Wu et al., 2021). Literature shows that SEZs can promote county-level innovation in China. Specifically, SEZs can increase the number of applications for invention patents, utility model patents, and design patents. As of March 2018, China had approved 219 national economic and technological SEZs, 156 national high-tech SEZs, 135 special customs supervision areas (including bonded zones and export processing zones), 19 border or cross-border economic cooperation zones, 23 national SEZs of other types, and 1991 provincial SEZs. Existing research on the effect of China's SEZs mainly examines and provides positive results on the impact of the SEZs on economic growth (Wang, 2013; Alder et al., 2016; Liu and Zhao, 2015), export (Wu and Huang, 2012; Huang et al., 2013), industrial restructuring and manufacturing upgrading (Li and Shen, 2015; Zhou et al., 2018), enterprise behaviour (Lu et al., 2019; Wang and Zhang, 2016; Zheng et al., 2017), and spillover effect (Zheng et al., 2017).

3.3. Rules and Definition of SEZs in the Italian Context

Although SEZs have some common features, such as single administrative management, simplified procedures, and tax and customs advantages for investors settling there, they differ according to the geographical areas where they are established, the type of activities developed, regulations, variety of administrative and tax advantages, and target markets (FIAS, 2008; Farole, 2011). SEZs are therefore used at regional and national levels as zones of advantage for economic growth and job creation through the establishment of new companies, the facilitation of export activities, and the attraction of foreign investment (Li et al., 2021). In the Italian case, their aim is to encourage the birth and implementation of new business initiatives by micro, small, medium and large enterprises, both domestic and foreign, as well as the reshoring of companies that have relocated their production activities abroad in the past. Based on its observation of the international experience of SEZs, the Italian government implemented its first national experience with the establishment of the Campania SEZ, with Legislative Decree No. 91 of June 20, 2017, implicitly assuming that SEZs are areas in which tax and administrative benefits are provided for all those companies that already operate or intend to set up within them.

By regulation, an SEZs is defined as being located in at least one port area (pursuant to Art. 4 para. Decree-Law No. 91 of June 20, 2017, as amended and including at least one port area with the characteristics established by Regulation [EU] No. 1315 of December 11, 2013 of the European Parliament and of the Council on Union guidelines for the development of the trans-European transport network [TEN-T]), defining the strategic role of such infrastructure nodes. At the Italian level, SEZ Campania represents the first national pilot project of SEZ in 2017, following the establishment of which other SEZs have been defined in Southern Italy (Apulia, Abruzzo, Calabria, Sardinia, Sicily). As of January 01, 2024, Decree Law no. 124 of September 19, 2023, Italy's SEZs underwent another radical change, going from the previous 8 to the single SEZ for southern Italy. The main innovations concerned the governance of the Single Italian Economic Zone (SEZ), with a control room for the development of inland areas, which was established at the presidency of the Council of Ministers. This chamber which will be given the functions of steering, coordination, supervision and monitoring the new SEZ. Among the new and innovative elements for this SEZ is the establishment of a web portal that provides all the information on the benefits granted to enterprises. The promotion of the SEZ will now be centralised; therefore, a direct relationship with the territories (which was previously managed through the role of the Extraordinary Commissioners) is lacking. The potential value

of a single SEZ lies in its opportunity to organise infrastructural development as a more and better-connected territory.

In this way, the Single SEZ for southern Italy will present itself as a single platform, in the eyes of investors. The current geo-political and economic context, characterised by the reconfiguration of global value chains towards a more localist model of the economy, and the related processes of nearshoring and friendshoring of enterprises, testify to the growing strategic relevance of Southern Italy due to its position at the centre of the Mediterranean. The emergence of these development opportunities, taking into account the existing gap in various aspects between the South and the Central-North of the country, will require coordinated actions to strengthen the production sector, adapt the infrastructure endowment and create a favourable ecosystem for new investments, innovation and the development of strategic skills. In this context, a large part of the economic development of the South in the Euro-Mediterranean framework will pass through the proper implementation of supranational and national initiatives and projects, seizing the investment opportunities arising from the corresponding and huge resources that can be activated.

4. MATERIALS AND METHODS

In our analysis, we investigate how the existence of special economic zones may affect: Foreign Direct Investment (FDI), the percentage of trade on GDP, and the percentage of high-tech exports on GDP. Five basic methodologies can potentially be considered for conducting this study. One method is time-series analysis, which uses other variables to capture the effect of SEZs on FDI flows over time. The variables denoting the existence of SEZs can be included in regression models along with other relevant variables. By examining the coefficients of the variables, one can assess the impact of SEZs on FDI, the percentage of trade on GDP, or the percentage of high-tech exports on GDP. Another methodology could be the Granger Causality Test, which can be useful for examining the causal relationship between the existence of SEZs and FDI flows, the percentage of trade on GDP, or the percentage of high-tech exports on GDP. Testing whether past values of SEZ variables can lead to changes in FDI, trade openness, or technological sophistication of exports over time. It is also possible to conduct an Event Study Analysis to observe the impact of specific events, such as the establishment or expansion of SEZs, on the dependent variables that we want to consider in our analysis. Independent or dummy variables can be created to represent the occurrence of these events during specific time periods and, subsequently, consider FDI flows, the percentage of trade on GDP, and the technological sophistication of exports before and after the events. Also, the Panel Data Analysis with Interaction Terms could be considered in order to develop our investigation. It can test the relationship between the existence of SEZs and FDI flows, trade openness and high-tech exports while controlling for both time and cross-sectional variations. Including interaction terms in regression models, this type of analysis can measure how the impact of SEZs on dependent variables varies with different levels of other factors.

All of the methodologies listed above could be suitable for an analysis of SEZs that highlight their usefulness, but one must also consider the availability of data and the scientific perspective of the analysis that one wishes to stress most emphatically. We can examine the appropriateness of using the listed econometric techniques by considering their potential for analysis. We recognise that Time-Series Analysis is suitable for testing trends and relationships within a single entity over time, whereas Event Study Analysis is ideal for evaluating the impact of specific events or interventions. The Granger Causality Test is also useful for measuring potential causal relationships between time series variables. Panel Data Analysis with Interaction Terms is useful for checking how the effect of one variable on an outcome varies across different levels of another variable, controlling for time-varying heterogeneity, or to test specific hypotheses about moderation or mediation effects. Considering the aim of our analysis, we choose an appropriate method that depends on the research question, nature of the data, and specific hypotheses being tested. In this case, a Fixed Effects Regression model with time trends can control for both time-invariant and time-varying factors that may affect FDI flows, the percentage of trade on GDP, and the percentage of high-tech exports on GDP. The presence of SEZs as an independent variable can be included in this model along with time trend variables. Our goal is to develop an analysis to determine the impact of SEZs in conjunction with the presence of other components in each country considered. Thus, a fixed-effect regression model can be very suitable for answering our research question.

5. RESULTS AND DISCUSSION

The primary source of data on SEZs is the World Trade Organisation. Additional information, referred to the contextualising variables, was provided by the International Labour Organisation (ILO), the NGO Know Your Country and the World Bank and partly used for cross checking and validation, in the sense that they were examined statistically and economically chosen for the purposes of appropriate econometric processing. The data not only provide indicators of countries that use economic zones for commercial policy but also provide a map of various indicators that can be derived from these policies.

The STATA software was used to perform the calculations.

Our research questions tend to provide answers on how relevant the presence or absence of SEZs/FTZs is for the purposes of attracting Foreign Direct Investments and the consequent income generated by them. However, highlighting their impact on foreign trade and on the "quality of exports." Furthermore, we demonstrate that the co-presence of favourable socio-economic context, taxation burden, and appropriate port endowments contribute to multiple positive generated effects of SEZs and FTZs.

To answer our research questions, we estimated different panel regressions with fixed effects. This choice was made to keep taxation fixed temporarily while varying it per country. The cross-sectional dimension of the panel comprises 17 countries. The following countries were included in the study: Qatar, North Korea, Jordan, Morocco, China, Ireland, Italy, Poland, United States of America, India, Kazakhstan, Brazil, Turkey, Dubai,

Russia, Philippines, and Thailand. The choice of countries was based on those most relevant for the analysis of free trade areas, recent or not, and widely covered in the literature and institutional reports. The dimensional expansion made it possible to capture the contribution of port quality in an extensive and relevant manner. The time dimension is equal to 10 years from 2010 to 2019. The time series was deliberately stopped in time due to possible data distortion due to pandemic events.

The positive effects generated by the territorial presence of an SEZ/FTZ are as follows:

- Incentives provided by the nation in these areas in order to favour them
- The socioeconomic and institutional characteristics of the regions and countries in which SEZs are present
- Port quality, a measure provided by the World Bank to show the evolution in the quality of port infrastructure in a country (1=extremely underdeveloped to 7=well developed and efficient by international standards). The quality of port infrastructure is a factor (as part of transport infrastructure) in the Global Competitiveness Index developed by the World Economic Forum
- The presence or not of SEZs and FTZs.

The proposed relationships, in particular, refer to the effects that SEZs and FTZs generate in terms of attracting Foreign Direct Investment and the increase in the foreign trade generated by them.

Three different models were introduced and used to analyse the dataset.

The first refers to the effects of SEZs/FTZs on FDIs. These are explained by considering the variables contextualising the reference territory, including population, per capita income, level of taxation, port quality, and the presence or absence of free trade areas and SEZs.

- First model:

$$FDI_{it} = \alpha + POP_{it} + income_{it} + tax_{it} + quality_{it} + FTZ_{it} + SEZ_{it} + \varepsilon_{it} \quad (1)$$

where:

- FDI_{it}, is the natural logarithm of FDI in country i at year t expressed in US dollars
- POP_{it} is the natural logarithm of the population of country i in year t
- $income_{it}$, is the natural logarithm of per capita gross national income of country i in year t
- tax_{it} is the natural logarithm of 1 + the total fiscal rate of country i at year t
- $quality_{it}$, is the natural logarithm of the measured quality of port infrastructure in country i at year t
- FTZ_{it} is a dichotomous variable that takes the value of one if country i in year t has a Free Trade Zone, and zero otherwise
- SEZ_{it} is a dichotomous variable that takes the value of one if country i in year t has at least one operative special economic zone, and zero otherwise
- ε_{it}, it is the error term.

The second functional model aims to capture the impact of foreign trade on the country's income generated initially by the context variables (population and per capita income), the profit tax rate, the infrastructural endowment of ports, and the presence or absence of free trade areas and SEZs.

- Second model:

$$TradeGDP_{it} = \alpha + POP_{it} + income_{it} + tax_{it} + quality_{it} + FTZ_{it} + SEZ_{it} + \varepsilon_{it} \quad (2)$$

where:

- $TradeGDP_{it}$, is the percentage of trade on GDP, i.e., the total value of goods and services traded by a country in a year compared to its total Gross Domestic Product. The remainder of this model is equal to that of the first model.

Finally, we consider the last functional relationship, which refers to the justification of exports with high technological content due to context variables, the profit tax rate, the infrastructural endowment of ports, and the presence or absence of free trade areas and SEZs.

- Third model:

$$HighTECH_{it} = \alpha + POP_{it} + income_{it} + tax_{it} + quality_{it} + FTZ_{it} + SEZ_{it} + \varepsilon_{it} \quad (3)$$

where:

- $HighTECH_{it}$, is the percentage of high-tech exports to the GDP of country i in year t, and we only change the dependent variable in that framework.

The models allow us to detect the impact generated by the structural variables of the geographical area of reference on the dependent variables, as well as the specific role played by favourable taxation, and the quality of ports, SEZs, and FTZs. The expectation of effectiveness of these variables, in terms of development policy, lies mainly in the ability to attract investments (1st model), leveraging creation, in these areas, with comparatively advantageous conditions for business activity. The expected processes of growth and development are supported in various areas of intervention by characterising of the active areas through investments in infrastructure, primarily ports.

The growth of foreign trade due to the creation of particularly advantageous and functional taxation conditions for the business activity in tax terms is the basis of the second model. From this model, it can be understood how the presence of FTAs and SEZs, as well as favorable context variables, can facilitate commercial exchanges and encourage, in particular, exports from countries whose prices/tariffs are lower. This generates a tipping effect or chain exports. Such arrangements encourage the importation of goods into low-priced countries and their subsequent shipment to countries with higher external tariffs. These conditions are also favourable to the generation of agglomeration economies.

Positive effects on exports, which we could define as quality with high technological content are under study with the 3rd model, which could also create a multiplier of income and attract human

capital. Specifically, in this model, we have another source of benefits coming from the co-presence of favourable conditions created by the socioeconomic context, port quality, taxation level, and presence of FTZs and SEZs. We believe that these conditions may stimulate competition, especially in managerial efficiency. Firms are come acutely cost-conscious and much more receptive to technological advances than before. An efficient, low-cost firm earns higher profits, and investment in additional capacity is encouraged. Such new investments naturally embody the latest technological advances that have caused substantial modernisation of industrial plants/firms.

5.1. Discussion

A positive relationship between FDIs and SEZs/FTZs on the one hand and between foreign trade, high-tech trade, and the presence of SEZs/FTZs in the territory is postulated by our empirical analysis. Relevant in both cases is the quality of the ports, i.e. countries with high-quality port infrastructure tend to expand the magnitude of the positive impact of SEZs and FTZs. Therefore, it is possible to demonstrate that the influence of ports, through public choice investment generates positive macroeconomic effects in competitive terms.

The results of the econometric analysis carried out are summarised in Tables 1-3 that refer to Models 1-3, respectively.

From model (1) we can argue that on FDIs:

- The population acts positively
- National income per capita acts positively
- The total tax rate acts negatively
- The port quality acts positively
- The presence of SEZs and FTZs have a positive impact on the dependent variable.

Table 1: Comparison among the three models proposed

Model	
First model	$FDI_{it} = \alpha + POP_{it} + income_{it} + tax_{it} + quality_{it} + FTZ_{it} + SEZ_{it} + \varepsilon_{it}$
Second model	$TradeGDP_{it} = \alpha + POP_{it} + income_{it} + tax_{it} + quality_{it} + FTZ_{it} + SEZ_{it} + \varepsilon_{it}$
Third model	$HighTECH_{it} = \alpha + POP_{it} + income_{it} + tax_{it} + quality_{it} + FTZ_{it} + SEZ_{it} + \varepsilon_{it}$

Table 2: Effects on FDIs, ln(FDI income)

Indepedent variables	Coefficients, p values
ln (population)	0.92
	(0.08)**
ln (per capita income)	1.88
	(0.16)**
ln (1+profit tax rate)	−0.56
	(0.31)*
ln Port quality	1.9
	(0.58)*
Free trade zone	0.49
	(0.21)***
Special economic zone	0.62
	(0.27)*
Constant	0.81**
R squared	0.88
N	170

*P<0.10; **P<0.05, ***P<0.01, based on the standard error

Analysing the results, it can be postulated that SEZs and FTZs are extremely useful in attracting foreign direct investments, even after controlling for the concurrent effects of tax incentives and the quality of port infrastructures.

Consistent with previous studies, we find that FDIs are positively attracted by the macroeconomic context. In addition, our results highlight the importance of efficient port infrastructures to extend the positive impact of Free Trade Zones and Special Economic Zones. We strongly believe that having well-developed ports plays a significant role in regional development and regional pattern trade. Simultaneously, we show that the actual configuration of the trade area as an FTZ or SEZ alone does not greatly influence, per sè, the impact on macroeconomic variables and that both can coexist in a country provided that they are coherently organised. Support for FTZs and SEZs with appropriate tax reliefs and high-quality harbours may have a positive impact.

In summary, it is possible to state that these areas, for their correct and competitive operation, need a well-stocked toolbox: the absence or almost duties on imported raw materials and taxation on exports, the exemption from paying taxes related to the issuing of authorizations and concessions. Overall, a great deal of responsibility is attributed to the governance of the territories, the decisions it takes at various levels, national, regional and local. It is based, for the most part, on this capacity to integrate different elements, the opportunity to implement these models, and the selection of suitable strategies. The results are suitable and will be expedited for the respective countries. In many countries around the world, as we have seen, all this has already happened successfully. We tried to prove it.

Analysing model 2's results, it is possible to deduce that SEZs/FTZs can be a useful element to increase the percentage of the trade in GDP (Table 3).

The estimation analysis also shows the percentage of trade on GDP:

- The population acts positively
- The national income per capita acts positively
- The profit tax rate acts negatively
- Port infrastructure quality acts positively.

Table 3: Effects on trade, Percentage of trade

Indepedent variables	Coefficients, p values
ln (population)	5.12
	(0.88)**
ln (per capita income)	4.66
	(0.61)*
ln (1+profit tax rate)	−3.95
	(0.95)**
ln Port quality	7.37
	(0.98)*
Free trade zone (EPZ and or EMPZ)	8.92
	(0.57)**
Special Economic Zone	9.12
	(0.63)**
Constant	12.59
	(3.81)*
R squared	0.91
N	170

*P<0.10; **P<0.05, ***P<0.01, based on the standard error

Finally (Table 4), the results show, in summary, the percentage of high-tech exports:

- The population acts positively
- National income per capita acts positively
- The profit tax rate acts negatively
- Port infrastructure quality acts positively
- The presence of SEZs and FTZs has a positive impact on the dependent variable.

The high figures of R-squared values make us confident of the fitness of the models.

The results show how FDIs, foreign trade, and the export of high-quality goods are extremely favoured not only by internal context variables, such as population, GDP, and the level of taxation, but also by specific elements that favour growth and expansion of trade through dedicated infrastructural elements, such as ports, as well as the establishment and presence of FTZs and SEZs. The magnitude of the coefficients with reference to these latter variables is highly significant, and it is therefore desirable to continue local investments and implement areas that favour trade.

In conclusion, Special Economic Zones, in the global context have achieved positive results, especially in terms of improving the economic conditions of host countries. Many SEZs, due to their high-rise structures and the offer of effective fiscal policies, have the greatest attraction for foreign investments in the region in which they are located.

The consequence of the increase in the volume of foreign investments is the positive effect that generates a higher level of specialisation from companies, which normally recruit employees with greater skills and increase the value of their production. Finally, an important economic effect derived from the creation of SEZs that should not be overlooked lies in their positive impact on the budgets for the companies operating within them and on those governments. Businesses obtain the greatest benefits the exemption or reduction of corporate income tax, from exemption from the payment of duties on imports, and the reduction of direct taxes.

Table 4: Effects on high-tech exports, High-tech export percentage

Indepedent variables	Coefficients, p values
ln (population)	3.7
	(0.92)***
ln (per capita income)	5.21
	(0.73)***
ln (1+profit tax rate)	−8.86
	(3.55)**
ln Port quality	9.42
	(4.83)**
Free trade zone	7.92
	(2.64)**
Special Economic Zone	7.12
	(4.33)***
Constant	13.11
	(5.69)*
R squared	0.93
N	170

*P<0.10; **P<0.05, ***P<0.01, based on the standard error

6. CONCLUSIONS

The analysis demonstrates that the quality of transport infrastructure, particularly port infrastructure, is of paramount importance in optimising the economic impact of special economic zones (SEZs) and free trade zones (FTZs). The capacity to attract foreign direct investment (FDI) and increase foreign trade is inextricably linked to the logistical accessibility and efficiency of the transport system. This reinforces the need for integrated transport policies that enhance SEZs' physical accessibility and connectivity while guaranteeing sustainable and resilient infrastructure. A strategic approach to the definition of special economic zones and free trade zones should be complemented by the implementation of targeted investments in multimodal transport networks. Such an approach would contribute to intermodality and the logistics flow efficiency, thereby facilitating continued economic growth while reducing the environmental impacts of trade. Furthermore, this approach aligns with sustainable development objectives. The establishment of well-developed transport systems within SEZs stimulates international trade, which has, in turn, yielded several positive local impacts. These developments may also facilitate the creation of quality employment opportunities and competitive industrial ecosystems. Accessibility is a key factor in SEZ design and development. The modelling techniques developed in this study can assist transport policymakers in analysing the impact of various factors on the effectiveness of SEZs and FTZs. They can also be used to simulate potential scenarios and optimise resource allocation. Further studies could investigate the inter-relationships among infrastructure quality, fiscal policies and SEZ governance, thereby extending the existing evidence base. The role of specific regional contexts in determining the performance of different types of SEZs should also be examined. Additionally, it would be advantageous to study how transport policies affect specific sectors, such as high-tech exports and industrial innovation.

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