European Journal of International Management > 2026 Vol.28 No.1

Title: FDI and technology transfer: the mediating role of market factors

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Keywords: FDI; foreign direct investment; technology transfer; FDI attraction; structural equation modelling; world economic forum; international business strategy; globalisation; international markets; global development; internationalisation theory.

DOI: 10.1504/EJIM.2026.150362

European Journal of International Management, 2026 Vol.28 No.1, pp.166 - 187

European J. International Management, Vol. X, No. Y, XXXX

FDI and technology transfer: the mediating role of market factors

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Reference to this paper should be made as follows: Morano, R.S., Feldmann, P.R., Jacomossi, R.R. and Barrichello, A. (xxxx) 'FDI and technology transfer: the mediating role of market factors', *European J. International Management*, Vol. X, No. Y, pp.xxx–xxx.

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1 Introduction

Economists have studied the competitiveness of nations for a long time. Smith (1985) argued that each country should specialise in the production and export of that good

which it produces most efficiently, that is, with the fewest labour-hours. Porter (1990) emphasised that for a country to be competitive, it should combine some characteristics related to the particularities of specific industries that would set the rhythm of competition. The studies on competitiveness have gained theoretical robustness (Feldmann et al., 2019) and several institutions are studying this topic, such as the World Economic Forum (WEF). Every year, the WEF releases a report where it ranks countries based on their competitiveness (Schwab et al., 2017).

Among the elements that influence the ability of a country to compete internationally, the literature has discussed the topic of the attraction of Foreign Direct Investment (FDI), which is the investment of money that comes from outside a country to be applied in its productive structure (Janeba, 2002). Actually, this was an agreed definition from the end of World War II to the 1980s when internalisation theory started to understand artificial boundaries of new Multinational Enterprises (MNE), small, non-Western, non-manufacturing firms (Buckley, 2016; Dunning and Lundan, 2008), magnifying the understanding of this concept. Many studies have been conducted on the flow of FDI in developing and underdeveloped countries, showing that they are almost entirely carried out by multinational companies that aim to increase their markets and/or reduce their costs (Delios and Ensign, 2009; Hayakawa et al., 2011, 2014; Kechagia and Metaxas, 2018).

FDI may represent an important resource for developing countries. FDI is an investment that remains in the country, unlike the speculative capital that swiftly comes and goes through the financial market. So, what is the importance of FDI to the competitiveness of a country? The answer lies in the fact that FDI is not only a flow of financial resources, but an instrument that leverages the productivity and the development of the recipient countries (Bresser-Pereira, 2006; Castells, 1999; Desbordes and Wei, 2017; Dicken, 2015; Sauvant et al., 2014; Von Hagen and Zhang, 2014; Wojciechowski, 2017). FDI leverages productivity because it also transfers technology, bringing innovative management practices and new technologies, two aspects of enormous importance for emerging countries that seek more significant insertion in the international competitive scenario (Park and Xiao, 2017). In addition, from the point of view of the recipient country, FDI brings a real potential for job generation (Lipsey and Weiss, 1981, 1984; Pearce, 1990).

According to the literature, among the variables that potentially attract FDI and technology transfer are Market Factors, Infrastructure, and Education and Training (Adhikary, 2017; Blejer and Khan, 1984; Elshamy, 2017; Kumari and Sharma, 2017; Pradhan et al., 2017; Williams, 2015). Although these variables have been addressed in the literature, there are no studies that relate all of them in a single model.

Even though there are several studies on FDI and technology transfer, the theme is not exhausted. Its importance demands a better understanding of the variables that make up the FDI in the countries and the relations among these variables. Therefore, this study is based on the following research question: do Market Factors, Infrastructure, and Education and Training variables, when brought together in a single model, remain as predecessors to FDI attraction and technology transfer?

Although the present study does not propose to discuss the theories involved with FDI, such as OLI paradigm (Dunning, 1988b, 1991; Dunning and Lundan, 2008), it addresses the need to advance the understanding of the variables that influence FDI and technology transfer. In this sense, predecessor variables, when placed together in a single model, may present different results than those obtained when such variables are

evaluated individually (Anderson et al., 2013; Hair et al., 2009) which can lead to strategic changes for companies and countries. The research is necessary since the variables considered here (Market Factors, Infrastructure and Education and Training), should be treated as joint elements and not isolated, since they present themselves as elements that are part of the same reality experienced by a society.

In this way, the objective of the research is to evaluate the variables in a global context, considering the group of countries existing in the GCR and not the specificities of each of them, in such a way as having an overview in terms of strategies, both public and private, and actions to be taken to attract foreign investments and technology transfer.

2 Literature review

A country attracts FDI by offering advantages to companies that hold the capital that enable them to reduce costs or to increase the size of their market (Cyrino and Barcellos, 2006; Dunning, 1988a, 2000, 2003; Haussmann et al., 2006; Kogut, 2002). Investments typically flow from regions with reduced expected profit to regions with high expected profit. This increase in profit may occur due to demand, cost, or both (Carbaugh, 2004). The following sections present a discussion on the possible factors that influence FDI and technology transfer in the nations.

2.1 The importance of market factors for FDI and technology transfer

There are several studies on the impact of the economic environment on firms' decision to enter foreign markets (Berry et al., 2010; Caves, 1996; Whitley, 1992a, 1992b; Yeung, 1997; Zaheer and Zaheer, 1997). As for FDI, Blejer and Khan (1984); Hassan and Murtala (2016); Luu et al. (2017); Lv and Spigarelli (2016); Milman (1996); Sarti and Laplane (2002); Schneider and Frey (1985); Serven and Solimano (1993) and Wai and Wong (1982) found that variables related to the level of market demand and the growth of market demands' rates are associated with FDI flows.

Some studies showed that the market size is an important determinant for attracting FDI (Blejer and Khan, 1984; Brandl et al., 2010; Elshamy, 2017; Gui-Diby and Renard, 2015; Hassan and Murtala, 2016; Luu et al., 2017; Lv and Spigarelli, 2016; Sarti and Laplane, 2002; Serven and Solimano, 1993; Wai and Wong, 1982). Kumari and Sharma (2017) emphasised this argument stating that the market size is the most important variable for attracting foreign investments in the country. Likewise, Milman (1996) and Schneider and Frey (1985) carried out analyses that demonstrated the association of the attraction of FDI with the annual growth rate of per capita GDP.

Other studies examined how market factors relate to FDI. Brandl et al. (2010) observed the influence of how participation in a trade bloc can facilitate the diffusion of FDI in the countries that formed the bloc. Any specific country within these markets opens up access to the other member countries, influencing FDI decisions.

Countries opened to foreign trade are favoured in relation to FDI attraction (Asiedu, 2002; Gastanaga et al., 1998; Lucas, 1993; Singh and Jun, 1995; Tsai, 1994). Markusen (1995) analysed the relation between customs barriers and the increase of FDI, noting that in the long term, the use of trade barriers results in a decrease in the volume of FDI. Büthe and Milner (2008) stated that investors fear excessive government intervention,

limiting future profits for ventures. Thus, countries in the investors' radar and more likely to receive investment are those engaged in free trade agreements.

Hossain and Rahman (2017) demonstrated the importance of governance over FDI in a sample of 80 developing countries in the period from 1998 to 2014. Kasasbeh et al. (2018) discussed the relations of FDI with population and institutional, economic, and financial factors. The authors demonstrated the existence of a significant negative effect of corruption on FDI flows. Other studies emphasised aspects related to the institutional quality of the market, such as Kumari and Sharma (2017) and Naanwaab and Diarrassouba (2016) which revealed that the more economically liberal markets when presenting quality human capital, are the ones that most influence the attractiveness of FDI.

Amal et al. (2010) connected FDI and economic stability, trade growth and openness, and the improvement of the institutional and political environment in Latin American countries. They found evidence that multinational companies are developing market strategies and seeking efficiency in the region. Markusen and Venables (1999) affirmed that the direct impact of the FDI flow on the industrialisation process is observed in the increase of local competitiveness since the multinationals receiving investments compete directly with the domestic firms. The multinational firms will produce the same substitutable products (which can also be imported), manufactured by the local companies, increasing a surplus of goods and promoting more competition.

Markusen and Venables (1999) also pointed out the creation of domestic firms to meet the demands of multinationals, which may reduce prices of intermediary products, usually allocated in oligopolies. Another aspect to consider is that the FDI flow increases the process of industrialisation of a country through technology transfer. This process increases productivity, impacting local firms, and contributing to the industrialisation process as a whole (Gui-Diby and Renard, 2015).

2.2 The importance of education and training in attracting FDI and technology transfer

The importance of the quality of human capital for the development of a country is undisputed, and firms observe the existence of this kind of capital while studying their investments in foreign countries (Adhikary, 2017; Dorożyńska and Dorożyński, 2015; Kumari and Sharma, 2017; Noorbakhsh et al., 2001). Wang and Wong (2011) confirmed the importance of human capital in the decision-making on foreign investments, emphasising the quality of education as a factor to attract FDI. The authors suggested that even a small increase in a country's quality of education is likely to promote positive impacts on its economic growth. Blundell et al. (1999) also refered to education, finding that higher education directly influences the national productivity and is relevant in the public policies of developed countries.

The human capital factor is one of the decisive aspects to attract investments to a country (Noorbakhsh et al., 2001). However, the study by Naanwaab and Diarrassouba (2016) found that Transnational Corporations (TNCs) demonstrate concern about the quality of human capital when assessing investment opportunities in low-income or developing countries, whereas this same concern is less emphasised when assessing investments in developed countries.

In the same way, Hecock and Jepsen (2013) proposed that countries willing to attract FDI should invest in education. Kaur et al. (2016) stated that the quality of the human

resources available in the host country affects the FDI, pointing out the importance in the quality of the country's infrastructure. Johanson and Vahlne (1977) emphasised the significance of differences in language, education, business practices, culture and industrial development for the volume of FDI.

In addition to higher education, corporate training has an important role. It reflects the firm's commitment to its human resources. Studies of the World Bank in OECD countries have shown that investment in employees' training is a practice in developed nations (Travkin and Sharunina, 2016).

Demirbag and Glaister (2010) identified that the qualification of the existing workforce in a country, mainly in science and engineering, is among the factors that are decisive for companies that are in the process of choosing locations abroad, especially when investments involve projects of R&D.

Mainga et al. (2009) pointed out that, in general, there is a direct association between the development of human capital and the technological development of a country. This practice contributes to the increase of a country's social capital, producing spin-offs that are used by all the companies that come to settle in the place (Zhang et al., 2019).

2.3 The importance of infrastructure in attracting FDI and technology transfer

Studies point to infrastructure as crucial to attract FDI. Such evidence suggests the development of public policies to improve infrastructure conditions and, consequently, the country's greater attractiveness (Pradhan et al., 2017; Tseng, 2007).

FDI is widely perceived as an alternative means of increasing domestic reserves and promoting economic development in low and middle-income countries. There is reliable and robust evidence that an improvement in infrastructure is effective in increasing the attractiveness of host countries. Thus, infrastructure is a crucial factor to attract FDI for developing countries (Donaubauer et al., 2016; Kaur et al., 2016).

Akhmetzaki and Mukhamediyev (2017) examined the potential determinants of FDI flows to the Eurasian Economic Union region, as well as incentives for investment in other neighbouring countries. Their results showed that Gross Domestic Product (GDP) and infrastructure development have a positive effect on FDI inflows in the region.

The infrastructure stock attracts foreign capital (Williams, 2015), and therefore, the development of telecommunication, for example, is an essential aspect of infrastructure for the growth of FDI, impacting the countries' economic growth (Pradhan et al., 2017).

2.4 Elaboration of research hypothesis

From the revised literature, it is clear that the variables Market Factors, Infrastructure, and Education and Training are predecessors to the attraction of FDI and technology transfer. However the joint analysis of these relationships in a single model was not found, thus characterising a gap to be filled.

In human sciences, causal relationships do not occur independently, making models of this nature not representing reality in its entirety (Field, 2009). Thus, broader models, which allow to capture the interdependence of the studied variables, may reveal more adherent relationships.

Thus, considering the research question that guides the present study, the following hypothesis was developed:

H1: The variables Market Factors, Infrastructure and Education and Training remain as predecessors to FDI attraction and technology transfer when analysed in a single theoretical model.

3 Methodology

The research's database was constructed based on indicators used in The Global Competitiveness Report (GCR) 2017–2018 (Schwab et al., 2017), with data from 137 countries. This number of countries and their regional distribution form the universe researched by the GCR (see Table 1).

Table 1 Countries / regions from GCR database

Region	*Country*	*Region*	*Country*	*Region*	*Country*
East Asia and the Pacific (17)	Australia	Europe (37)	Albania	Sub-Saharan Africa (31)	Benin
	Brunei Darussalam		Austria		Botswana
	Cambodia		Belgium		Burundi
	China		Bosnia		Cameroon
	Hong Kong SAR		Bulgaria		Cape Verde
	Indonesia		Croatia		Chad
	Japan		Cyprus		Congo, D. Rep.
	Korea, Rep.		Czech Republic		Côte d'Ivoire
	Lao PDR		Denmark		Ethiopia
	Malaysia		Estonia		Gabon
	Mongolia		Finland		Gambia, The
	New Zealand		France		Ghana
	Philippines		Germany		Kenya
	Singapore		Greece		Lesotho
	Taiwan, China		Hungary		Liberia
	Thailand		Iceland		Madagascar
	Vietnam		Ireland		Malawi
Eurasia (9)	Armenia		Italy		Mali
	Azerbaijan		Latvia		Mauritania
	Georgia		Lithuania		Mauritius
	Kazakhstan		Luxembourg		Mozambique
	Kyrgyz Republic		Macedonia, FYR		Namibia
	Moldova		Malta		Nigeria
	Russian Federation		Montenegro		Rwanda
	Tajikistan		Netherlands		Senegal
	Ukraine		Norway		Sierra Leone

Table 1 Countries / regions from GCR database (continued)

Region	*Country*	*Region*	*Country*	*Region*	*Country*
Latin America and the Caribbean (21)	Argentina	Middle East and North Africa (15)	Poland	South Asia (6)	South Africa
			Portugal		Tanzania
	Bolivia		Romania		Uganda
	Brazil		Serbia		Zambia
	Chile		Slovak Republic		Zimbabwe
	Colombia		Slovenia	N.A.(2)	Canada
	Costa Rica		Spain		USA
	Dominican Republic		Sweden		Bangladesh
	Ecuador		Switzerland		Bhutan
	El Salvador		Turkey		India
	Guatemala		UK		Nepal
	Honduras		Algeria		Pakistan
	Jamaica		Bahrain		Sri Lanka
	Mexico		Egypt		
	Nicaragua		Iran, Islamic Rep.		
	Panama		Israel		
	Paraguay		Jordan		
	Peru		Kuwait		
	Trinidad and Tobago		Lebanon		
	Uruguay		Morocco		
	Venezuela		Oman		
			Qatar		
			Saudi Arabia		
			Tunisia		
			UAE		
			Yemen		

Source: Adapted from Schwab et al. (2017).

The GCR encompasses three dimensions that make up the Global Competitiveness Index (GCI). The dimensions of the GCI are separated in pillars (12, in total), and these pillars altogether present 114 indicators (including essential concepts related to productivity and long-term prosperity). From the twelve pillars, the indicators to be analysed as items for the research were identified.

The indicators are derived from a survey and several other World Economic Forum indexes, such as the Networked Readiness Index, the Enabling Trade Index, the Travel & Tourism Competitiveness Index, the Gender Gap Index, and the Human Capital Index as well as several other reports, including The Inclusive Economic Growth and Development Report and regional competitiveness studies (Schwab et al., 2017).

The survey captured the opinions of more than 14,000 business executives in several economies between February 2017 and June 2017. This edition of the survey was made available in 39 languages, 21 of which were available online (Schwab et al., 2017).

The questions ask respondents to evaluate, on a scale of 1 to 7, one particular aspect of their operating environment, 1 represents the worst possible situation and 7 represents the best. The survey is administered by the World Economic Forum and conducted at national level by the Forum's network of Partner Institutes. Partner Institutes are recognised research or academic institutes, business organisations, national competitiveness councils, or other established professional entities and, in some cases, survey consultancies. These institutes have the network to reach out to the business community, are reputable organisations, and have a firm commitment to improving the competitiveness conditions of their economies (Schwab et al., 2017).

The responses obtained by the GCR in the survey are subjected to tests to ensure their reliability and adherence. Among them are the tests to check the respondents' lack of focus, duplicate responses, Mahalanobis distance tests (to exclude outliers), perception bias tests, and reliability and consistency tests of the obtained data (Schwab et al., 2017).

The research sought to identify in the GCR the indicators that best reflect the variables Education and Training, Market Factors, and Infrastructure, in order to use the report's information to assess the impact of these three variables on FDI and Technology Transfer. This is particularly important in the case of the Education and Training and Market Factor variables to guarantee their content validity. Nunnally and Bernstein (1994) suggested that this premise is largely based on the interpretation of whom is selecting the items to compose the variables.

Because the GCI's second pillar is related to infrastructure, the entire pillar was used as an item for the research's variable Infrastructure. From the fourth (Health and Primary Education) and fifth pillars (Higher Education and Training) the research used the indicators Quality of Primary Education, Quality of the Educational System, Quality of Math and Science Education, Quality of Management Schools, Internet Access in Schools, Local Availability of Specialised Research and Training Services and Extent of Staff Training, as items related to the variable Education and Training. The sixth pillar's (Goods Market Efficiency) indicators Intensity of Local Competition, Effectiveness of Anti-monopoly Policy, Effect of Taxation on Incentives to Invest, Prevalence of Trade Barriers and Business Impact of Rules on FDI were used as items of the variable Market Factors. This variable also used as items the indicator Domestic Market Size Index from the GCI's tenth pillar (Market Size) and the indicators Local Supplier Quantity and Local Supplier Quality from the eleventh pillar (Business Sophistication). Finally, the variable FDI and Technology Transfer was used from GCI's ninth pillar. Table 2 presents the description of the variables adopted in this research, as well as the items related to the elements of the GCI, as explained in the GCR (Schwab et al., 2017).

Table 2 Variables and items

Variable	*Item*	*Description*
FDI and technology transfer		The amount of FDI and new technologies that are brought to the country.
Infrastructure		Infrastructure for ensuring the effective functioning of the economy, including modes of transport (roads, railroads, ports and air transport), constant electricity supplies and a solid and extensive telecommunication network.

Table 2 Variables and items (continued)

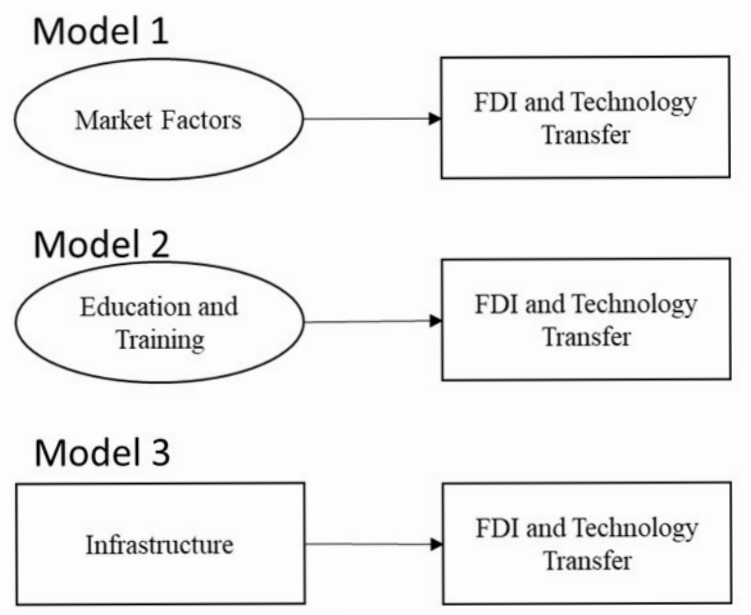
Variable	*Item*	*Description*
Education and training	Quality of primary education	The quality of primary education in the country.
	Quality of education system	The effectiveness of the education system in the country.
	Quality of math and science education	The quality of education in mathematics and science in the country.
	Quality of management schools	Quality of business schools in the country.
	Internet access in schools	The extent to which the internet is used in schools for learning purposes in the country.
	Availability of specialised training services	The availability of high-quality, professional training services in the country.
	Extent of staff training	The extent to which companies invest in training and development of employees in the country.
Market factors	Intensity of local competition	The intensity of competition in local markets.
	Effectiveness of anti-monopoly policy	The effectivity of the anti-monopoly policies in the country to ensure fair competition.
	Effect of taxation on incentives to invest	The extent to which the country's taxes reduce the incentive to invest.
	Prevalence of trade barriers	The extent to which the country's non-tariff barriers (health and product standards, technical and labelling requirements, etc.) limit the ability of imported goods to compete in the domestic market?
	Business impact of rules on FDI	How restrictive the country's rules and regulations are on FDI.
	Domestic market size index	Sum of the country's gross domestic product plus the value of imports of goods and services, minus value of exports of goods and services, in 2016 or the most recent year available.
	Local supplier quantity	The quantity of local suppliers in the country.
	Local supplier quality	Quality assessment of local suppliers in the country.

Source: Adapted from Schwab et al. (2017).

The theoretical models 1, 2 and 3 below are based on previous researches linking Market Factors, Infrastructure and Education and Training with FDI and Technology Transfer (Adhikary, 2017; Blejer and Khan, 1984; Elshamy, 2017; Kumari and Sharma, 2017; Pradhan et al., 2017; Williams, 2015). The models (see Figure 1), relating the variables individually, allows corroboration the existing literature and verify the quality and adequacy of the data used in the research.

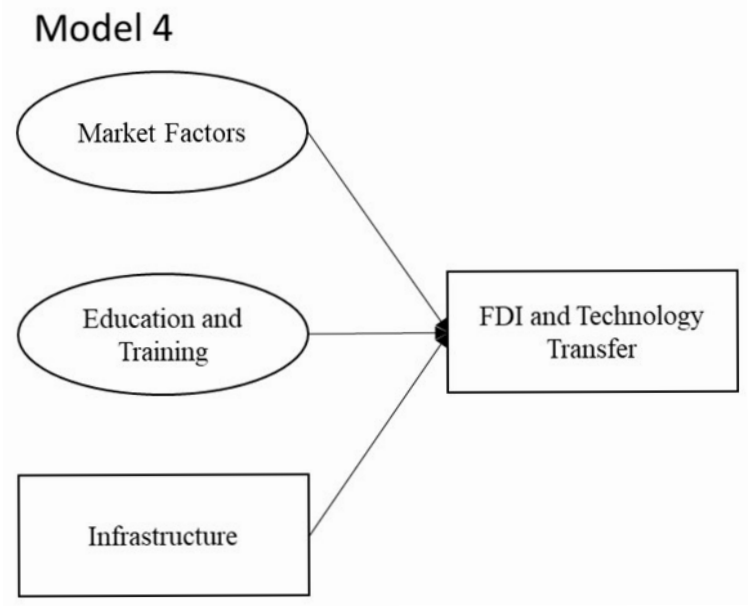
To test hypothesis H1 proposed in this study, model 4 (see Figure 2) was developed. The model relates the variable FDI and Technology Transfer with the other three variables altogether.

Figure 1 Theoretical models 1, 2 and 3 (individual analysis of the variables)



Source: Elaborated by the authors.

Figure 2 Theoretical model 4 (joint analysis of the variables)



Source: Elaborated by the authors.

According to Hair et al. (2009), it is possible, through the statistical technique factor analysis, to promote the reduction of the number of a group of variables without significant loss of the information they provide. Generally speaking, factor analysis provides the tools to analyse the structure of the interrelationships (correlations) in a large number of variables defining sets of variables that are strongly interrelated known as factors (Hair et al., 2009). Such a process can be done in an exploratory or confirmatory manner, and it is necessary to verify the reliability and validity of these factors. In this sense, the literature shows some distrust in relation to exploratory factor analysis (Batista-Foguet et al., 2004; Marôco and Garcia-Marques, 2006) and the limitations of the reliability assessment by using Cronbach's alpha. As an alternative, the treatment of reliability and validity is proposed by confirmatory factor analysis (Batista-Foguet et al., 2004).

Market Factors, and Education and Training are variables considered under this reduction process and were submitted to a confirmatory factor analysis before the evaluation of the relations. As this process does not involve the construction of a scale and only the reduction of the number of measurable variables used, it was decided to evaluate the Composite Reliability (CR), the factorial validity and the convergent validity (AVE) of the two factors (Byrne, 2010; Marôco, 2014), considered from now on as latent variables. Despite this, it is important to highlight the concern with the choice of indicators used in the reduction process and their respective connection with the Market Factors and Education and Training constructs in order to meet the precepts recommended by Nunnally and Bernstein (1994) regarding validity of content.

The number of countries in the database was higher than the minimum value to reach the ratio of five records per item, guaranteeing the significance and representativeness of the data used for these variables (Bentler and Chou, 1987).

The quantitative method involving confirmatory factor analysis and structural equation modelling (Rivera et al., 2018) were performed using the software IBM SPSS Amos® 22.0.

4 Analysis and discussion of results

In the confirmatory factor analysis, the estimation of the measurement model regarding the variables Market Factors and Education and Training used the maximum likelihood method (Byrne, 2010; Marôco, 2014).

As for normality, for the same variables, studies show that even data without a normal distribution may be acceptable as long as the measures of univariate kurtosis (Sk) and skewness (Sk) of each item approach zero and are not higher, in module, than 2 and 7, respectively (Marôco, 2014). The results of univariate normality tests, as measured by skewness ([–0.659: 0.367]) and kurtosis ([–0.683: 1.093]) parameters, indicated that none of the variables presented $|Sk| > 2$ and $|Ku| > 7$. Therefore, there was no extreme violation of normality.

The measurement model presented adequate quality adjustment indexes (Byrne, 2010; Marôco, 2014): $\chi^2 = 153.246_{(49)}$, $p<0.001$, NFI = 0.934, PNFI = 0.587, IFI = 0.954, TLI = 0.926, CFI = 0.953, RMR = 0.024. The correlations found between the items of the variables were incorporated improving the fit of the model, without compromising the analyses performed (Byrne, 2010).

Due to low factor loading, some of the items were discarded: Effect of Taxation on Incentives to Invest and Domestic Market Size Index. The item Domestic Market Size Index is the one that draws the most attention because it is counterintuitive. Also, the literature supports the importance of this item in the attraction of FDI (Hassan and Murtala, 2016; Luu et al., 2017; Lv and Spigarelli, 2016). In contrast, removing this item from the variable Market Factors would, in a certain way, agree with studies such as the ones by Hossain and Rahman, (2017) and Kasasbeh et al. (2018). These authors reinforce that the market size is as important as its quality in terms of governance – among other factors – to attract FDI. Complementing, Chobanyan (2017) highlights elements such as the size of a country's external market, its capacity to dispose of production, as well as physical, institutional and legal infrastructure, as the significant factors in attracting FDI.

Table 3 presents the factor loadings of each item of the variables Education and Training, and Market Factors (factorial validity). In addition, it presents the Composite Reliability index (CR) and the Average Variance Extracted (AVE – convergent validity).

Table 3 Confirmatory factor analysis

Variables	*Item*	*Factor Loadings*	*AVE*	*CR*
Education and training	Quality of primary education	0.868	0.767	0.958
	Quality of education system	0.879		
	Quality of math and science education	0.800		
	Quality of management schools	0.831		
	Internet access in the schools	0.911		
	Availability of specialised training services	0.907		
	Extent of staff training	0.928		
Market factors	Intensity of local competition	0.758	0.615	0.904
	Effectiveness of anti-monopoly policy	0.915		
	Prevalence of trade barriers	0.726		
	Business impact of rules on FDI	0.651		
	Local supplier quantity	0.676		
	Local supplier quality	0.932		

Source: Elaborated by the authors

The results of the CR showed values above the recommended (0.7), in the same way as the values of AVE were above the suggested limit (0.5) (Byrne, 2010; Marôco, 2014). Thus, the items that make up the variables Education and Training and Market Factors met the requirements of factorial validity, composite reliability and convergent validity (Byrne, 2010; Marôco, 2014), and were considered adequate for the study.

After the findings of the confirmatory factor analysis, the theoretical models proposed were analysed based on the literature review. For Model 1, Market Factors → FDI and Technology Transfer relation, it was observed adequate quality adjustment indexes ($\chi^2 = 52.085_{(7)}$, $p<0.001$, NFI = 0.940, PNFI = 0.313, IFI = 0.947, TLI = 0.840, CFI = 0.947, RMR = 0.023) (Byrne, 2010; Marôco, 2014). A positive and significant relation was found between the first and second variables with standardised path coefficient (β) equal to 0.864 ($p<0.001$) and coefficient of determination (R^2) equal to

0.747. This result corroborated Amal et al. (2010); Gui-Diby and Renard (2015) and Markusen and Venables (1999), who relate the market to FDI and technology transfer.

For model 2, Education and Training → FDI and Technology Transfer relation, it was observed adequate quality adjustment indexes ($\chi^2 = 49.782_{(13)}$, $p<0.001$, NFI = 0.966, PNFI = 0.448, IFI = 0.975, TLI = 0.945, CFI = 0.974, RMR = 0.029) (Byrne, 2010; Marôco, 2014). A positive and significant relation was found between the first and second variables with standardised path coefficient (β) equal to 0.808 ($p<0.001$) and coefficient of determination (R^2) equal to 0.652. This result corroborated Hecock and Jepsen (2013); Noorbakhsh et al. (2001b), and Wang and Wong (2011), who relate education and training to FDI and technology transfer.

For model 3, Infrastructure → FDI and Technology Transfer relation, both directly measurable variables, a positive and significant relation was found between the first and the second with the standardised path coefficient (β) equal to 0.775 ($p<0.001$) and the coefficient of determination (R^2) equal to 0.600. This result, corroborated Kaur et al. (2016) and Pradhan et al. (2017), who relate infrastructure to FDI and technology transfer.

The three models analysed above, as well as corroborating the existing literature, suggest good quality and adequacy of the research data.

After the individual analyses, the theoretical structural model was analysed, combining all variables (model 4). This model deals with the direct causal relations from the three variables (Market Factors, Education and Training and Infrastructure) toward the variable FDI and Technology Transfer, as illustrated in Figure 2 presented before.

Table 4 shows the path and determination coefficients of the relations among the variables of the model. The model presented adequate quality adjustment indexes ($\chi^2 = 295.864_{(71)}$, $p<0.001$, NFI = 0.895, PNFI = 0.605, IFI = 0.918, TLI = 0.878, CFI = 0.917, RMR = 0.029).

Table 4 Model 4 – Path coefficients (β) and coefficient of determination (R^2)

Description	*Model 4*	
	β	R^2
Education and Training → FDI and Technology Transfer	-0.036^{ns}	
Infrastructure → FDI and Technology Transfer	0.012^{ns}	
Market Factors → FDI and Technology Transfer	0.879**	
FDI and Technology Transfer		0.733

Notes: ns – non-significant**$p < 0.01$; Elaborated by the authors.

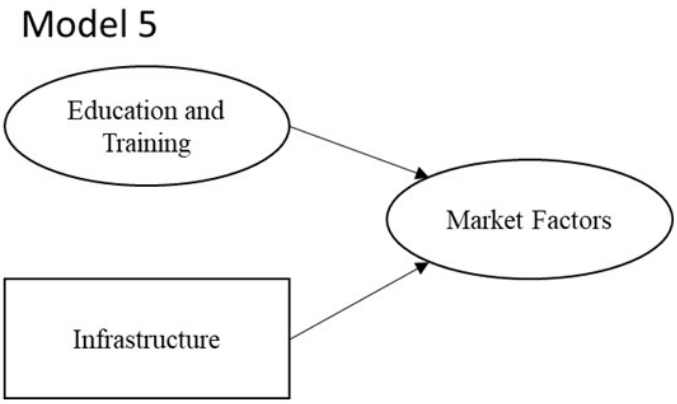
As observed in Table 4, only the Market Factors → FDI and Technology Transfer relation was positive and significant. The other relations – different from the findings in models 1, 2 and 3, and the literature reviewed – were not significant, not supporting the H1 hypothesis. The explanatory power of the proposed model exceeded 70%, having only Market Factors as antecedent of FDI and Technology Transfer.

Because the literature had confirmed the influence of the tested variables on FDI and Technology Transfer, the possibility of multicollinearity was speculated (Hair et al., 2009). The tests performed showed a VIF of less than 5, discarding the possibility of the phenomenon (Hair et al., 2009; Marôco, 2014).

FDI and technology transfer

Based on the findings, the study proceeded with an examination of the relations among the variables Market Factors, Education and Training and Infrastructure, separately from FDI and Technology Transfer. Besides that, it was speculated that the variable Market Factors is consequential to the others because of its significance in model 4, which led to the elaboration of model 5 (see Figure 3).

Figure 3 Model 5 – Relations among variables antecedents to FDI and technology transfer



Source: Elaborated by the authors.

The results obtained for model 5 regarding quality adjustment indexes were satisfactory (χ^2 = 21.474 $_{(60)}$, p<0.001, NFI = 0.917, PNFI = 0.605, IFI = 0.939, TLI = 0.907, CFI = 0.939, RMR = 0.025). Table 5 presents the path ($\beta$and determination (R^2) coefficients of the model. All the relations in model 5 were positive and significant. The explanatory power of such a model was above 90%, confirming that the variable Market Factors is a consequent of the others.

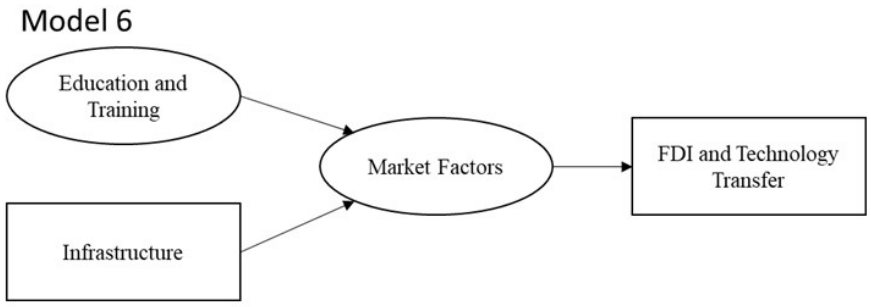
Table 5 Model 5 – Path coefficients (β) and coefficient of determination (R^2)

Description	*Model 5*	
	β^i	R^2
Education and Training → Market Factors	0.644***	
Infrastructure → Market Factors	0.360***	
Market Factors		0.934

Notes: [i]Direct effect; *** p < 0.001; Elaborated by the authors.

Models 4 and 5, when analysed together, suggest that the variable Market Factors is intermediary of the relations between Education and Training and Infrastructure, and the variable FDI and Technology Transfer. Thus, model 6 (see Figure 4), was elaborated, connecting all the variables studied.

Figure 4 Model 6 – Market factors as an intermediary to FDI and technology transfer



Source: Elaborated by the authors.

The results obtained regarding quality adjustment indexes were satisfactory ($\chi^2 = 295.917_{(73)}$, $p<0.001$, NFI = 0.895, PNFI = 0.622, IFI = 0.919, TLI = 0.882, CFI = 0.918, RMR = 0.029). Table 6 presents the path (β and determination (R^2) coefficients of the model. All relations were positive and significant. The explanatory power of such a model was above 70%, confirming that the variable Market Factors act as an intermediary.

Table 6 Model 6 – Path coefficients (β) and coefficient of determination (R^2)

Description	*Model 6*	
	β^i	R^2
Education and Training → Market Factors	0.635**	
Infrastructure → Market Factors	0.371*	
Market Factors → FDI and Technology Transfer	0.856**	
Market Factors		0.934
FDI and Technology Transfer		0.732

Notes: [i]Direct effect; **$p < 0.01$ *$p < 0.05$; Elaborated by the authors.

In addition, the indirect effects of the relations Education and Training → FDI and Technology Transfer, and Infrastructure → FDI and Technology Transfer were analysed to verify the possible mediating effect of the variable Market Factors (Byrne, 2010; Hayes, 2018).

Table 7 shows the analysis of the indirect effects of the mentioned relations.

Table 7 Path coefficients (β) – Indirect effect

Description	*Indirect effect*
	β
Education and Training → FDI and Technology Transfer	0.543**
Infrastructure → FDI and Technology Transfer	0.317**

Notes: **$p < 0.01$; Elaborated by the authors.

The significant values of indirect effect obtained indicate that the variable Market Factors act as a mediator in the relation Infrastructure → FDI and Technology Transfer, and Education and Training → FDI and Technology Transfer. Thus, it is evident that Market Factors is determinant to attract FDI and technology transfer, corroborating the existing literature on the subject (Berry et al., 2010; Blejer and Khan, 1984; Caves, 1996; Hassan and Murtala, 2016; Luu et al., 2017; Lv and Spigarelli, 2016; Milman, 1996; Sarti and Laplane, 2002; Schneider and Frey, 1985; Serven and Solimano, 1993; Wai and Wong, 1982; Whitley, 1992b, 1992a; Yeung, 1997; Zaheer and Zaheer, 1997). In this sense, the variable Market Factors discussed in this study (considering the items Intensity of Local Competition, Effectiveness of Anti-monopoly Policy, Prevalence of Trade Barriers, Business Impact of Rules on FDI, Local Supplier Quantity, Local Supplier Quality) refers to the market environment a country can offer for business to run freely and face competition. It is about the capacity to create an environment with some degree of economic freedom that is adequate in the investors' point of view. In addition, aspects related to the qualification and diversity of suppliers complement the constitution of the variable Market Factors.

Nevertheless, regarding the countries' public policies, encouraging or promoting a political and economic agenda that privileges free market and competition, valuing topics such as the quality of education, as well as improving infrastructure conditions, reinforce a healthy market environment. This market environment is crucial for countries to be on the radar of large transnational corporations to receive productive investment, which creates job and takes these nations to another level of competition.

The other variables tested in this study had no direct relations with FDI and Technology Transfer, which does not invalidate or contradict previous studies that relate them as essential indicators in the attraction of investment and technological contribution (Hecock and Jepsen, 2013; Kaur et al., 2016; Noorbakhsh et al., 2001; Pradhan et al., 2017; Wang and Wong, 2011). However, these relations occur mediated by market factors, indicating that efforts in education and training and infrastructure are not effective in countries where market factors are not present and favourable.

5 Conclusions

This research aimed to evaluate how Market Factors, Infrastructure, and Education and Training affect the attraction of FDI and Technology Transfer in the countries, considering all the variables in a single structural model. The study used structural equation modelling and worked with data from the Global Competitiveness Report 2017/2018 (Schwab et al., 2017).

The literature presents studies that examined the relations among these variables individually (Amal et al., 2010; Gui-Diby and Renard, 2015; Hecock and Jepsen, 2013; Kaur et al., 2016; Markusen and Venables, 1999; Noorbakhsh et al., 2001; Pradhan et al., 2017; Wang and Wong, 2011). This research, however, innovated by analysing the variables together and found that market factors, when understood based on the items designated in this study, play a mediating role that has been undetected in previous studies. So far, the literature had evidenced market factors as an antecedent to FDI and technology transfer, but no studies were emphasising the mediation role observed here.

This finding does not invalidate the analysis of the direct relation between education and training, and infrastructure, with FDI and technology transfer. However, the study

suggests that it is better to understand these relations through a new dynamic, considering market factors as a mediating variable. This perspective represents an important academic contribution and a richer way of understanding the phenomena.

The domestic market size, in particular, is not necessarily an important variable, as well-explored in the literature (Blejer and Khan, 1984; Hassan and Murtala, 2016; Luu et al., 2017; Lv and Spigarelli, 2016). However, in order to attract FDI and ensure technology transfer, countries must focus their efforts on factors that ensure their ability to promote adequate openness and economic freedom from the investors' point of view, as well as to encourage suppliers' quality and diversity.

In terms of practical contributions, this study shows that some of the items that form the variables Market Factors, and Education and Training, both regarding the elaboration of public policies and seizing opportunities in the market, deserve attention and priority in future strategies. In terms of public policies, the existence of a healthy market with economic freedom enhances the role of quality education and infrastructure, which lead to attracting FDI. In this sense, a spin-off is encouraged, which positively affects the competitiveness of the country and works as a virtuous cycle. In practical terms for industries, the central role is to work in partnership, discussing together with political leaders the creation of an area of greater autonomy and less bureaucracy for business activity.

Regarding the limitations of this research, it is worth mentioning that the study was restricted to the indicators presented in the Global Competitiveness Report 2017/2018 published by the World Economic Forum to measure the variables. Although it is one of the most important reports to measure countries' performance, it is recommended that future research focus on expanding the variables using other indicators.

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