Can the Vietnamese Provincial Competitiveness Index Attract Enterprises for Locals?

Nhan Thanh Trinh and Seongwoo Lee

The Vietnamese provincial competitiveness index (PCI) is a tool designed to assess the economic governance quality of provincial authorities in creating a favorable business environment for enterprises. This study employs descriptive statistical analysis and structural equation modeling to examine the effectiveness of PCI in attracting enterprises. We utilize two official data sources in Vietnam, namely, the PCI and proxies of enterprise attraction, including the number of enterprises, employees, and capital value of enterprises, covering the period from 2013 to 2020. Our results show a strong correlation between the PCI and its subindices and a positive impact of the PCI on all proxies of enterprise attraction. Specifically, the effect of the PCI on the number of enterprises is more potent than on the number of employees and the capital value of enterprises. In addition, our study finds that the effect of the PCI on enterprise attraction in less developed provinces is more vital than in developed provinces.

Keywords: Competitiveness, Enterprise Attraction, PCI, Vietnam
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I. Introduction

The market-oriented economic reform of Vietnam in 1986 has spurred the development of private enterprises, which serves as one of the most crucial drivers for national and regional economic growth, facilitating the country's move from the low- to the middle-income group since 2008. However, challenges remain, such as corruption, bureaucratic inefficiencies, and a lack of transparency in the legal system, hindering the development of enterprises (World Bank 2020). In addition, the development of enterprises is uneven across localities, being concentrated in central cities and their vicinities. In response, the government and local authorities have continued seeking many initiatives to conquer the challenges in enterprise development. One such initiative was the promulgation of the PCI, designed to assess the economic governance quality of provincial authorities in creating a favorable business environment for private enterprise development. Accordingly, a province with a high PCI is expected to have a good business environment and attract enterprises. Therefore, the local governments have made efforts to improve their PCI since the PCI was promulgated in 2005. Nonetheless, the effect of PCI on enterprise attraction nationally has yet to be examined.

Aside from Vietnam, many countries adopt the national and regional competitiveness approach to create a propitious business environment for enterprises (Bronisz *et al.* 2008; Benzaquen *et al.* 2010; Huggins *et al.* 2014; Villamejor-Mendoza 2020), which serves as a significant factor of economic development (Eduardo 2019; Patarapong 2019; Peter 2020). Many scholars have devoted considerable attention to the subjects of competitiveness, with early works focusing on defining the concepts (Krugman 1994; Barker and Köhler 1998; Porter 2008; Klaus *et al.* 2014) and constructing a set of competitiveness measures (Lall 2001; Bowen and Moesen 2011; Bulu 2011). Recently, scholars have shifted their interest to assessing the effectiveness of competitiveness indices to provide empirical evidence (Xia *et al.* 2012; Dadgar *et al.* 2018; Villamejor-Mendoza 2020), which will be valuable references for improving the business environment and refining the set of measurement indicators. However, empirical studies on such a subject require improvement in both quantity and research methods. To our knowledge, the first empirical study examining the relationship the PCI and enterprise attraction in Vietnam was conducted by Le and Duy

(2021). However, their investigation covers only five Central Highlands provinces and does not necessarily represent the entire country. Furthermore, their empirical findings are mainly explained using description and correlations (Pearson product moment correlation), which only examine the relationship between each pair of variables separately but do not analyze complex relationships among multiple variables simultaneously. Thus, elucidating the correlations among the subindices, the CPI, and the proxies of enterprise attraction is challenging. This limitation requires further examination of the impact of PCI on enterprise attraction in Vietnam.

To fill the existing research gap, this study examines the effect of PCI on enterprise attraction across the country by using a novel method. We utilize two official data sources in Vietnam: the PCI and proxies for enterprise attraction between 2013 and 2020. We use descriptive analysis with tables and graphics to comprehensively assess the current situation, distribution, and change of PCI and enterprise attraction across the country. The results will offer valuable insights to policymakers seeking to enact policies that narrow the development gap between provinces by improving the business environment and promoting enterprise development. We employ correlation analysis and structural equation modeling (SEM) to determine the relationships among the PCI, its subindices, and enterprise attraction. These analytical methods will enable us to identify the subindices that significantly influence the PCI and enterprise attraction, which will then help us provide recommendations for improving the index and attracting enterprises for locals. The SEM results with multigroup analysis will provide valuable evidence of the impact of PCI on enterprise attraction in different groups of provinces. Our findings offer valuable information on how to improve the PCI and attract enterprises for locals. In addition, this study contributes to the body of knowledge on regional competitiveness and provides a novel method to elucidate the effect of competitiveness indices constituted by a wide range of indicators.

The rest of the paper is structured as follows: Section 2 summarizes national and regional competitiveness and the Vietnamese PCI. Section 3 describes data sources and research methods. Section 4 demonstrates the empirical results. Section 5 presents the conclusion and discusses the results, limitations, and implications.

II. Literature review

A. Brief review of national and regional competitiveness

Competitiveness is a multifaceted concept that associates multiple backgrounds, from economics, politics, and history to culture (Waheeduzzaman and Ryans 1996) and is changeable over time and context (Chaudhuri and Ray 1997; Flanagan *et al.* 2007). With different backgrounds and particular purposes, scholars have considered competitiveness at various levels, from the country, region, and industry levels to the firm level (Peng *et al.* 2001; Dhingra *et al.* 2009; Huggins *et al.* 2014; Villamejor-Mendoza 2020). At the industry and firm levels, the notion of competitiveness is less controversially judged. At the region or country level, a firm's competitiveness according to its profitability or market share and an industry's competitiveness according to its share of GDP or export ratios (Martin *et al.* 2004) has been subject to debate (Annoni and Dijkstra, 2013; Kitson *et al.* 2014).

Before Porter's diamond model was developed, a country's competitiveness was understood to be its export capacity. However, it involves many variables, typically the country's economic success (Porter 1990). With an economic focus, most scholars agree that a country's competitiveness is essentially about its ability to provide employment and prosperity to its population (Barker and Köhler 1998; Krugman 1994; Porter 2008). Therefore, previous concepts of a country's competitiveness tended to emphasize economic factors, such as GDP growth, employment rates, and the share of goods and services in the global market. Recent notions focus on a country's ability to provide a favorable business environment for its enterprises. The World Economic Forum (2014) defines competitiveness as a combination of institutions, policies, and factors that determine a country's productivity and efficiency levels (Klaus *et al.* 2014). The Global Competitiveness Index (GCI) was first introduced by the World Economic Forum in 2004 to measure a country's competitiveness and has been annually published in the Global Competitiveness Report.

The GCI is based on the theory of a country's development stages and involves 12 pillars grouped into three groups corresponding to three distinct phases of a country's competitiveness. The first group is *basic requirements*, the phase of factor-driven growth expected in low-income countries. These factors consist of four pillars: institutions,

infrastructure, macroeconomic environment, and health and primary education. In the 2018 edition, this group was replaced by the enabling environment, including institutions, infrastructure, information communication technology adoption, and macroeconomic stability (Schwab and Zahidi 2020). The second group is *efficiency enhancers*, which is the phase of investment-driven growth expected in medium-income countries. These factors consist of six pillars: higher education and training, goods market efficiency, labor market efficiency, financial market development, technological readiness, and market size. In the 2018 edition, this group was replaced by two groups: human capital with the pillars of health and skills and markets with the pillars of production market, labor market, financial system, and market size (Schwab and Zahidi 2020). The third group is *innovation and sophistication factors*, which is the phase of innovation-driven growth expected in high-income countries. These factors consist of two pillars: business sophistication and innovation. It was then replaced by the innovation ecosystem, including two pillars, namely, business dynamism and innovation capacity, in the 2018 edition (Schwab and Zahidi 2020).

Many scholars filter competitiveness down to region/local levels, referring to the geographic division of a country. Benzaquen *et al.* (2010) argue that the word "region" could be defined by various factors involving demography, history, culture, economics, and climate. In the World Competitiveness Index of Regions, covering 546 regions globally, regions are defined by city or provincial boundaries for most countries (Huggins *et al.*, 2014). Therefore, the Vietnamese PCI can be regarded as a regional/local competitiveness measurement. Storper (1997) defines *local competitiveness* as the potential to sustain a favorable environment for market growth and provide standards of living for its population. Annoni and Dijkstra (2013) explain *regional competitiveness* as providing a favorable environment for enterprises and residents to live and work. Regional competitiveness is then materialized into specific indicators that vary by country or region. For instance, the National Competitiveness Council of Peru composed the 2008 regional competitiveness index, consisting of 12 pillars: institutional framework, infrastructure, macroeconomy, health, education, labor market, financial market, technological readiness, market, business sophistication, innovation, and natural resources. Meanwhile, Chile's 2003 regional competitiveness index includes eight pillars: economic

result factor, enterprise factor, person factor, innovation factor, science and technology, infrastructure factor, government factor, and natural resources factor (Benzaquen *et al.* 2010). In other countries, regional competitiveness is constructed as the PCI (in Vietnam), consisting of 10 pillars (PCI-Vietnam 2022), or the municipal competitiveness index (in the Philippines), consisting of eight pillars (Villamejor-Mendoza 2020).

While definition and indicators of competitiveness are likely to be studied and discussed more, another crucial concern emerges: whether the existing competitiveness indicators can work for their original targets. This question can be addressed by conducting various empirical studies to examine the association between the competitiveness index and a country or region's efficiency and productivity levels. However, empirical studies on such a subject are still limited in quantity, subject, and methodology, leading to ongoing controversy. Petrylė (2016) analyzed data on the GCI and GDP of countries from 2006 to 2015 and reported that the GCI could not predict a country's GDP growth rate even though it could indicate if a country can avoid sharp fluctuations in GDP and maintain sustainable economic growth. Xia *et al.* (2012) analyzed data from 40 countries and found that GCI is not a good predictor of economic growth. In contrast, Dadgar *et al.* (2018) employed linear regression to analyze data from Iran from 2006 to 2016 and reported that GCI positively correlates with economic growth. Villamejor-Mendoza (2020) used descriptive statistics and reported that the cities and municipalities competitiveness index (CMCI), which has been applied in the Philippines since 2012, positively correlates with other material dimensions of development other than economic development. Specifically, this research reveals that CMCI drives better performance in the human development index and poverty incidence in urbanized cities. These empirical findings indicate that the relationship between competitiveness index and efficiency and productivity level varies by region, country, selected indicators, and analytical method. More credible empirical evidence is needed to comprehensively assess the effect of the competitiveness index on regional or national efficiency and productivity levels, which are the foundation for promulgating corresponding policies.

B. Vietnamese provincial competitiveness index

The Vietnamese PCI was first introduced in 2005 by the Vietnam

Chamber of Commerce and Industry (VCCI) with the assistance of the United States Agency for International Development (USAID) to assess the economic governance quality of provincial authorities in creating a favorable business environment for private enterprise development (PCI Vietnam 2022). The PCI was piloted in 42 of 63 provinces of Vietnam in 2005 and then applied to all provinces and central cities (hereafter "provinces") since 2006. The VCCI re-evaluates the methodology and recalibrates the indicators of the PCI every four years to reflect the changing business environment in Vietnam. The 2021 edition of the PCI encompasses 10 subindices (as presented in Table 1) and 142 indicators that evaluate critical areas of local economic management relevant to the development of enterprises.

The PCI is conducted annually through a three-step process. First, data are collected from business surveys and published sources, with the sample including approximately 10,000 domestic and 1,500 foreign-invested enterprises. Random sampling with stratification is used to ensure that the sample accurately represents firm age, legal type, and sector. Second, the subindices are calculated and standardized on a 10-point scale. Finally, the composite PCI is calibrated as the weighted mean of the subindices with a maximum score of 100 points. This calculation enables a province with a higher PCI to be considered more attractive to enterprises.

Although the PCI report is recognized nationwide as a reliable reference for evaluating the economic governance quality of local authorities in creating a favorable business environment for enterprises, empirical studies on this subject are lacking. Rigorous evaluation of the effectiveness of PCI is critical not only for readjusting the methodology and recalibrating the indicators of the CPI but also for guiding policymakers in developing policies aimed at improving the business environment. To our knowledge, the first empirical study that examines the relationship between the PCI and enterprise attraction was conducted by Le and Duy (2021). However, their investigation covered only five provinces of the Central Highlands, which makes it inadequate to assess the effectiveness of the PCI at a national level. Moreover, their empirical findings are mainly explained with descriptive and correlation analysis, making it challenging to consistently estimate the impact of PCI on enterprise attraction. Therefore, conducting more empirical studies with more credible and scientific methodology and on a broader scale is crucial.

TABLE 1

Components Of The Vietnamese Provincial Competitiveness Index 2021

Subindices	Number of indicators	Measurement and evaluation
Entry costs	19	Assesses the differences in entry costs for new firms across provinces
Land access and security of tenure	14	Measures the ease with which entrepreneurs can access land and the security of tenure once they have acquired it
Transparency and access to information	17	Assesses whether firms have access to planning and legal documents necessary to run their businesses, whether those documents are equitably available, whether new policies and laws are communicated to firms and implemented predictably, and whether the provincial webpage is useful for businesses
Time costs and regulatory compliance	14	Measures how much time firms waste on administrative compliance and much time they have to shut down their operations for inspections by local regulatory agencies
Informal charges	16	Assesses the amount of informal charges firms pay, how difficult it is for their business operations to pay those extra fees, whether payment of those extra fees produces expected results, and whether provincial officials use compliance with local regulations as a means of extorting money from businesses
Policy bias	11	Assesses the competitive environment for private enterprises in advance of incentives for state-owned enterprises, foreign-invested enterprises, and businesses familiar with provincial government officials, expressed in the form of specific privileges and privileges when accessing resources for development such as land, credit, etc., and priority treatment in the implementation of administrative procedures and policies
Proactivity of provincial leadership	9	Assesses how provinces implement central policy, design their private sector development initiatives, and work within sometimes unclear national regulatory frameworks to assist and interpret in favor of private firms

Subindices	Number of indicators	Measurement and evaluation
Business support services	13	Measures provincial services for private sector trade promotion, provision of regulatory information to firms, business partner matchmaking, provision of industrial zones or industrial clusters, and technological services for firms
Labor and training	11	Measures the efforts by provincial authorities to promote vocational training and skill development for local industries and assist in local labor placement
Legal institutions	18	Measures the private sector's confidence in provincial legal institutions and whether firms regard provincial legal institutions as an effective vehicle for dispute resolution or as an avenue for lodging appeals against corrupt official behavior

Source: Adopted from PCI Vietnam (2022)

III. Data and methodology

A. Data sources

We obtained data from two official sources. The first source is the PCI dataset, which has been obtained annually by the VCCI with the assistance of USAID since 2005 and is available on the official website of PCI Vietnam. As previously mentioned, the PCI data from the VCCI are obtained with scientific sampling methods and are the official source in Vietnam, thus making them highly reliable. Before 2013, the PCI consisted of nine subindices, which lacked the "Policy bias" index. Thus, we use data only from 2013 onward, with all 10 subindices. Although the VCCI readjusted the indicators and recalibrated the PCI in 2017, 2019, and 2021, its subindices remained unchanged from 2013 to 2021. However, the dataset of enterprise attraction in 2021 was incomplete, so we used data from 2013 to 2020.

The second source is the dataset of the proxies of enterprise attraction extracted from the Vietnamese statistical yearbooks, which is considered the official data resource on the socioeconomic situation of Vietnam and published annually by the General Statistics Office (GSO). We employ three key indicators that represent enterprise attraction:

the number of enterprises operating in the province, the number of employees working in enterprises in the province, and the capital value of enterprises operating in the province. The first indicator represents the number of enterprises, and the second and third indicators represent enterprise scale by labor and capital. The PCI is calibrated for a province-level unit regardless of the province size. Thus, we calculate the number of enterprises, the employees in enterprises, and the capital value of enterprises per the area of the province to avoid any bias that might arise from differences in province size. Specifically, we use the number of enterprises per area (enterprise/km^2), the employees per area (persons/km^2), and the enterprise capital value per area (billions VND/km^2). We use data from 2013 to 2020 from all 63 provinces to firm a dataset of 504 observations.

B. Data analysis

The PCI is calibrated from 10 subindices, comprising more than a hundred specific indicators. Manipulating these indicators will affect the subindices, the overall PCI, and enterprise attraction. However, the number of particular indicators is more than a hundred and are not identical from 2013 to 2020 because they were adjusted in 2017 and 2019. Therefore, we analyze only the PCI and subindices. In this study, enterprise attraction is an unobservable variable whose real value does not exist in the dataset but is made up of three indicators: the number of enterprises, the number of employees working in the enterprise, and the capital value of the enterprise. The subindices, the PCI, and the proxies of enterprise attraction have complicated relationships, which is why we adopt SEM, which can present the relationships of the variables in a single model to estimate their relationships comprehensively.

The SEM shows its feasibility for this study through other advantages. First, SEM can improve the reliability of the structural path coefficients by allowing the application of terms of measurement error to the estimation process (Chin 1998). In conventional regression models, the null hypothesis is imposed for the error rate of variable measurement and the between variable residuals or their observed variables (Pedhazur and Kerlinger 1982). However, this hypothesis could be more realistic because the gauged variables have some degree of measurement errors, which may be tiny but can generate biased coefficients from the utilization of the measurements (Jenatabadi and

Ismail 2014). Second, the SEM can provide a more robust analysis of the proposed model, which improves the evaluation results because it allows for the inclusion of measurement and latent variables in the same analysis (Gefen *et al.* 2000). Third, SEM can handle complex data with nonnormality and multicollinearity and model graphical interfaces (Garson 2009). Finally, SEM provides a complete model test by generating goodness-of-fit statistics and the overall fit (Ho 2006). Given these advantages, SEM has increasingly become a powerful tool for analyzing and evaluating multivariate causal relationships in many research fields, such as customer loyalty (Forgas *et al.* 2012; Mikulić and Prebežac 2011), job satisfaction (Chen and Kao 2011), airline performance (Jenatabadi and Ismail 2014), ecological sciences (Grace 2006; Eisenhauer *et al.* 2015; Fan *et al.* 2016), and traffic control (Kuo *et al.* 2012). Figure 1 depicts the research model where 10 subindices are expected to affect PCI positively, and PCI positively affects enterprise attraction.

The first stage in the SEM analysis process is validating the factors of the latent indicator construct (Anderson and Gerbing 1988). We use confirmatory factor analysis (CFA) to estimate latent constructs for an enterprise attraction variable whose real value does not exist in the data. On the basis of previous findings (Le and Duy 2021), we

Subindices:
1. Entry: Entry costs
2. Land: Land access and security of tenure
3. Transparency: Transparency and access to information
4. Time: Time costs and regulatory compliance
5. Charges: Informal charges
6. Policy: Policy bias
7. Proactivity: Proactivity of provincial leadership
8. Support: Business support services
9. Labor: Labor and training
10. Legal: Legal institutions

H_1^+ → **PCI** → H_2^+

Enterprise attraction:
1. Enterprise: the number of enterprises
2. Employees: the number of employees in enterprises
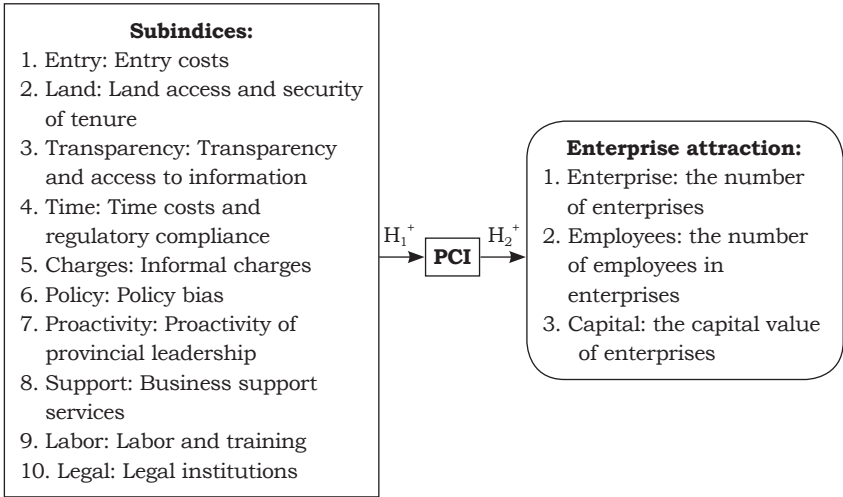3. Capital: the capital value of enterprises

FIGURE 1
RESEARCH MODEL

identify three main components of enterprise attraction: the number of enterprises operating in the province (enterprise/km^2), the number of employees working in enterprises in the province (persons/km^2), and the capital value of enterprises operating in the province (billions VND/km^2). However, because the PCI variable is the observable variable, which is a linear combination of 10 subindices based on given weights, we do not extract it from the factor analysis as a latent variable. In this study, the PCI is a dependent variable affected by 10 subindices and is an independent variable that affects the enterprise attraction variable. In observed variable commonly acts as the dependent and independent variable in the SEM from previous studies (Chaudhary *et al.* 2009; Jones *et al.* 2014).

The next stage is the evaluation of the whole fitting model and individual models, consisting of the following tasks. First, correlation analysis is used to identify potential relationships between variables in SEM. This process includes examining the correlation between the 10 subindices and the PCI variable, between three proxies of enterprise attraction, and between the PCI and three proxies of enterprise attraction. These correlations are expected to be statistically significant. Second, evaluating the model's convergent validity involves three tests: reliability of items, construct composite reliability, and average variance extracted (AVE) (Fornell and Larcker 1981). The reliability of items is measured by factor loadings, which should be equal to 0.7 and above (Hair *et al.* 2010). Nunnally and Bernstein (1994) suggest that the composite reliability should be 0.7 and above. A value of 0.5 or higher for the AVE is considered adequate (Segars 1997). Convergent validity evaluation is performed only for latent variables, which is why we proceed only with the measurement model of enterprise attraction. Third, CFA with the maximum likelihood method is used to test the model fit for full SEM. Kline (2015) suggests that SEM is acceptable and compatible when at least four tests among chi-square, goodness of fit index (GFI), relative fit index (RFI), normed fit index (NFI), incremental fit index (IFI), Tucker-Lewis index (TLI), comparative fit index (CFI), and root mean square error of approximation (RMSEA) are satisfactory. Finally, the estimated model coefficients are used to describe the relationships between the variables in the models and to show that the PCI positively affects enterprise attraction. Ten subindices are expected to solidly explain the variability of the PCI.

In Vietnam, many provinces are inherently more attractive to

businesses than others. The central cities and their vicinities, especially the Southeast region and the Red River Delta, are the country's economic centers with concentrated enterprise density. As a result, on the basis of data on enterprise density in 2013, we divide 63 provinces into two groups—31 with higher enterprise density (called *developed provinces* because such provinces are more economically developed) and 32 with lower enterprise density (called *less developed provinces*)—to conduct a multigroup analysis of these two groups. Such a multigroup analysis allows the effect of PCI on enterprise attraction to be elucidated more explicitly because it can minimize the effect of the inherent factors due to the difference between the group with high enterprise attraction and the group with low enterprise attraction.

IV. Results

A. Change tendencies of PCI and enterprise attraction from 2013 to 2020

Table 2 illustrates the change tendency of the PCI, its subindices, and enterprise attraction. Figure 2 depicts the distributions of the PCI and the proxies of enterprise attraction by province in 2013 and 2020. As shown in Table 2, the average PCI exhibited a gradual increase from 2013 to 2019, followed by a slight decrease in 2020, potentially due to measures implemented to combat the COVID-19 pandemic. Generally, PCI changed positively toward yielding a favorable business environment. Figure 2 shows that provinces with low PCI in 2013, such as the Northwest and the Central regions, significantly improved their PCI. While some provinces experienced a PCI increase, others witnessed a decrease within several years. These results suggest that the PCI is associated with the actions of provincial authorities rather than geographic location. The PCI growth was primarily driven by seven of the 10 subindices—transparency and access to information, time costs and regulatory compliance, policy bias, proactivity of provincial leadership, business support services, labor and training, and legal institutions—which demonstrated an increasing trend during the examined period. Meanwhile, the remaining three subindices—entry costs, land access and security of tenure, and informal charges—showed erratic fluctuations without a clear tendency.

Similar to the PCI, the proxies of enterprise attraction also experienced an increasing period from 2013 to 2020, except for

TABLE 2
INDICATORS OF PCI AND ENTERPRISE ATTRACTION FROM 2013 TO 2020

Indicators	2013	2014	2015	2016	2017	2018	2019	2020
Subindices								
Entry costs	7.53	8.30	8.42	8.50	7.80	7.39	7.32	7.76
Land access and security of tenure	6.80	5.81	5.92	5.77	6.29	6.59	6.86	6.66
Transparency and access to information	5.65	6.05	6.17	6.24	6.30	6.22	6.68	5.86
Time costs and regulatory compliance	6.31	6.55	6.65	6.58	6.55	6.82	6.93	7.74
Informal charges	6.51	5.05	5.13	5.33	6.55	6.01	6.24	6.59
Policy bias	5.60	5.15	4.93	5.05	5.13	5.76	6.39	6.69
Proactivity of provincial leadership	5.54	4.57	4.68	4.88	5.53	5.70	6.38	6.37
Business support services	5.24	5.62	5.57	5.49	6.50	6.47	6.22	6.05
Labor and training	5.41	5.80	5.76	6.00	6.42	6.35	6.68	6.49
Legal institutions	5.57	5.81	5.78	5.46	5.89	6.22	6.63	6.77
PCI	57.78	58.07	58.32	58.89	62.40	63.31	65.66	64.38
Enterprise attraction								
Number of enterprises (*enterprise/km²*)	2.32	2.52	2.77	3.17	4.13	4.53	4.82	5.15
Employees in enterprises in the province (*persons/km²*)	69.82	74.09	80.04	87.54	91.47	92.91	95.03	93.55
Capital of enterprises in the province (*billion VND/km²*)	93.73	104.15	114.47	124.69	146.95	178.06	202.05	225.71

Source: Adopted from PCI Vietnam and GSO Vietnam from 2013 to 2021

employees in enterprises, which exhibited a slight decrease in 2020. The decrease in the number of employees in 2020 could be attributed to the anti-COVID-19 policies implemented that year, such as isolation, social distancing, and personnel reduction in many enterprises. Table 2 shows that enterprises in the provinces increased in quantity and in scale by employee and capital value during the examined years. The average growth rates of the number of enterprises and the capital value of enterprises were similar, being 12.31% and 13.45%, respectively, and significantly higher than that of the employees in enterprises (4.33%). Enterprise attraction differs across provinces. Figure 2 shows that many provinces had higher enterprise attraction than the others on all three

FIGURE 2
SITUATIONS OF PCI AND ENTERPRISE ATTRACTION BY PROVINCE IN 2013 AND 2020

indicators—the number of enterprises, the employees of the enterprises, and the capital value—in both 2013 and 2020. Provinces with a high number of enterprises also had more employees in enterprises and greater capital value, and vice versa. This finding reveals the close relationship between the proxies of enterprise attraction. The locals with high enterprise attraction were the central cities and their vicinities, especially the Red River Delta region (the Northeast region on the map) and the Southeast region.

The descriptive statistical results in Table 2 indicate a relative coincidence in the change trends observed for the PCI, its subindices, and enterprise attraction, which may suggest potential relationships between these variables. The situation depicted in Figure 2 provides a view of the distribution of the PCI and enterprise attraction across the country. Further analyses, including correlation analysis and SEM, will consolidate these relationships.

B. Correlations between the PCI, subindices and enterprise attraction

Table 3 reveals that the PCI significantly correlates with all its subindices. More specifically, the PCI correlates positively with nine of the 10 subindices, including land access and security of tenure, transparency and access to information, time costs and regulatory compliance, informal charges, policy bias, proactivity of provincial leadership, business support services, labor and training, and legal institutions. However, the PCI negatively correlates with entry costs. Yet the correlation analysis alone is not sufficient to fully elucidate the proper relationships between these indicators because it places them under relaxed constraints. Therefore, correlation analysis is mainly used to investigate the potential relationships between the variables and provide the basis for deducing the proper relationships between the variables in SEM. The result of correlation analysis suggests the suitability of investigating the causal pathways of the subindices on PCI, as illustrated in our research model (Figure 1). Furthermore, the results reveal potential correlations among the subindices, which are accounted for by establishing correlations among the errors of the subindices in SEM to more consistently estimate the correlations between variables.

Similarly, Table 4 reveals a potential relationship between the PCI and the proxies of enterprise attraction. Specifically, the PCI positively correlates with all proxies, namely, the number of enterprises, the employees in enterprises, and the capital value of enterprises. This finding supports the appropriateness of the study model presented in Figure 1, which incorporates the correlation between the PCI and enterprise attraction. In addition, the result suggests a potential relationship among the three proxies, providing further evidence for creating a latent variable (*i.e.,* enterprise attraction) that combines the three proxies into a single construct.

TABLE 3

CORRELATIONS BETWEEN PCI AND SUBINDICES

	PCI	Entry	Land	Transparency	Time	Charges	Policy	Proactivity	Support	Labor	Legal
PCI	1.00										
Entry	−0.21***	1.00									
Land	0.49***	−0.24***	1.00								
Transparency	0.49***	0.03	0.07	1.00							
Time	0.54***	0.07	0.52***	0.08*	1.00						
Charges	0.59***	−0.21***	0.67***	0.02	0.63***	1.00					
Policy	0.44***	−0.24***	0.51***	0.01	0.48***	0.48***	1.00				
Proactivity	0.71***	−0.21***	0.64***	0.25***	0.58***	0.68***	0.58***	1.00			
Support	0.59***	−0.27***	0.04	0.20**	0.06	0.13***	0.01	0.14***	1.00		
Labor	0.65***	−0.20***	−0.03	0.28**	0.03	0.08	−0.05	0.23***	0.44***	1.00	
Legal	0.58***	−0.10***	0.46***	0.21**	0.54***	0.44***	0.50***	0.61***	0.08*	0.15***	1.00

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

TABLE 4

CORRELATION BETWEEN THE PCI AND ENTERPRISE ATTRACTION

	PCI	Enterprise	Employees	Capital
PCI	1.00			
Enterprise	0.20***	1.00		
Employees	0.21***	0.94***	1.00	
Capital	0.20***	0.97***	0.94***	1.00

*** $p < 0.01$

C. Effect of the PCI on enterprise attraction

Figure 2 summarizes the effects of the subindices on the PCI and the effects of the PCI on enterprise attraction for the pooled data from 2013 to 2020. To verify these results, we conduct tests for the model's validity and demonstrate them in Tables 5 and 6. Table 5 presents the results of evaluating the model's convergent validity, including those obtained by three tests: reliability of items, construct composite reliability, and AVE. The upper part of Table 5 is the result of the pooled sample, and the rest are the samples of the multigroup analysis divided into the sample of developed and less developed provinces. The findings demonstrate that all factor loadings surpass the recommended minimum of 0.7,

TABLE 5

RESULTS OF CONVERGENT VALIDITY CHECK

	Factor loading	AVE	Composite reliability
Pooled sample			
Enterprise density	0.99		
Employees in enterprises in the province	0.95	0.95	0.98
Capital of enterprises in the province	0.98		
Sample of developed provinces			
Number of enterprises	0.99		
Employees in enterprises in the province	0.96	0.95	0.98
Capital value of enterprises in the province	0.98		
Sample of less developed provinces			
Number of enterprises	1.00		
Employees in enterprises in the province	0.77	0.74	0.89
Capital value of enterprises in the province	0.80		

TABLE 6
TESTS FOR MODEL FIT

Model fit index	Acceptable value	Pooled sample	Multigroup samples
Chi-square fit (p-value)	< 0.05	0.00*	0.00*
GFI	> 0.90	0.95*	0.91*
NFI	> 0.90	0.97*	0.94*
RFI	> 0.90	0.94*	0.88*
IFI	> 0.90	0.98*	0.95*
TLI	> 0.90	0.95*	0.90*
CFI	> 0.90	0.98*	0.95*
RMSEA	< 0.08	0.09	0.08

* Acceptable value

which aligns with the guidelines for both the pooled sample and the samples used in the multigroup analysis. Similarly, the construct composite reliability and AVE for all samples are above the minimum of 0.7 and 0.5, respectively. These results suggest that the model's convergent validity is satisfactory.

Table 6 illustrates the test results of the model fit for the pooled sample model and the models of multigroup analysis. The results show that seven of eight indices—chi-square, GFI, RFI, NFI, IFI, TLI, and CFI—satisfy the recommended guidelines, and only RMSEA is at least 0.08. Although Hu and Bentler (1999) recommend that RMSEA be less than 0.08, some scholars argue that RMSEA may be greater than 0.08 (Kenny *et al.* 2015). More importantly, Kline (2015) notes that SEM can be acceptable if at least four of the eight fit indices meet the recommended thresholds. These results allow us to assert that the SEM employed in this study is appropriate.

D. Effects of subindices on PCI

The left part of Figure 3 illustrates the effect of the subindices on the PCI in the pooled sample model. Table 8 describes the effect of the subindices on the PCI and the effect of the PCI on enterprise attraction in three models: the pooled sample, the sample of developed provinces, and the sample of less developed provinces. The results show that all subindices positively affect the PCI at a significance level of 1%. The model's squared multiple correlation is 0.99 (Table 8, Panel A), which means that the subindices can explain 99% of the variation in the PCI.

This result shows that the SEM of this study produces a consistent estimate of the PCI when a linear combination of the subindices calibrates the PCI. In the PCI calibration, the VCCI converted the survey data so that all the subindices positively contributed to the PCI. Therefore, an estimate that produces a negative association between the PCI and its subindices would be biased. Correlation analysis (Table 3) produces a negative correlation between the PCI and the entry cost indicator, which differs from the proper relationship between the PCI and its subindices. With the proper contribution of the subindices to the PCI and the estimated results taken into consideration, SEM appears to be a more plausible methodology in this study than correlation analysis.

With regard to the effect of the subindices on PCI, Table 8 shows five subindices with higher standardized regression weights; these five subindices are labor and training, business support services, transparency and access to information, informal charges, and policy bias. In contrast, five subindices with lower regression weights are time costs and regulatory compliance, proactivity of provincial leadership, legal institutions, land access and security of tenure, and entry costs. This finding means that five subindices—labor and training, business support services, transparency and access to information, informal charges, and policy bias—affect the PCI more than the remaining five subindices. Specifically, a one-point increase in labor and training, business support services, transparency and access to information, informal charges, and policy bias will increase the PCI by 2.03, 1.84, 1.90, 0.71, and 0.58 points, respectively. Meanwhile, a one-point increase in time costs and regulatory compliance, proactivity of provincial leadership, legal institutions, land access and security of tenure, and entry costs will increase the PCI by just 0.60, 0.55, 0.51, 0.64, and 0.47 points, respectively (Figure 3). Furthermore, the descriptive statistical analysis (Table 3) shows that the average scores of labor and training, business support services, transparency and access to information, informal charges, and policy bias are significantly lower than those of the remaining five subindices. The results of the multigroup analysis between developed and less developed provinces also show that the magnitude order of the standardized regression weights of the subindices remains consistent. This finding indicates that the contribution of the subindices to the PCI remains stable regardless of whether the province is developed or less developed. The results of SEM and descriptive statistical analysis imply that the future policy for

improving PCI should be established prior to increasing the scores of labor and training, business support services, transparency and access to information, informal charges, and policy bias.

E. Effect of PCI on enterprise attraction

Table 7 demonstrates the effect of the subindices and of the PCI on enterprise attraction estimated by regressing the factor scores of enterprise attraction on the subindices and the PCI, consisting of three models: pooled sample, developed province, and less developed province. The results show that the PCI has a significantly positive effect on enterprise attraction in three models, with the PCI having a greater explanatory power (R^2) in the model of less developed provinces. This result is in line with the expectation. Most subindices positively correlate to enterprise attraction; however, some are statistically insignificant. Some variables show a negative correlation (*i.e.*, entry costs and legal institutions in the model of less developed provinces). Similar results appeared in the research of Le and Duy (2021), with some subindices being insignificantly or negatively correlated with enterprise attraction. Nevertheless, this result does not necessarily imply that some subindices do not have an effect or that they have a negative impact on enterprise attraction. Indeed, the subindices were converted to be positively correlated with PCI, reflecting a favorable environment for enterprise development. The results of correlation analysis (Table 3) and SEM (Figure 3 and Table 8) show a strong positive correlation between the subindices and the PCI. Therefore, when the PCI shows a strong positive correlation with enterprise attraction in all analysis results (Table 4, 7 and 8, and Figure 3), a negative association of a subindex with enterprise attraction (Table 7, Panel A) is probably a chance. The PCI comprises multiple subindices. Thus, when a certain subindex has a lower value than others and the PCI, other subindices serve as determinants of enterprise attraction, thus resulting in a negative correlation between that subindex and enterprise attraction. We check the total effects of subindices by summing their coefficients in each model. The results show positive values in all models, implying that the total effect of subindices on enterprise attraction is positive. Therefore, it is not advisable to rely solely on the correlation results of individual subindices with enterprise attraction to conclude the relationship between each subindex and enterprise attraction because
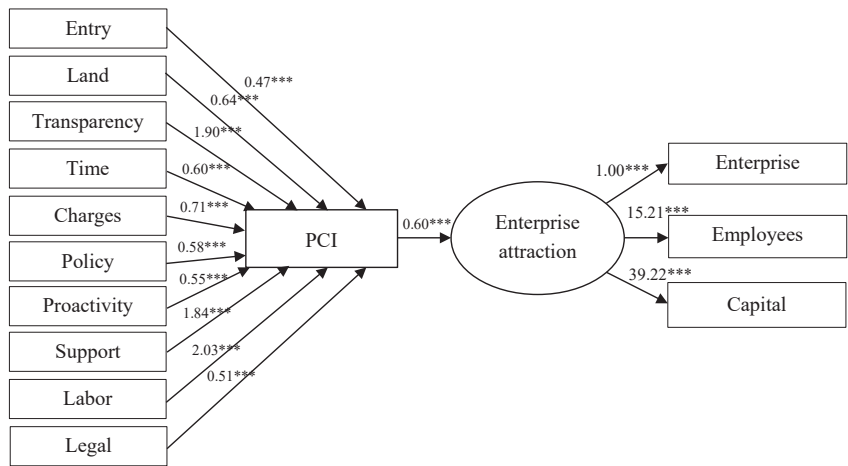
TABLE 7

RESULTS OF LINEAR REGRESSIONS OF THE EFFECTS OF SUBINDICES AND OF THE
PCI ON ENTERPRISE ATTRACTION

Variables	Coefficients		
	Pooled sample	Developed provinces	Less developed provinces
Panel A: Effect of subindices on enterprise attraction			
Entry	0.020	0.067**	−0.003**
Land	0.036*	0.066*	−0.003
Transparency	−0.024	−0.033	−0.002
Time	0.062*	0.109	0.005**
Charges	−0.011	0.000	−0.001
Policy	0.006	0.001	0.003**
Proactivity	0.025	0.048	0.002**
Support	0.028**	0.054*	0.002
Labor	0.032**	0.065*	0.008**
Legal	0.009	0.011	−0.002**
Constant	−1.189**	−2.296**	−0.357***
R_Squared	0.134	0.231	0.376
p-value of model	0.000	0.000	0.000
Panel B: Effect of PCI on enterprise attraction			
PCI	0.019***	0.038***	0.002***
Constant	−1.148***	−2.079***	−0.421***
R_Squared	0.088	0.170	0.239
p-value of model	0.000	0.000	0.000

Dependent variable is factor scores of enterprise attraction; the models of fixed-effects regression; $*p < 0.01$, $** p < 0.05$, $*** p < 0.01$

it may not provide a comprehensive and accurate understanding of the phenomenon.

A more comprehensive and precise assessment of the association between provincial competitiveness and enterprise attraction can be attained by integrating the subindices within their aggregate index (PCI) and analyzing their interplay with other subindices. This approach can be efficiently accomplished through SEM. The right part of Figure 3 illustrates the effect of PCI on enterprise attraction and the relationship between enterprise attraction and its proxies. SEM shows that the PCI positively affects enterprise attraction. This result is in line with our initial hypotheses. Enterprise attraction is an unobservable variable;

The values are unstandardized regression weights (coefficients),*** p < 0.01.

FIGURE 3

STRUCTURAL EQUATION MODELING OF PCI, SUBINDICES, AND ENTERPRISE ATTRACTION

thus, establishing the relationship between this variable and its proxies is crucial to elucidate the effect of the PCI on enterprise attraction.

Table 8 shows that the positive impact of enterprise attraction is evident across all its proxies, as indicated by high squared multiple correlations ranging from 0.91 to 0.97. This finding means that enterprise attraction can explain from 91% to 97% of the variation in each proxy: the number of enterprises, the employees in enterprises, and the capital value of enterprises. The magnitude order of the standardized regression weights in the model is the number of enterprises, the capital value of enterprises, and the employees in enterprises, with 0.99, 0.98, and 0.95, respectively. This result implies that through enterprise attraction, the magnitude order of the effect of the PCI on enterprise attraction is the number of enterprises, the capital value of enterprises, and the employees in enterprises. In other words, increasing the PCI will increase the number of enterprises more than the capital value of enterprises and the employees in enterprises.

The unstandardized regression weight in the model of the effect of the PCI on enterprise attraction is 0.6, and those in the model of the effect of enterprise attraction on the number of enterprises, the employees in

RESULTS OF SEM FOR POOLED SAMPLE AND MULTIGROUP (DEVELOPED PROVINCES
AND LESS DEVELOPED PROVINCES

Variables	Standardized regression weights		
	Pooled sample	Developed provinces	Less developed provinces
Panel A: Dependent variable is PCI			
Entry	0.08***	0.08***	0.08***
Land	0.12***	0.12***	0.12***
Transparency	0.24***	0.25***	0.25***
Time	0.13***	0.10***	0.13***
Charges	0.17***	0.15***	0.18***
Policy	0.15***	0.17***	0.15***
Proactivity	0.13***	0.14***	0.14***
Support	0.33***	0.33***	0.36***
Labor	0.41***	0.40***	0.36***
Legal	0.11***	0.11***	0.12***
Squared Multiple Correlations (R^2)	0.99	0.99	0.99
Panel B: Dependent variable is enterprise attraction			
PCI	0.20***	0.15***	0.52***
Squared Multiple Correlations (R^2)	0.04	0.02	0.27
Panel C: Effect of enterprise attraction on enterprise, employees, and capital			
Enterprise	0.99***	0.99***	1.02***
Employees	0.95***	0.96***	0.77***
Capital	0.98***	0.98***	0.80***
Squared Multiple Correlations (R^2) for Enterprises density	0.97	0.96	0.64
Squared Multiple Correlations (R^2) for Employees	0.91	0.91	0.59
Squared Multiple Correlations (R^2) for Capital	0.97	0.97	1.00

the enterprise, and the capital value of enterprises are 1.00, 15.21, and 39.22, respectively. These weights allow us to estimate the net effect of the PCI on the number of enterprises, the employees in enterprises, and the capital value of enterprises. For example, when the PCI increases by one point, the number of enterprises increases by 0.60 × 1.00 = 0.6 (enterprise/km^2), the number of employees in enterprises increases by 0.60 × 15.21 = 9.3 (persons/km^2), and the capital value of enterprises

increases by $0.60 \times 39.22 = 33.53$ (billion VND/km^2). Throughout the PCI, we can estimate the effect of subindices on enterprise attraction. For example, when the entry costs index increases by one point, the number of enterprises increases by $0.47 \times 0.60 \times 1.00 = 0.28$ (enterprise/km2), the number of employees in enterprises increases by $0.47 \times 0.60 \times 15.21 = 4.29$ (persons/km^2), and the capital value of enterprises increases by $0.6 \times 39.22 = 11.06$ (billion VND/km^2). However, the PCI weakly explains the change in enterprise attraction at only 4% (Table 8). The distribution graphics of PCI and enterprise attraction (Figure 2) reveal considerable variation in the intrinsic level of enterprise attraction across regions. To further elucidate the relationship between the PCI and enterprise attraction, we employed multigroup analysis to assess the effect of PCI more explicitly.

The results of the multigroup analysis show that the magnitude order of the unstandardized regression weight of the variables, *i.e.*, the number of enterprises, the employees in enterprises, and the capital value of enterprises in both groups, remains the same. PCI still retains a more substantial effect on the number of enterprises than on the remaining two variables in less developed and developed provinces. Notably, the standardized regression weight of the PCI on enterprise attraction is significantly higher in less developed provinces than in developed provinces. Similar to the regression results (Table 7), the PCI's ability to explain the variability of enterprise attraction is significantly greater in less developed provinces at 27% compared with 2% in developed provinces (Table 8). These results suggest that the impact of the PCI on enterprise attraction is more significant in less developed provinces, indicating that the PCI plays a more crucial role in attracting enterprises to these regions.

V. Conclusion and Discussion

This study documents various notions of national and regional competitiveness and finds that the most common metric of national and regional competitiveness is the creation of a favorable business environment for enterprises regardless of diversity in notions and measurement indicators due to time and contexts. Unlike previous studies, this study provides empirical evidence of the effectiveness of a high competitiveness index in attracting enterprises through flexible application of quantitative analysis. By utilizing data on the PCI and

enterprises from official sources in Vietnam between 2013 and 2020, our study summarizes the current situation of the PCI and the proxies of enterprise attraction: the number of enterprises, the employees in enterprises, and the capital value of enterprises across the country during the examined period. Through descriptive analysis and SEM, our study determines the relationship among the PCI, its subindices, and enterprise attraction. These findings provide practical implications for policymakers and subsequent researchers.

Our study finds that the PCI of provinces significantly increased from 2013 to 2020, with a more pronounced increase in provinces with lower initial PCI scores in 2013. The PCI tends to be highly contingent on local authorities' actions rather than geographic factors. A province with a low PCI in a remote region can significantly improve its PCI within one or several years, whereas a province with a high PCI may drop its PCI within a corresponding time. In light of the analysis results, we recommend regular improvement and maintenance of PCI. Our SEM reveals that in the relationship with the PCI and enterprise attraction, the subindices of labor and training, business support services, transparency and access to information, informal charges, and policy bias directly impact PCI (then impact enterprise attraction) more strongly than time costs and regulatory compliance, proactivity of provincial leadership, legal institutions, land access and security of tenure, and entry costs. In addition, the descriptive statistical analysis shows that the average scores of the subindices labor and training, business support services, transparency and access to information, informal charges, and policy bias are significantly lower than those of the remaining five subindices. On the basis of these findings, we recommend that local authorities prioritize improving these subindices in the short term.

The distribution graphics of enterprise attraction reveal a disparity among provinces. The central cities and their vicinities, the provinces in the Red River Delta, and the Southeast region (the developed provinces) have a higher number of enterprises, employees in enterprises, and capital value of enterprises than the rest of the country does. This condition implies that the government should implement more policies that encourage enterprises' investment in the less developed provinces. Simultaneously, the local authorities of less developed provinces should take more actions to improve the PCI because our findings demonstrate that the PCI can efficiently work in less developed provinces. Our

results also reveal that the PCI may be more attractive to small-scale firms than to large-scale firms because the SEM result indicates that the PCI more significantly impacts the number of enterprises than the number of employees and the capital value of enterprises.

SEM in our study is a more robust method than the correlation analysis employed in prior research to elucidate the effect of the PCI on enterprise attraction. Our study thereby provides a novel methodology for further studies evaluating the effectiveness of PCI.

However, this study still has some unavoidable limitations. Although our study proves that the PCI can attract enterprises for locals, the explanatory power of the model remains limited. This condition also indicates that many other underlying factors that influence enterprise attraction remain unexplored. Although we attempt to overcome this limitation with multigroup analysis, we conduct multigroup analysis between developed and underdeveloped provinces only due to data limitations. Conducting further studies that investigate additional factors, such as national or regional development planning, and updating the indicators to specifically appeal to enterprises, particularly large-scale firms, holds significant importance.

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