

Government Support Index and Public Support for Public-Private Partnerships in Asian Countries

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ABSTRACT: The purpose of the study is to assess the level of government support for Public – Private Partnership (PPP) in Asian countries, identify the main factors affecting it and assess their impact on the implementation of PPP projects. The study covers 15 Asian countries. As a methodological basis, the PPP Government Support Index (GSI) was developed and calculates according to five criteria: regulation, institutions, maturity, investment and business climate and financing. Different initial data were normalized to a single 0-2 scale, and measurements were combined with the corresponding weight. The stability of the index was tested using alternative weighting scenarios. The results showed that there are significant differences in the level of government support for PPP among Asian countries. The stability analysis showed that the relative positions of countries are largely maintained. The results of the study show the importance of improving the institutional and regulatory environment, the investment climate and financing mechanisms in improving the effectiveness of PPP. The updated GSI framework offers a functional and analytically sound instrument for assessing government support programs, pinpointing policy discrepancies, and overseeing focused approaches to enhance PPP management and infrastructure growth in Asia.

Keywords: Public Private Partnership (PPP), Government support index, Institutional development, PPP readiness, Infrastructure financing, Investment climate, Asia.

I. INTRODUCTION

In the last 30 years, there has been a notable evolutionary change in how Asian countries implement public infrastructure projects by economic operators. The shift from conventional public contracts has driven more attention towards investment projects and enhanced synergistic efficiency in managing infrastructure responsibilities [1]. PPPs, formed through long-term collaborations between the government and economic sectors, act as a framework for executing infrastructure projects, spanning from the project's inception to its financial structuring and final implementation [2]. PPPs are primary tools for major infrastructure projects and socioeconomic programs in various countries [3]. They are notably crucial in Asian nations because of the necessity to upgrade infrastructure and spur economic development [4]. To gauge the efficacy of state

backing for Public-Private Partnerships (PPPs), a Government Support Index was devised to evaluate the extent and quality of state assistance in executing PPP initiatives [5].

Numerous studies by scholars and organizations have analyzed the effectiveness of Government Support Indexes and their impact on socioeconomic development. For instance, the Country Readiness Index, which includes aspects of government support, legal frameworks, and institutional structure, assesses countries' readiness to implement government programs [6]. The World Bank has been active in PPP research, publishing reports and guides such as *Private Participation in Infrastructure (PPI)* and *Reference Guide to Public-Private Partnerships* [7]. It also publishes reports analyzing the status and prospects of PPPs in Asian countries, focusing on government support and regulatory frameworks [8].

A transparent and stable legal and institutional framework is essential to attract private investors and ensure long-term cooperation, considering the economic aspects and mechanisms of government support for PPPs [9]. A study of global experience in PPP government support and project implementation is crucial for successfully implementing PPP projects in developing countries and emerging markets [10]. The economic and financial aspects of PPPs, including the impact of government support on project profitability, show that financial support mechanisms such as subsidies, guarantees, and tax incentives play an important role in reducing risks and increasing the attractiveness of PPP projects [11]. PPPs also analyze the institutional and legal aspects of government support [12]. Monitoring and evaluating the effectiveness of government support and PPP projects are necessary to improve policies and practices in this area [13]. These studies and findings emphasize the importance of an integrated approach to public support for PPPs in achieving sustainable socioeconomic development. Previous studies have examined the impact of government support programs on private investments in PPP projects [14]. The results showed that direct government support programs strongly impact the attraction of private capital through PPPs.

The development of the public support index has provided a comparative overview of the main elements of the PPP's institutional framework in different countries. Verhoest noted that government support for PPPs has developed in three areas: policy formulation and political commitment, legal and regulatory frameworks, and the creation of support mechanisms [15]. The preparation and improvement of PPPs were studied. The readiness of countries to build institutional infrastructure for PPPs is necessary to support development, implementation, and outcomes [16]. The scope of government support for PPPs may include the following:

- Policy support for the active development of PPPs in every sector of the economy and a framework to provide a basis for the application of regulations.
- An outcome framework, including public sector process management capacity, legal approval processes, and stakeholders.
- A viability framework related to technical, contractual, environmental, and social viability to support project value for money and risk transfer methods.
- Bank-friendly frameworks that support contractor interests, market capacity, and financial institutions' appetites.
- A convenient pricing framework for financial institutions.
- End-user affordability, considering capital investment, operating costs, financing costs, contract requirements, and other key aspects of PPPs.

According to our study, the primary focus is on the structures and institutions developed by governments to support PPP development [17]. Based on primary data collected from 15 Asian countries, we also examined the PPPs Government Support Index as one of the main aspects of creating a favorable national environment for PPPs. In addition, a preliminary study was conducted on developing and implementing PPPs in various countries, highlighting government support activities and their links to national PPP activities. This perspective requires a multi-level analytical framework to explore the interaction of government support and other elements offered below. Public support for PPPs refers to providing infrastructure services to governments to harness the potential of high-quality, sustainable, and well-structured PPP projects through information on policy, regulation, support institutions, market improvements, investment, business climate, and financing. Government support for PPPs addresses the

following tasks: developing a specific PPP policy, establishing a special PPP unit, adopting specific procedures and defining responsibilities for PPP development and implementation, establishing a PPP structural evaluation mechanism, and financing PPPs. Governments will develop support for PPPs in five areas: policy development, political commitment, regulatory frameworks, supporting institutions, and creating a favorable investment and business climate, PPP improvement, and financing. The Government Support Index is used for PPPs to assess the current situation in the PPP's government support system and identify weaknesses. The study's novelty is that for the first time in Asian countries, the index of government support for the development of PPPs was used, and indicators different from those used in previous calculations were selected for the calculation of GSI.

II. LITERATURE REVIEW

In the international literature on assessing PPP development, several index approaches have been developed that measure PPP readiness, institutional and regulatory environments of countries, the level of market maturity, and opportunities to attract private capital. Although all these indices are aimed at assessing the favorable environment for the development of PPP, their objects of study and methodological goals are not the same. Based on the literature review, five indexes were identified: UNESCAP, Deloitte, Economist Intelligence Unit, European Investment Bank, and Koen Verhoest, among others.

The UNESCAP index is one of the first approaches; a tool aimed at assessing the government's readiness to create PPP projects. Its primary objective was to identify the areas where governments should enhance their efforts to integrate private investment into infrastructure projects. This tool's main objective is to identify institutional and investment challenges within the PPP framework, not to rank countries [18]. The Deloitte index places greater emphasis on achieving PPP perfection [19]. This approach considers the development of PPP, local geography, political climate, capital market complexity, forces that contribute to the formation of partnerships, and factors that contribute to partnership formation [20]. The Economist Intelligence Unit index is aimed at determining PPP readiness. Non-calculation of indicators such as regulatory framework, institutional structure, operational maturity, investment climate, financial resources, and subnational adjustment ratio [21]. The approach is close in content to the proposed index. Therefore, the novelty of the study lies not in the unification of indicators in the five directions, but in their re-operationalization in terms of government support and bringing them to a single comparative criterion for Asian countries. The European Investment Bank (EIB) index focuses on the quality of PPP legislation and the effectiveness of its implementation, assessing legal clarity, procurement rules, contractual arrangements, dispute resolution mechanisms, and the broader institutional environment supporting PPP enforcement [22]. Therefore, while this approach is aimed at assessing the quality of project and procedural processes, the proposed approach is intended to integrate the structural characteristics of the national-level PPPs Government support environment. Recent studies highlight the importance of legal and institutional mechanisms in ensuring the effective implementation of PPPs. It notes that the effective implementation of PPP contracts requires an appropriate legal and administrative framework, transparency, accountability, and effective institutional oversight [23]. This factor is important for assessing the regulatory, legal and institutional capacity of the public-private partnership. However, it is not aimed at developing a composite index that would allow for a comparison of government support between countries. This difference provides additional justification for developing the proposed GSI.

One of the key studies aimed at directly measuring government support is the index developed by Koen Verhoest et al. This index assessed the extent to which an institutional environment conducive to the introduction and spread of public-private partnerships has been established. However, bearing in mind that every study has its advantages and disadvantages, the parameters relating to the overall investment climate according to the UNESCAP index have been widely applied. The Economist Intelligence Unit (EIU) index characterises PPP readiness using six dimensions. The IEU does not take into account PPP policy and the Government's political commitment to implementing PPP projects, which are key elements in supporting and developing PPP projects from the perspective of public administration and public policy. The European

Investment Bank focuses on assessing the quality of PPP legislation and the effectiveness of its implementation, with measurement covering two main aspects: an evaluation of the legislative framework for PPPs and a review of legal indicators. The Deloitte index used a different set of parameters to show at what stage the country was: the latest results are defined as the level of maturity in developing PPP projects. Three of these indicators (UNESCAP, Deloitte and the EIU) are comprehensive and cover many aspects of how favourable or hindering the country's conditions are for PPP development [24]. The EIU index is much more limited in scope and focuses solely on the regulatory and legal framework. Thus, these indices qualitatively combine diverse aspects and perspectives into a single index, yet they are very difficult to interpret [25].

As a result of comparing these studies, at least three main dimensions of PPP indices were identified: first, PPP readiness; second, PPP repayment period; and third, government support for PPPs. Therefore, the existing indices measure different aspects of PPP and their results cannot be compared with one another. The main shortcoming of these studies lies in the fact that the indices are used for different purposes and according to different measurement logics. A concise index is needed for Asian countries that brings together the normative, institutional, market and financial elements of government support onto a single comparative scale, identifying each component's political weaknesses and strengths. Accordingly, the proposed PPP GSI combines five dimensions: regulatory framework, institutions, maturity, investment and business climate, and financing. The distinguishing feature of the proposed approach is that sub-indicators have been re-selected as factors describing the specific mechanisms of government support. The various original dimensions have been normalized onto a single 0-2 scale. A single composite indicator was created for the comparative assessment of Asian countries. Moreover, the proposed GSI is not limited to reflecting the country's overall PPP readiness. It enables the identification of which component of government support is undermining the national PPP's overall performance. For example, Regulations describes regulatory and contractual frameworks, Institutions describes specific institutional capacity, Maturity describes PPP experience and contractual stability, Investment and business climate describes the political and market environment, and Financing describes sovereign payment risk and private infrastructure financing opportunities. Thus, the index serves not only as a ranking function but also as a diagnostic and policy tool. Therefore, the proposed GSI scientific contribution has been restructured to assess the quality of government support for elements of pre-existing PPP readiness and PPP support in the literature, It was standardised into a single metric and applied to a comparative analysis of Asian countries.

III. METHODOLOGY

The following indicators were selected to calculate the PPP Government Support Index: PPP regulation; PPP institutions; PPP maturity; investment and business climate; financing. Each of the aforementioned indicators comprises the following sub-indicators:

- Regulation includes sub-indicators such as the quality of the regulatory and legal framework, PPP project selection criteria, transparency in contract modifications, dispute-resolution mechanisms, risk-allocation practices, interagency coordination, and regulatory stability.
- Institutions assess the strength of the PPP institutional framework, the stability and capacity of specialized PPP units, and the availability of project-preparation functions.
- Maturity captures risks related to expropriation, breach of contract, and the overall stability of long-term contractual arrangements.
- Investment and Business Climate includes political commitment to PPPs, market competition, and conditions affecting private-sector participation.
- Financing evaluates the depth of domestic capital markets, engagement of institutional investors, availability of insurance mechanisms, and risks associated with public-sector payment obligations.

The indicators were selected to cover the five main aspects of government support for the PPP. Sub-indicators for each component were selected on the principle of covering factors that influence the formulation, preparation, financing, and implementation of PPP projects. When selecting the sub-indicators,

their relevance to PPPs, comparability across countries and the availability of data were taken into account. The primary data comprised statistical and qualitative information; the qualitative data were converted into quantitative values through expert/rating assessments, and information was drawn from the reporting in the International Development Bank's database. Quantitative data were used as the primary statistical values, drawn directly from international and national statistical sources. The Quality Rating (QR) method was employed to quantify the qualitative indicators. A single assessment scale was not used in the original aggregated data. Sub indicators were collected in various original measures according to their nature: 0–1 and 0–2 qualitative ratings, 0–100-point scores, percentages and numerical indicators. In order to bring these various measures onto a single comparative scale, all the original sub indicators were converted into a uniform normalized scale from 0 to 2, where 0 denotes the lowest and 2 the highest result.

Missing data are not taken into account when processing. If data are present but the indicator does not meet the requirement and indicates a poor level, it is set to 0. The index component of the study was aimed at calculating the GSI index based on the most recent data available as of 2022, while data on projects from 1990 to 2022 were used to assess the actual historical outcomes of PPP projects. To calculate the PPP Government Support Index, the data were first normalized using the normalization method. In the Data 1 database, the sub-indicator values are aggregated across different dimensions, so a 0–2 scale was used for normalization:

$$N_{i=} \begin{cases} 2x_i, & x_i \in [0, 1] \\ x_i, & x_i \in [0, 2] \\ \frac{2x_i}{100,0}, & 0 - 100, a \text{ higher value is better} \\ 2(1 - \frac{x_i}{100}), & 0 - 100, a \text{ lower value is better} \\ \frac{2x_i}{x_{max}}, & \text{accurate quantitative indicator, high value is better} \end{cases} \quad (1)$$

where, $0 \leq x_i \leq 2$, 2 is the best result, 0 is the lowest result. That is, 0-2 is not a primary assessment scale, but a single normalization scale. These sub-indicators were aggregated into the component using the corresponding percentage weights. The PPP GSI was developed using the quality assessment method. Quality rating (QR) is a simple technique for quantifying a particular quality indicator. QR is determined by the following formula:

$$QR_i = \sum_{j=1}^n W_j N_{ij} \quad (2)$$

Where QR_i value of the compant for the indicator i ; W_j subindicator weight; N_{ij} normalized subindicator value for j .

The rating of 15 Asian countries has been determined according to the indicators that determine the PPP Government Support Index. Therefore, the corresponding weight coefficients were used for each variable. The relative weight of the main variables in the PPP Government Support Index: PPP regulation 18.2%; PPP institutions 18.2%; PPP maturity 27.2%; investment and business climate 18.2%; financing 18.2%. All sub-indicators were given a corresponding weight within their component. The following formula was used to calculate the PPP Government Support Index:

$$GSI_i = 0.182R_i + 0.182I_i + 0.272M_i + 0.182C_i + 0.182F_i \quad (3)$$

where R is Regulation, I is Institutions, M represents Maturity, C represents Investment and business climate, F represents Financing, i represents countries. To classify countries into four readiness categories, interval classification was used:

$$interval = \frac{range}{k} \quad (4)$$

where, Range denotes the difference between the maximum and minimum composite scores and $k = 4$ represents the number of classification groups (Startup, Emerging, Advanced, Mature). Based on these

calculations, 15 Asian countries were ranked to determine their relative level of government support for PPP development, providing a comparative assessment of institutional readiness and enabling the identification of key gaps across the region.

IV. RESULTS

Table 1 presents the structure for calculating the PPPs Government Support Index and its sub-indicators.

Table 1. Structure of the government support index (GSI).

Dimension	Indicators	Description
Regulation	R1. Conducive regulatory environment	PPP regulatory environment, procurement practices, appeal procedures and contract-dispute mechanisms
	R2. PPP selection criteria	Competitive bidding, selection criteria, cost-benefit analysis and value-for-money assessment
	R3. Fairness and openness of bids and contract changes	Transparency of bidding documents and contracts, unsolicited proposals and disclosure of contract changes
	R4. Conciliation schemes	Availability of conciliation mechanisms, international arbitration and independent arbitration tribunals
	R5. Regulators' risk-allocation record	Regulation and measurement of contingent liabilities
	R6. Coordination among government entities	National infrastructure planning, PPP prioritization and inter-agency coordination
	R7. Renegotiations	Transparency, procedures, termination and compensation mechanisms for contract renegotiations
	R8. Sustainability	Environmental impact, stakeholder consultation, disaster-risk management and alignment with sustainability policies
Institutions	I1. PPP institutional framework	Existence and staffing of a dedicated PPP agency and institutional capacity
	I2. Stability of PPP dedicated agency	Reporting lines, institutional independence and coordination of PPP procurement
	I3. Project preparation facilities	Project preparation facilities, preparation budgets and project development funds
	I4. Transparency and accountability	PPP registries, monitoring and reporting, project evaluation and publication of results
Maturity	M1. Experience with infrastructure PPP contracts	Number of PPP projects, PPP investment relative to GDP and project cancellation/distress experience
	M2. Expropriation risk	Experience with project expropriation and unilateral price revisions
	M3. Contract termination	Appeals, project transfer, compensation and termination procedures
Investment and business climate	C1. Political effectiveness	Effectiveness of the political and institutional environment relevant to PPP implementation
	C2. Business environment	Overall quality and attractiveness of the business environment
	C3. Political will	High-level political support and broader political support for PPPs, including attitudes toward PPPs
	C4. Competition environment in the local industry	Degree of concentration and competitiveness of the relevant local industry
Financing	F1. Government payment risk	Sovereign risk, PPP contract defaults, government guarantees and government support for low-income users

F2. Capital market for private infrastructure finance	Availability of marketable debt, PPP financing sources and sustainable finance instruments
F3. Institutional investors and insurance market	Participation of institutional investors and availability of guarantee mechanisms
F4. Currency risk	Exposure of PPP projects to foreign-exchange and currency-related risks

Source: Author's compilation based on Data 1.

The indicators for Turkey, China, India, Thailand, Indonesia, the Philippines, and Bangladesh are presented in more detail, while Tajikistan and Georgia are at the initial stage of development, so some indicators are missing. In addition, the financing indicators are incomplete in Kazakhstan, Kyrgyzstan, Mongolia, Nepal, and Vietnam because the financing problem has not been fully resolved. By calculating the average value of these indicators of the initial assessment, the leading aggregate indicators of the Government Support Index for PPPs were determined: regulation, institutions, maturity, investment and business environment, and financing values. The results are presented in Table 2.

Table 2. GSI scores for 15 Asian countries.

Indicators	Regulations	Institutions	Maturity	Investment and business climate	Financing	GSI
	18.2	18.2	27.2	18.2	18.2	
Kazakhstan	1.122	1.750	0.698	1.565	0.836	1.149
Kyrgyzstan	1.222	1.633	1.073	1.493	0.889	1.245
Tajikistan	0.896	0.867	1.064	1.085	0.727	0.940
China	1.378	1.875	1.288	1.438	1.047	1.395
Mongolia	1.111	1.417	0.557	1.147	0.716	0.951
Sri Lanka	0.625	0.717	0.842	1.244	0.742	0.835
Timor-Leste	1.326	1.450	0.501	0.952	0.550	0.915
India	1.503	1.883	1.071	1.353	1.204	1.373
Bangladesh	1.309	1.800	1.202	1.259	0.878	1.282
Indonesia	1.566	1.050	0.900	1.273	1.126	1.158
Nepal	1.035	1.492	0.961	1.344	0.599	1.075
Pakistan	0.913	1.767	1.233	1.318	0.930	1.232
Philippines	1.566	1.883	0.836	1.497	1.276	1.360
Thailand	1.719	1.933	1.093	1.512	1.550	1.519
Vietnam	1.215	1.675	1.150	1.167	0.766	1.191

According to Table 2, the results show that Thailand had the highest GSI value 1,519. It was followed by China (1,395), India (1,373), the Philippines (1,360) and Bangladesh (1,282). This indicates that the institutional and regulatory environment supporting MSME in these countries is relatively well developed. Sri Lanka (0.835), Timor-Leste (0.915), Tajikistan (0.940) and Mongolia (0.951) recorded low results. This indicates that the components of the private equity market's maturity, the investment climate or institutional support are relatively low in these countries. Kazakhstan's GSI score is 1,149, placing it at a medium level. Although the Institutions (1,750) and Financing (1,149) indicators are relatively high in Kazakhstan, the Investment and Business Climate (0,836) and Maturity (0,968) indicators lower the overall GSI level. Overall, the results indicate that there are significant differences in the level of government support for SMEs among countries. While Thailand, China, India and the Philippines demonstrate a high level of preparedness, the lower-performing countries need to further improve their institutional, market and investment environments. The final score range of the GSI values is shown in Table 3.

Table 3. Final score range of GSI values.

No	Description	PPP Government Support Index GSI range
1	Mature	$1.348 \leq \text{GSI} < 1.519$
2	Advanced	$1.177 \leq \text{GSI} < 1.348$
3	Emerging	$1.006 \leq \text{GSI} < 1.177$
4	Startup	$0.835 \leq \text{GSI} < 1.006$

According to Table 3, the highest index belongs to Thailand at 1.519, and the lowest index belongs to Sri Lanka at 0.835, with an interquartile range of 4; therefore, the interval value is: $\text{interval} = \text{range} / k = (1.519 - 0.835) / 4 = 0.171$. Based on these data, the range value of the PPPs Government Support Index was calculated, and the results are shown in Table 4.

Table 4. Range of the PPPs government support index across 15 Asian countries.

No	Countries		GSI	GSI range	Description
1	Kaz	Kazakhstan	1.149	$1.006 \leq \text{GSI} < 1.177$	Emerging
2	Kyr	Kyrgyz Republic	1.245	$1.177 \leq \text{GSI} < 1.348$	Advanced
3	Taj	Tajikistan	0.940	$0.835 \leq \text{GSI} < 1.006$	Startup
4	Chi	China	1.395	$1.348 \leq \text{GSI} < 1.519$	Mature
5	Mon	Mongolia	0.951	$0.835 \leq \text{GSI} < 1.006$	Startup
6	Lka	Sri Lanka	0.835	$0.835 \leq \text{GSI} < 1.006$	Startup
7	Tls	Timor-Leste	0.915	$0.835 \leq \text{GSI} < 1.006$	Startup
8	Ind	India	1.373	$1.348 \leq \text{GSI} < 1.519$	Mature
9	Ban	Bangladesh	1.282	$1.177 \leq \text{GSI} < 1.348$	Advanced
10	Indo	Indonesia	1.158	$1.006 \leq \text{GSI} < 1.177$	Emerging
11	Nep	Nepal	1.075	$1.006 \leq \text{GSI} < 1.177$	Emerging
12	Pak	Pakistan	1.232	$1.177 \leq \text{GSI} < 1.348$	Advanced
13	Phil	Philippines	1.360	$1.348 \leq \text{GSI} < 1.519$	Mature
14	Thai	Thailand	1.519	$1.348 \leq \text{GSI} < 1.519$	Mature
15	Viet	Vietnam	1.191	$1.177 \leq \text{GSI} < 1.348$	Advanced

The highest level of GSI maturity is observed in Thailand (1,519), followed by China (1,395), India (1,373) and the Philippines (1,360). These countries have relatively favorable institutional, regulatory and financial conditions for developing the GSI.

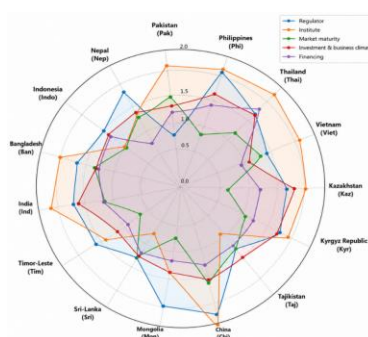


FIGURE 1. Structure of the indicators of the PPPs government support index in 15 Asian countries.

Source(s): Authors' work (Data 2).

Bangladesh (1,282), Pakistan (1,232) and Vietnam (1,191) are at an upper-middle level of development. Kazakhstan (1,149), Indonesia (1,158) and Nepal (1,075) belong to the next emerging level. Tajikistan (0.940), Mongolia (0.951), Sri Lanka (0.835) and Timor-Leste (0.915) showed low levels of entrepreneurial activity. Overall, the table shows that there are significant differences in the level of PPP readiness among countries, and that a high GSI score is positively influenced by institutional and regulatory, as well as investment and financial conditions. Figure 1 shows the structure of the key indicators of the PPPs Government Support Index in Asian countries.

According to Table 4, the ranges for calculating the public support index for PPP projects in the 15 Asian countries surveyed correspond to their differing characteristics. This indicates that there are significant differences among the indicators of PPP development. While the indicators are high in Thailand, China, India and the Philippines, Sri Lanka and Timor-Leste show low levels in market maturity and financing channels. The development of PPPs indicates the need for a comprehensive improvement of the institutional environment, the investment climate, market maturity, and financing mechanisms. Let us consider sensitivity analysis. The sensitivity analysis scenarios are given in Table 5.

Table 5. Sensitivity analysis scenarios.

Scenarios	R	I	M	C	F
Baseline	18.2%	18.2%	27.2%	18.2%	18.2%
Equal weights	20%	20%	20%	20%	20%
Maturity emphasis	17.5%	17.5%	30%	17.5%	17.5%
Financing emphasis	17.5%	17.5%	17.5%	17.5%	30%
Regulation & Institutions emphasis	25%	25%	20%	15%	15%

Several alternative weighting options were tested to assess the robustness of the results according to Table 5. These included assigning an equal 20% weight to each of the five dimensions, increasing the weight of the Maturity and Financing dimensions to 30% each, scenarios in which the Regulations and Institutions dimensions were each assigned a 25% weight. The GSI values for these scenarios, calculated for 15 Asian countries, are presented in the following Table 6.

Table 6. Calculation of GSI for sensitivity analysis scenarios.

Countries	Baseline	Equal 20%	M = 30%	F = 30%	R = I = 25%
Thailand	1.519	1.561	1.503	1.560	1.591
China	1.395	1.405	1.391	1.361	1.444
India	1.373	1.403	1.362	1.378	1.445
Philippines	1.360	1.412	1.340	1.395	1.446
Bangladesh	1.282	1.290	1.279	1.238	1.338
Kyrgyz Republic	1.245	1.262	1.239	1.216	1.286
Pakistan	1.232	1.232	1.232	1.194	1.254
Vietnam	1.191	1.195	1.189	1.141	1.243
Indonesia	1.158	1.183	1.148	1.176	1.194
Kazakhstan	1.149	1.194	1.132	1.149	1.218
Nepal	1.075	1.086	1.070	1.025	1.115
Mongolia	0.951	0.990	0.935	0.955	1.023
Tajikistan	0.940	0.928	0.945	0.903	0.925
Timor-Leste	0.915	0.956	0.899	0.905	1.019
Sri-Lanka	0.835	0.834	0.835	0.822	0.802

The sensitivity analysis results show that, although there are slight changes in the relative positions of some countries, the overall rankings of the countries with the highest and lowest scores remain largely unchanged under alternative weighting scenarios. Thailand retained the top spot in all five scenarios tested, while Sri Lanka remained among the countries with the lowest rankings. Thailand, China, India and the Philippines stayed in the top positions across all scenarios, and Kazakhstan, although its ranking varied depending on the scenario, remained in the middle group. Mongolia, Timor-Leste, Tajikistan and Sri Lanka remained in the lowest tier. Although there were some changes in the relative positions of the countries in the middle of the ranking, these changes did not affect the overall nature of the results. These results indicate that the main conclusions based on GSI are not significantly dependent on changes in the weights within reasonable limits, and that the obtained results are relatively stable.

V. DISCUSSIONS

In the Asian countries covered by the study, 4,633 projects were planned between 1990 and 2022, of which 708 are under implementation, 3,582 have been completed upon financial close, and 343 have been cancelled. (Asian Development Bank, 2023). Data on the number of PPP projects by country is shown in Figure 2.

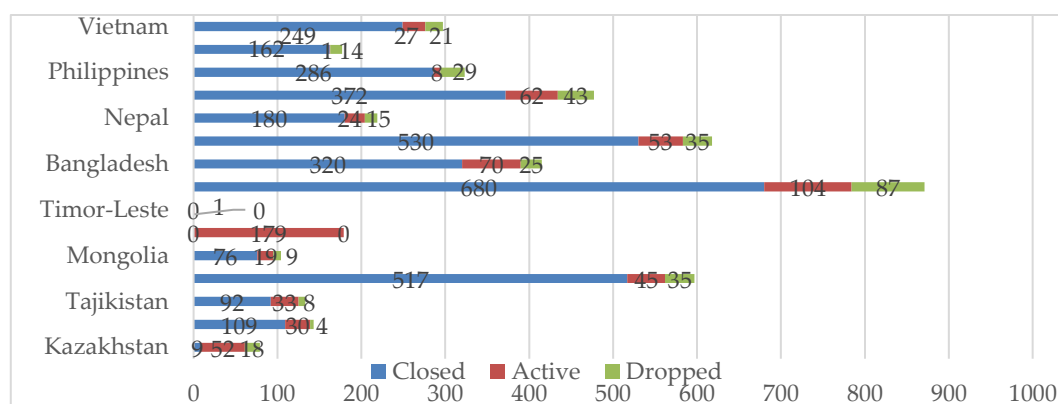


FIGURE 2. Number of PPP projects in 1990-2022.

Source: Author's calculations based on data from [8].

Countries with higher GSI scores - Pakistan, Indonesia, India, Bangladesh, the Philippines, and China - are characterized by a relatively large number of implemented PPP projects, higher financial closure volumes, and more diversified sectoral participation. This pattern suggests an association between regulatory stability, institutional capacity, the maturity of financing mechanisms, and PPP activity, but does not imply that these factors directly cause PPP expansion. Conversely, countries with lower GSI scores, including Tajikistan and Mongolia, demonstrate relatively limited PPP project portfolios. This suggests that there may be some relationship between institutional and regulatory conditions and the level of PPP project activity. This pattern suggests an association between regulatory stability, institutional capacity, financing mechanisms, and PPP activity, without implying a direct causal relationship. According to the research, there are currently 28 projects in the Philippines, 370 in Pakistan, 530 in Indonesia, and 680 in India, Bangladesh (320), China (517), Kyrgyzstan (109) and Vietnam (249) have reached financial closure, i.e. have been completed. The implemented PPP projects covered the following sectors: transport, rural development, healthcare, education, energy and other sectors. Many projects were implemented across various sectors, and information on the five specific areas of interest is presented in Figure 3.

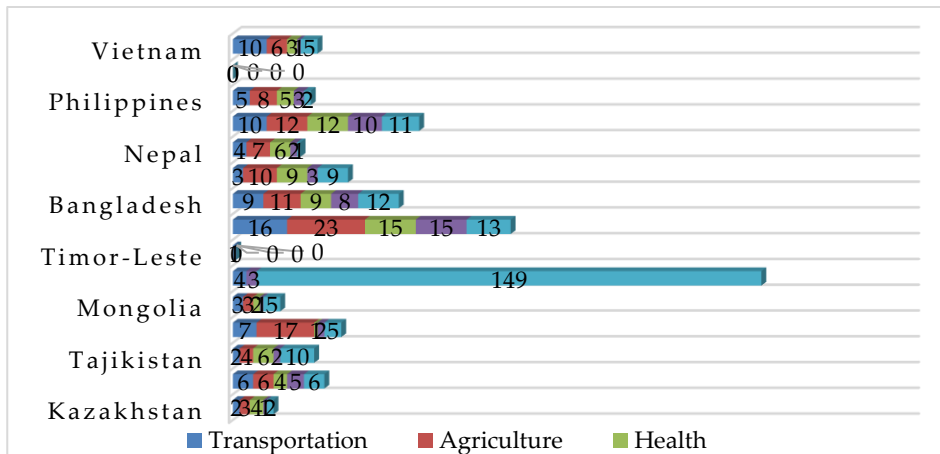


FIGURE 3. Number of PPP projects by economic sector, 1990–2022.

Source: Author's Calculations Based on Data From [8].

From 1990 to 2022, 4,633 projects were implemented in 15 Asian countries, of which 3,582 were financially closed. The financially closed projects cover agriculture, healthcare, education, transport, energy, solid household waste processing, housing, construction and other sectors. Of these sectors, only 5 have seen 554 projects reach financial close. Of these, 82 projects were implemented in transport, 110 in agriculture, 76 in healthcare, 56 in education, and 230 in energy and infrastructure. The largest projects to achieve financial close were implemented in India (82), Bangladesh (49), Pakistan (55), China (32), and Indonesia (34). Across all countries, the total investment mobilized across the five sectors under consideration amounted to USD 54,809.05 million. Figure 4 shows the volume of investment from financially closed projects across five economic sectors.

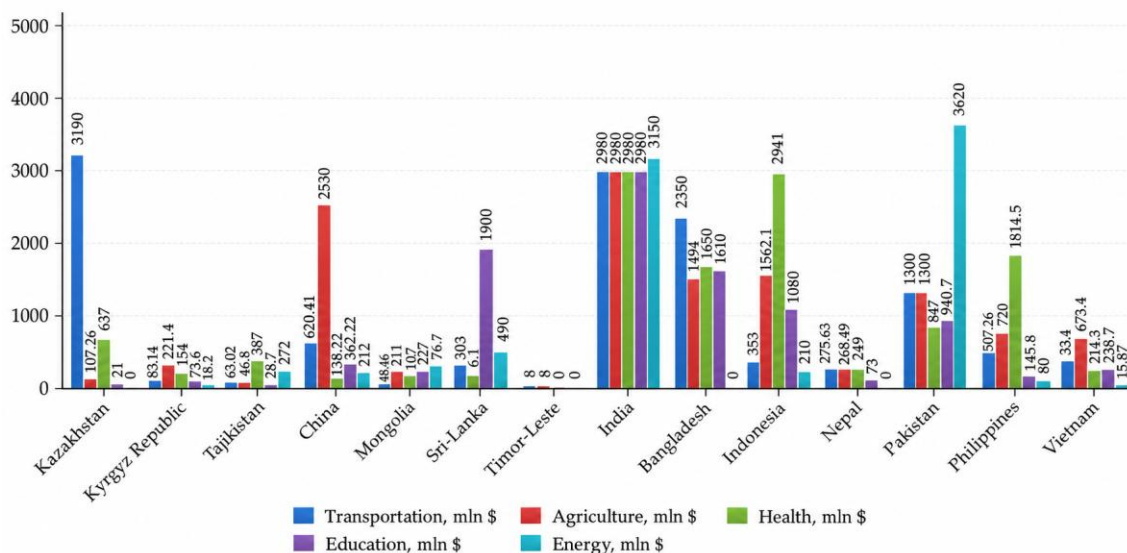


FIGURE 4. Investment volume from financially closed projects by the five sectors of the economy, in millions of dollars.

Source: Author's calculations based on data from [8].

As illustrated in Figure 4, transport accounted for USD 13,357.09 million of the total investment mobilized through PPP projects, followed by agriculture (USD 11,050.78 million), healthcare (USD 9,235.61 million), education (USD 6,986.52 million), and energy (USD 14,179.05 million). At the country level, the volume of investment mobilized varied considerably. India recorded the highest volume at USD 15,670 million, followed by Bangladesh (USD 8,350 million), Pakistan (USD 8,157.77 million), and Indonesia (USD 5,087 million). The corresponding figures were USD 3,501.26 million for Kazakhstan, USD 3,410.07 million for China, USD 3,316.03 million for the Philippines, and USD 1,351.54 million for Vietnam. In Asian countries, there are several reasons for the government's support of PPPs:

- Economic growth and infrastructural needs: Asian countries such as China, India and Indonesia have achieved significant economic growth in recent years. This growth is accompanied by increased demand for infrastructure, including roads, transport, energy systems, and water supply. PPPs provide a way to attract private investment to finance and manage projects that help governments address infrastructure needs. This growth is accompanied by an increase in demand for infrastructure such as roads, transport, energy systems and water supply. Public-private partnerships offer one way for government bodies to attract private investment to finance and manage projects that help address infrastructure needs.
- Efficiency and professionalism of the private sector: Engaging the private sector in infrastructure projects through PPPs enhances the efficiency and quality of project implementation through the professional skills, innovation and experience of private companies. This is particularly important for countries with limited government resources and administrative capacity.
- Financial constraints and budget deficits: Many Asian countries face budgetary constraints and deficits, which makes it difficult to finance large-scale infrastructure projects with public funds alone. Public-private partnerships allow the financial burden to be shared between the government and the private sector, which promotes sustainable infrastructure development.
- Support from international organizations: International organizations such as the Asian Development Bank (ADB) and the World Bank actively support the development of public-private partnerships (PPPs) in Asian countries. These organizations provide financial assistance, technical support and expertise to implement PPP projects that strengthen institutional capacity and boost investor confidence.
- Political and regulatory environment: In recent years, the political and regulatory environment for public-private partnerships has improved in Asian countries. Many countries have introduced reforms and enacted legislation to create a favorable environment for private investment in infrastructure projects. These include streamlining bureaucratic procedures, granting tax incentives and providing legal protection for investors.

Furthermore, as the analysis shows, the GSI's investment and business climate dimension is the decisive driving force behind the PPP results. Countries with strong political will, competitive local markets and open procurement systems boost investor confidence and attract substantial private capital inflows. For example, India and China, which scored highly for investment climate and project maturity, attract the largest volumes of finance, particularly in the transport and energy sectors. Conversely, countries with unstable legal environments or limited capital markets struggle to attract sufficient investment, leading to fewer or stalled PPP projects. The financial dimension of the GSI also plays a crucial role in shaping PPP indicators. Countries with relatively developed capital markets and active institutional investors, such as Thailand and India, exhibit higher financial close metrics and larger project sizes. Meanwhile, countries with low scores often face persistent financial shortfalls, forcing their governments to become heavily reliant on direct budget allocations or concessional loans. This result underscores the importance of expanding long-term financing instruments to enhance the PPP's banking attractiveness, strengthening the participation of domestic investors, and reducing the payment risk of the public sector.

Overall, the comparative analysis of GSI components and PPPs results shows that improving regulatory clarity, institutional maturity and financing capacity is crucial for enhancing PPPs indicators across the region. These results indicate a positive relationship between the quality of the government support environment and PPP outcomes. However, this relationship does not imply a causal relationship, as PPP project outcomes may also be influenced by economic scale, market size, investment conditions, and other factors.

Empirical results indicate a moderate positive relationship between the proposed GSI and PPP project outcomes. A Pearson coefficient was calculated to determine the relationship between the GSI indicator across 15 countries and the number of PPP projects that reached financial close between 1990 and 2022, and the correlation was approximately 0.61, indicating a moderate positive relationship. However, this correlation should not be interpreted as a causal relationship or as a full independent validation of the model, as the number of PPP projects also depends on the size of the country and the scale of the market, and the experience and investment intensity indicators of PPP projects are included in the Maturity component of the GSI. Accordingly, the obtained result demonstrates the construct validity of the GSI model. However, to definitively assess the index's external and predictive validity, further validation is required in future research using independent outcome measures, alternative PPP indices and econometric models.

The UNESCAP, Deloitte, EIU/Infrascope and Verhoest indices do not measure the same thing, so their absolute scores cannot be directly compared with GSI scores. This is because UNESCAP and EIU measure PPP readiness, Deloitte measures PPP maturity, while their PPP-GSI directly measures the institutional mechanisms of government support. However, the results of comparing the GSI linkages of the aforementioned indices are presented in Table 7.

Table 7. Comparison of indices.

Indices	The main object of measurement	Key dimensions	GSI connection
UNESCAP (2005)	PPP readiness	Macroeconomic environment, business and financial environment, legal and governance environment, PPP legislation, policy, institutional capacity, project selection and contracting, post-selection and social dimension	Corresponds to R, I, C and F sizes.
Deloitte (2007)	PPP maturity	Development level of the PPP market, political climate, capital market, geographical and institutional conditions, PPP activity	It is approaching the Maturity component.
EIU / Infrascope	PPP readiness and capacity	Regulation, Institutions, Operational Maturity, Investment & Business Climate, Financing	Similar to the GSI structure
Verhoest et al. (2015)	PPP Governmental Support	Policy & political commitment, legal/regulatory framework, dedicated PPP-support arrangements	It is close to the R and I components of the GSI but denotes a concept narrower than PPP readiness.
GSI	PPP government-support/readiness composite index	Regulation, Institutions, Maturity, Investment & Business Climate, Financing	Combining the main elements of the previous indices, it is reduced to a scale of 0-2

UNESCAP's 2005 tool divided 98 questions into 10 dimensions and considers the general economic environment and specific PPP issues together. Deloitte's 2007 approach is aimed at assessing the maturity level of the PPP market. EIU Infrascope assessed the PPP readiness and capability of the five key component countries. From these studies, it is reliable to conduct a comparative analysis of the EIU Infrascope 2014 calculation approach. Therefore, the result of the comparison is shown in the following Table 8.

According to the results of the EIU for 2014, India scored 70.3, Philippines-64.6, China -55.9, Indonesia - 53.5, Thailand - 50.4, Bangladesh - 49.3, Kazakhstan - 41.4, Pakistan - 41.0, Mongolia - 39.7, Vietnam - 33.1, Kyrgyz Republic - 29.5 and Tajikistan - 28.7. The four countries ranked higher in GSI - Thailand, China, India

and the Philippines-are also in the top Group in the EIU/Infrascope results. Especially in the 2018 Infrascope, Thailand-83, Philippines - 81, China - 80 and India - entered the top four places with a score of 77. Therefore, our main high-level rating of the results is in good agreement with previous EIU studies.

Table 8. Comparison of the results of GSI and EIU Infrascope.

Countries	GSI	EIU Infrascope	EIU category	Comparison
Thailand	1.519	50.4	Emerging	High
China	1.395	55.9	Emerging	High
India	1.373	70.3	Developed	High
Philippines	1.360	64.6	Developed	High
Bangladesh	1.282	49.3	Emerging	Medium-high
Kyrgyz Republic	1.245	29.5	Nascent	There is a difference
Pakistan	1.232	41.0	Emerging	Middle
Vietnam	1.191	33.1	Emerging	Middle
Indonesia	1.158	53.5	Emerging	Middle
Kazakhstan	1.149	41.4	Emerging	Middle
Nepal	1.075	-	-	Not included in EIU
Mongolia	0.951	39.7	Emerging	Low-medium
Tajikistan	0.940	28.7	Nascent	Low
Timor-Leste	0.915	-	-	Not included in EIU
Sri-Lanka	0.835	-	-	Not included in EIU

VI. CONCLUSION

The research findings revealed significant differences in the level of government support for PPPs in Asian countries. The proposed GSI index enables a comprehensive assessment of the regulatory and institutional environment, the maturity of the PPP market, the investment and business climate, and financing opportunities. Based on calculations across 15 Asian countries, the highest GSI was recorded in Thailand (1.519), China (1.395), India (1.373) and the Philippines (1.360). Kazakhstan's score corresponded to a 'present' level of 1.149. Although the institutional framework for PPPs has been established in Kazakhstan, this indicates the need for further market development and the further improvement of the investment and business environment.

Sensitivity analysis showed that the relative positions of countries are preserved under alternative weighting scenarios. This indicates that the GSI results are not dependent on the weighting method used and demonstrates the relative stability of the index. The effective development of PPP depends not only on the amount of funding, but also on a qualitative regulatory base, institutional potential, market maturity and a favorable investment environment. In this regard, the GSI index, in addition to comparing the level of government support for PPP in countries, is presented as a practical tool that allows you to identify the main areas that need to be improved in policy. The scientific novelty of the study is determined by the development of a single composite GSI index for assessing government support for PPP in Asian countries. The proposed approach does not duplicate the elements of the existing PPP readiness, maturity and government support indices, but re-operationalizes them in terms of reflecting the specific characteristics of the government support. The index combines five interrelated dimensions into one index. Different initial scales were adjusted to a single 0-2 scale and a comparative assessment was carried out for 15 Asian countries. At the same time, the index was presented not only as a rating indicator, but as a diagnostic tool for determining which components of government PPP support limit the overall result of the country. The reliability of the index was tested using alternative weighting scenarios and the stability of the main relative positions of countries was determined. Thus, the study provides a new methodological tool that allows assessing government support for PPP among Asian countries at a comparative and component level.

A certain caution is required in interpreting the results obtained. At the same time, a moderate positive correlation was found between the GSI and the number of PPP projects that reached financial closure in 1990-2022 at the level of $r=0.608$. However, this result should not be interpreted as evidence of full independent empirical validation of the index or of a causal relationship. Therefore, the proposed GSI should be regarded as the initial methodological tool for the comparative assessment of government support for PPPs in Asian countries. To provide a more conclusive assessment of the index's external and predictive validity, future research should conduct additional analyses using broader cross-country and longitudinal datasets, independent outcome indicators, alternative PPP indices, and econometric models.

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Authors Contribution

Conceptualization, S.R. and A.B.; methodology, S.R., and O.S.; software, S.R.; validation, A.B. and O.S.; formal analysis, S.R.; investigation, A.B. and A.K.; resources, B.Zh.; data curation, A.K.; writing-original draft preparation, S.R. and B.Zh.; writing-review and editing, A.B.; project administration, S.R. All authors have read and agreed to the published version of the manuscript. All authors have read and agreed to the published version of this manuscript.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript.

Data Availability Statement

The data presented in this study are available on request from the corresponding author.

Ethical Statement

No human participants, animals or personal data were involved in this study. Therefore, ethical approval and informed consent were not required.

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