Private Equity Infrastructure Investment in Emerging Infrastructure Markets

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LIST OF ABBREVIATIONS

ABA	Asian Bankers Association
ADB	Asian Development Bank
AUM	Assets Under Management
BRICS	Brazil, Russia, India and China
Capex	Capital Expenditure
EAP	East Asia and Pacific
EM	Emerging Markets
EIM	Emerging Infrastructure Markets
EMDC	Emerging Markets and Developing Countries
EMDE	Emerging Markets and Developing Emerging
EVCA	Venture Capital Association
FTSE	Financial Times Stock Exchange
FSB	Financial Stability Board
GCEC	Global Commission on the Economy
GFC	Global Financial Crisis
GPs	General Partners of the fund
GTEs	Government or Public Trading Enterprises
IBRD	International Bank for Reconstruction and Development
ICMA	International Capital Markets Association
IMF	International Monetary Funds
IRR	Internal Rate of Return
JV	Joint Ventures
L/E	Loan-to-Equity Ratio
LPs	Limited Partners of the fund
MDBs	Multilateral Development Banks
MSCI	Morgan Stanley Capital International
NDBs	New Development Banks
NCE	New Climate Economy Climate
OECD	Organization for Economic Cooperation and Development
PRIF	Pacific Region Infrastructure Facility
PE	Private Equity
PEIFI	Private Equity Infrastructure Funds Investment
PFI	Project Finance International
PPPs /P3	Public Private Partnerships
PPRFs	Public Pension Reserve Funds
PSP	Public Service Provision
PWC	Price Waterhouse Coopers
SDGs	Sustainable Development Goals
SWFs	Sovereign Wealth Funds
SPV	Special Purpose Vehicles
SSI	Semi-Structured Interviews
TFSD	Thomson Financial Securities Data
UN	United Nations
UN SDGs	(the United Nations Sustainable Development Goals),
UPEIF	Unlisted Private Equity Infrastructure Funds
VC	Venture Capital
WB	World Bank
WBGs	World Bank Groups
WEF	World Economic Forum

ABSTRACT

The development of investment in infrastructure, along with the continuing attraction of Emerging Infrastructure Markets (EIMs) for global institutional investors, has been closely associated with the increased growth in Private Equity Infrastructure Funds (PEIFs). Emerging Infrastructure Markets (EIMs) are currently experiencing an increasing demand for infrastructure to support sustainable economic and social development. In the last decade, wholesale inadequacies in national government budgets has promoted, Emerging Infrastructure Markets (EIMs) to increase the scale of the private capital to support essential infrastructure. The scale of investment need coupled with the risk profile infrastructure opportunities within EIMs has attracted global Private Equity (PE) institutional investors with investment being channelled predominantly through the PEIF model in order to avail of specialist fund manager expertise and enhanced market opportunities.

This study examines the key challenges pertaining to global infrastructure investment within EMs. The research offers an assessment of committed infrastructure funding deals in EMs as a proxy for private infrastructure investment. In addition, there is an analysis of the growth pattern across twenty-three emerging countries of PEIFs within EMs, based on Preqin data for the period Q1-2009 to Q4-2019 (for deals) and Q1-2006 to Q4-2019 (for funding vehicles). Specifically, this segment of the research affords enhanced contextualization of the investment landscape and of the behaviour of global PE institutional investors in EMs, in order to answer the following four critical questions:

1. Who have been the key PE investors within EIMs?
2. What types of infrastructure deals tend to be targeted by global PE institutional investors in EIMs?
3. Which regions/countries in EIM are the majority of global institutional investors choosing to invest?
4. Which are the most targeted infrastructure project styles[1] within EIMs?

[1] Refers to greenfield and brownfield project

The analysis reveals that EIMs are currently experiencing a significant wave of transformative growth, which has prompted additional PEIF investment across the period under examination. There has been an unprecedented growth of PEIF investment in EIM , with the aggregate number of 2,519 infrastructure deals, with a cumulative value of $632,116.51 million (USD) in the period Q1-2009 to Q4-2019. In addition, the research has shown that from within the PEIF universe 853 infrastructure investment fund vehicles managed by 405 fund managers, with a cumulative fund of $682,364.83 million (USD), have invested in EMs, or countries/regions in EIMs. This study concludes that the development of infrastructure investment markets has been fuelled by a powerful need to engage global institutional investors and fund managers in EIMs to redress the shortfall in public sector financial capacity. The growth in PEIF investment meanwhile reflects the considerable opportunities that exist within EIM infrastructure investment markets for those investors willing to absorb and capable of effectively managing the associated risks of EIM infrastructure investment.

This research also highlights international challenges currently influencing PE investment flows into infrastructure projects within emerging infrastructure markets. The interviews concerning investors' experience and knowledge of infrastructure assets reveals that EM barriers generally curtail investment and heighten risks within EIMs, namely: 1) primary financial challenges perceived in EIMs encompassing currency rate risks (foreign exchange risks); payment model/ revenue model risks; bankability; liquidity; and credit rating risks; 2) principal political challenges pertains to unstable government risks (political instability); political influences; insurance of absence of political risks (guarantees); and level of corruption; 3) absence of regulatory and policy frameworks; 4) economic volatility and social challenges; 5) sectoral (technical/industry) difficulties.

The research nonetheless demonstrates that EIMs provide significant opportunities for global institutional investors to invest in economic infrastructure assets in EIM due to number of drivers. Firstly, EIMs ensure better access to deal flows and to capture future growth market opportunities. Additionally, EIMs offer for sector specialist investors EIMs offer scope for portfolio development and expansion with contrasting risk-return profiles whilst benefiting from their sectoral specialist knowledge. In addition, the high demand for infrastructure assets in the area of EIM (e.g. the needs for power energy sector –conventional power energy or renewable power energy- in

South Africa and the needs for transport sector in Brazil).Thirdly, EIMs offer higher internal rates of return relative to developed markets entrants often able to benefit from ‘first mover advantages’ and the reduced levels of competition. Investor competence, robust due diligence along with the capacity to effectively identify, manage and off-set risk remain key fundamentals to the realisation of the infrastructure investment opportunities that EMs afford.

Keywords: *Investment, Infrastructure Investment, Challenges, Emerging Infrastructure Markets, Private Equity, Financing, Infrastructure Funds, Global Private Investors, Funds Managers, Investment Vehicle, Preqin.*

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Chapter One: Introduction and Background

1.0 Introduction and Background

1.1 Background of the research

A series of studies have highlighted infrastructure investment to be a key driver of regional growth, with well-directed investment into appropriate infrastructure serving to trigger a number of positive outcomes in respect of societal advancement and economic productivity (Elburz et al., 2017). In terms of social advancement, according to Squires et al. (2021), the development of infrastructure sectors (e.g. transport and utilities services) accelerate the growing in housing markets. At the same time, a lack of sufficient investment can contribute to a decline in the quality of public infrastructure systems, which in turn can undermine economic outcomes. Any economic development program thus needs to consider the role of infrastructure and the importance of investment.

Infrastructure investment throughout the globe requires continuous growth, with various drivers having been identified, including: firstly, the growth and regeneration of existing assets; secondly, a lack of adequate public finance for investment into capital assets; and thirdly, the shortage of public sector budgets to meet financial demands related to infrastructure assets (OECD, 2007; Biancone and Radwan, 2018).

It is critical to differentiate between emerging infrastructure markets (EIMs) and emerging economies (EE), to provide a comprehensive insight into the motivations behind the attractiveness of EIMs to multi-national corporations and global investors (Sunje and Çivi, 2008).The concept of an EIM applies to countries that are part of a developing market, and are aiming to increase their ability to invest in their own infrastructure (i.e. the infrastructure perspective is a facilitator), but whose own economies are insufficiently developed for them to do so independently (Begg et al., 2011). The most significant characteristic is that EIMs are undeveloped markets (i.e. their macroeconomic framework, market institutions, and infrastructure markets are undeveloped), which offer prospects and opportunities for global companies and

investors to play an essential role in the development process of these markets in the future (Miller, 1998; Sunje and Çivi, 2008; Bang et al., 2016).
EEs can be categorized as countries that have shown sustained development and market growth that is enhancing their status in the global economies (Yu, 2012). Notably, a number of EEs have recently experienced rapid growth, with large investments in infrastructure foundations being supported by the openness of their economies, and significant institutional development (Fincke and Greiner, 2015). Such countries typically demonstrate a relatively greater capacity to provide investors and multinational companies with opportunities to achieve higher rates of return (Karolyi and Karolyi, 2015; Tihanyi and Tihanyi, 2015). Overall, those countries classified as EEs are in a transitional phase, both structurally and economically, as their financial markets and regulatory systems are in the process of developing (Muller, 2018).

There are currently a number of issues with the potential to impact on future infrastructure projects. Given the increased pertinence of climate change, one of the primary considerations concerns the extent and nature of the environmental impact (Arndt et al., 2011). A critical injection of investment is required in emerging countries to meet the objective of creating sustainable infrastructure assets. For EMs in particular, there remain several barriers to the implementation of the concept of green growth in relation to infrastructure investment. According to Bhattacharya et al. (2015) and Inderst and Stewart (2014) further investments of circa to $250 billion over a period of 15 years (2015-2030) are required for renewable energy (i.e. water, electricity and transport). The rationale underpinning financial challenges in Emerging Infrastructure Markets focuses on: 1) local currency being linked to international currency and therefore lacking flexibility; 2) financial resources targeting basic infrastructure assets; and 3) possessing less developed financial markets than those of developed nations (Studart and Gallagher, 2018). But, despite these additional financial constraints, there remains an increasing awareness of the importance of reducing carbon emissions in Emerging Infrastructure Markets (Bhattacharya et al., 2015).

A number of barriers are faced by investors in emerging countries, which makes their decisions to invest in emerging markets doubtful (Gao et al., 2010; Della Croce, 2011; Inderst and Stewart, 2014; Percoco, 2014; Goncalves et al., 2015; Egan, 2018).

Reasons such as macro-level instability, for instance, social unrest, economic instability, political unrest, lack of knowledge and experience are the factors which make investing in Emerging Infrastructure Markets difficult. Due to macro level instability, the value of assets is weakened on returns on investment becomes completely a matter of chance. This is all linked to political and social unrest in these emerging markets. Empirical evidence has suggested that higher the economic instability, lower the investment in emerging countries. Another risk that investor face by investing in emerging nations is a slow growth rate, slowly leading towards bankruptcy. This puts their investment into danger, which is why investors avoid investing in a volatile economic environment. Factors such as good monetary policies adopted by the government low inflation rates and increased economic stability will lead to increased private investments within the country (Gao et al., 2010).

It is critical to overcome this gap in supply in order to boost the long-term economic growth and social development. In order for this to materialise, there are various challenges that need to be overcome. Although lack of infrastructure is primarily a problem in the developing world, it can also hamper the growth of developed economies. Therefore, it is critical to understand the key challenges pertaining to infrastructure funding and to find ways to rectify the same. One of the most widely present challenges is to match private sector financing with suitable long-term projects. This is because there are sufficient sources of private finance available. Institutional investors including insurance companies, large institutional investors, as well as the micro-level financiers have set aside large volumes of capital to be invested in infrastructure related projects (Ehlers, 2014). Nonetheless, the relative absence of a ‘bankable’ project pipeline with risk-return characteristics aligned to institutional investor expectations has meant that much of the money raised for infrastructure has yet to be committed (Haran et al., 2020).

Despite their appetite to invest, institutional investors often do not commit to funding infrastructure. The primary reasons for non-investment include the lack of credible long-term infrastructure projects as well as the longer time frame needed for returns to materialise. The specific financial risks to investors include government interference; the long payback and return period for infrastructure investments; the lack of clear frameworks to resolve any disputes; and the lack of effective project governance. Another critical factor hindering investment is the inherent volatility in economic conditions. This can influence the markets, and in turn the ability to undertake sustainable development (Gubbi et al., 2010; Gaur et al., 2014).These factors act to discourage investment in infrastructure (Hoskisson et al., 2013; Loxley, 2013; Percoco, 2014; Rahman et al., 2015; Osei-Kyei and Chan, 2017; Squires et al., 2021).

A considerable body of research has demonstrated the effective development and improvement generated from suitable capital asset investment in Emerging Infrastructure Markets (EIM) (Kim and Jung, 2009; Lenz et al., 2017). However, Tiryaki and dos Santos (2017) pointed out that this relationship has tended to be suspended as a result of a shortage of efficient and effective infrastructure assets in EIM. Meanwhile, Fukuda and Tanaka (2017) stated that this nexus can be detected in implications related to financial market spillovers, including the negative impact of severe financial crises acting to reduce infrastructure investment and damaging the development of economies in Emerging Markets (EM). In addition, such countries tend to continuously face the challenge of meeting a growing demand for new and improved infrastructure and services (Hayes, 2017). Nevertheless, there is considerable evidence to identify infrastructure investment in EIM as continuing to offer a solid return. This is particularly so when capital asset investments assist in incorporating institutions and firms within worldwide value chains, as well as enhancing and developing their value and strengthening their future economy by minimising levels of instability and preparing for future breakdowns (Bass, 2016). Furthermore, Caselli et al. (2015) highlighted that developed economies tend to encounter similar issues, particularly due to a framework that frequently fails to increase funding available for infrastructure investment. This emphases the need for strong technical, financial, and legal regulations to rectify this defect. Furthermore, there needs to be a recognition of a wide range of global institutional investors and fund managers, in order to establish additional efficiency when it comes to detecting a lack of funding. This would facilitate additional productivity through the ‘matching’ of opportunities for infrastructure projects with the profiles of global institutional investors and fund managers, so enhancing the potential for future investments.

A considerable number of empirical studies and professional reports have focussed on a variety of vehicles for investment into capital assets. In addition, the Preqin Report (2017) introduced additional aspects required from global institutions. These include the adequacy of capital volume specified for infrastructure investment, as well as other funds available for the required projects. Two primary methods are capable of enabling global institutional infrastructure investors to compile their resources and methods, i.e. direct or indirect investment (Inderst, 2013, 2016; Inderst & Stewart, 2014). In addition, there is a large body of diversification methods and infrastructure investment vehicles. However, over the previous century, a new wave of infrastructure investment funds in the field have tended to focus on Private Equity (PE)(Inderst, 2009).

A number of researchers have attempted to create a framework of factors impacting on global investors, with the aim of attracting them to target the capital markets and ensuring continued investment into infrastructure assets in place of project finance in EIMs (Blundell-Wignall, 2007; Groh, 2009; Rothballer and Kaserer, 2011; Mackay-Fisher, 2012; Oyedele et al., 2013; Pries and Berla, 2015; Bhattacharya et al., 2016B). PE investment is characterised by being transformational and having value-added features. Despite the developments in the PE market, including its global distribution, the majority of PE remains concentrated in the USA and the UK, representing approximately 60% of raised capital. However, Emerging Infrastructure Markets (EIMs) (e.g., Brazil, India, and China) have now begun to address this difference by creating an effective environment for PE fundraising (Dias and Macedo, 2016).

1.2 Research Aims and Objectives

1.2.1 Aim of the research

The aim of the research is to enhance understanding of the key challenges pertaining to global infrastructure investment and the impacts this has on the allocation of capital to Emerging Infrastructure Markets.

1.2.2 Research Objectives

1. To examine of the composition and structure of the global infrastructure investment universe, including the main barriers to investment flows and strategies for attracting global investment within the infrastructure industry.
2. To evaluate the theoretical perspectives that underpin the dynamics of the global infrastructure financing sector and examine the global development of investment structure and financial resources.
3. To evaluate the resources of unlisted Private Equity infrastructure Funds modes and finance vehicles.
4. To critically evaluate the main opportunities and barriers influencing global investment flows into Emerging Infrastructure Markets, and the barriers to these flows.
5. To devise a conceptual framework for global infrastructure investment within Emerging Infrastructure Markets.

1.3 Identification of Research Gap

The McKinsey and Company Report (McKinsey, 2016A) highlighted a gap in worldwide infrastructure investment, one that is currently widening. This is due to the amount of global capital invested in economic infrastructure assets (i.e. transportation, renewable energy, conventional power energy and utilities services, such as water and sewage), being recorded as approximately $2.5 trillion annually. This, however, falls short of the quantity needed (recorded as being approximately $3.3 trillion annually) to support the required rate of economic development over the next two decades. Furthermore, this gap in infrastructure investment is now widening on an annual basis. McKinsey (ibid) stated that this was primarily due to the fall in the rate of world-wide infrastructure investment, due to the sustained increase in global infrastructure demands. Moreover, persistent under-investment has prevented economic development and growth, as well as depriving countries throughout the globe of essential utilities and services (Jakob, et. al., 2016; Raji, 2017).

There remains a gap in the literature focussing on endeavours to boost infrastructure investment aimed at reducing this demand and bridging the infrastructure investment gap now globally recognised in the literature, in addition to the need to identify current global infrastructure investment drivers and challenges.

The assessment of the literature undertaken by this research follows McKinsey Report (McKinsey, 2016A) which indicated that the global prediction concerning the demand for infrastructure investment has been identified for a specific period (i.e. 2015-2030). In addition, Rumney (2015) proposed a number of methods of increasing infrastructure investment projects, including: 1) further comprehensive dimensions for financial requirements and decreasing interest rate levels; 2) a structure for urban growth; 3) endeavours to apply green infrastructure and sustainability capital assets; and 4) investment in the latest technological innovation in order to contribute to EIM development. Further solutions have also been recommended, including the necessity for the participation of the private sector in infrastructure investment. Meanwhile, the outcomes revealed a partial success, resulting in a recognition of the notable challenges and difficulties correlated with these methods, resulting in restrictions to their capacity to consider a critical challenges in EIM (Pasquali, 2015; Branchoux et al., 2018).

Moreover, in the context of EIMs, Leigland (2018) pointed out that this absence in the literature tends to be surrounded with elements influencing the needs and growth of capital assets, as well as infrastructure investment in EMs. Consequently, the gap in literature also concerns the specific performance drivers of investment and infrastructure in EIM, as well as the elements impacting on capital assets (Sullivan et al., 2010). This research therefore addresses the challenge of effectively tackling current global infrastructure investment and its implications for EIM, particularly in terms of scale and multifaceted scope.

Meanwhile, in the context of the existing knowledge gap, there is a significant dearth of empirical research and information based insight (i.e. previous studies) addressing and targeting this subject area (i.e. as efficiency to address the secondary data). Few empirical studies concern infrastructure investment in general, or specifically with regard to EMs. Furthermore, there is a notable absence of academic studies addressing the specific challenges and opportunities presented by infrastructure investment in EIMs. Accordingly, the majority of data relates to professional reports designed to assess overall economic development in EMs (e.g. financial market development, transparency, market openness, and regulations and policy) rather than exclusively the expansion of infrastructure investment.

1.4 Research Contribution

The current research contributes to perceptions about global investment in infrastructure assets, including associated challenges and difficulties, and the implications of these as barriers to entering EIMs. Additionally, it aims to provide original and in-depth insight into infrastructure investment in EIMs. The following four key research questions have been posed to achieve this:

1. Who have been the key PE investors within EIMs?
2. What types of infrastructure deals tend to be targeted by global PE institutional investors in EIMs?
3. Which regions/countries in EIM are the majority of global institutional investors choosing to invest?
4. Which are the most targeted infrastructure project styles[2] within EIMs?

This research contributes to the current knowledge concentrating on the growth of PEIF investment in EIMS, and highlights the fact that a number of EMs have gravitated towards the use of PE infrastructure investment. This has involved recognizing global institutional investors as key players in EIMs, and targeting key assets and geographical locations when forming infrastructure investment strategies for both greenfield and brownfield projects, so as to deliver crucial infrastructure development needs. A detailed exploration is provided of the chief infrastructure sectors in EIMS.

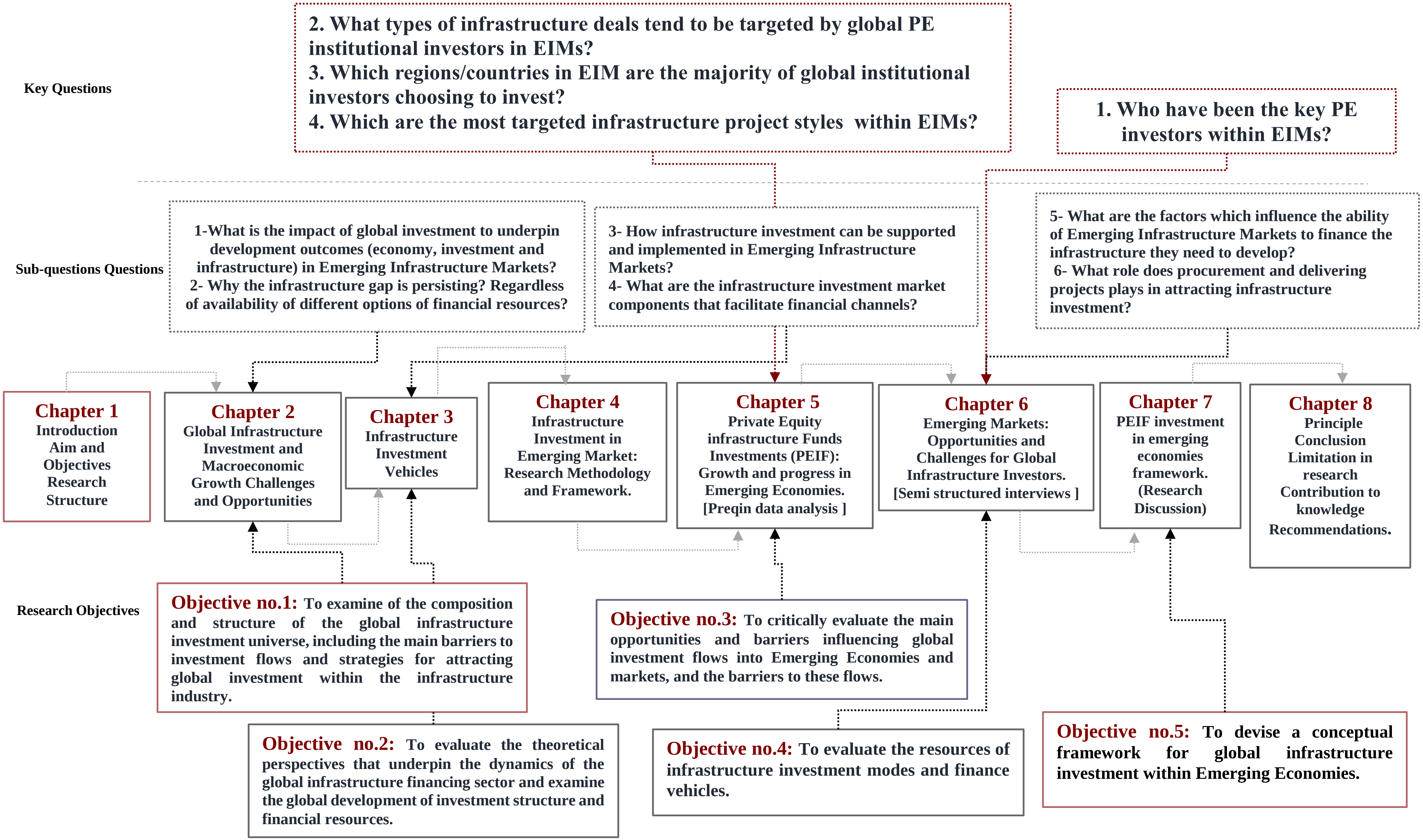
[2] Refers to greenfield and brownfield project

Furthermore, to acquire comprehensive insight into infrastructure investment in EIMS, and the associated challenges and barriers, additional research questions (i.e. sub-questions) were formulated to underpin the research:

1- What is the impact of global investment to underpin development outcomes (economy, investment and infrastructure) in Emerging Infrastructure Markets?
2- Why the infrastructure gap is persisting? Regardless of availability of different options of financial resources?
3- How infrastructure investment can be supported and implemented in Emerging Infrastructure Markets?
4- What are the infrastructure investment market components that facilitate financial channels?
5- What are the factors which influence the ability of Emerging Infrastructure Markets to finance the infrastructure they need to develop?
6- What role does procurement and delivering projects plays in attracting infrastructure investment?

The research contributes to the current knowledge focussing on global challenges impacted by the various investment flows into infrastructure assets within EMs as follows. Firstly, it examines the scale and nature of global infrastructure challenges and features impacting on the investment in EMs. Secondly, it provides a critical comprehensive perspective of the investment market in EIM, as well as key attributes concerning market transparency and openness, political and economic risks and repayment models in Emerging Infrastructure Markets. Thirdly, it delivers a comprehensive recognition of the innovative development of investment vehicles providing various methods and instruments of financing channels and new tools. Fourthly, it quantifies trends in the behaviours of global institutional investors in EMs and examines specific constraints, barriers and other issues hindering infrastructure investment flows in EIM. Finally, the study delivers a conceptual framework for addressing the nexus between global infrastructure challenges and the barriers and constraints preventing investment in EIM. The framework can serve to conceptualise and enhance understanding of the relationship between these variables, while at the same time exploring viable market solutions for enhancing investment flows into EIM, so optimising the impact of such investment in relation to key economic, social and environmental indicators (See Figure 1.1).

Figure 1.1- Key research questions and sub-questions



1.5 Research Methodology

Research consists of a process of systematic detection, with the assistance of demonstrable evidence, to explore the answers for questions raised, in order to satisfy the research objectives (Leedy and Ormrod, 2019). Furthermore, the identification of evidence depends on the selection of a suitable research methodology. Gill and Johnson (2010, p.25) stated that the realisation of a research objective forms the basis on which to select the appropriate research methodology, which is critical for establishing the research procedures. Easterby-Smith et al. (2018) viewed research methodology as a process by which data is gathered and subsequently analysed. This indicates the need for a solid nexus between the research methodology and philosophy, allowing for the identification of decisions concerning the research design. In particular, there is a need to emphasise the practicalities of the research structure, including for the appropriate analytical procedures for the interpretation of data and defining of outcomes. A number of academic researchers have concurred with Easterby-Smith et al. (2018), although Collis and Hussey (2014) emphasised the influence of research philosophy on the selection methodology (i.e. collecting data methods). Tharenou et al. (2012) and Bell and Water (2018) highlighted the importance of the analysis techniques used for the collected data for structuring the research methodology.

The process of the selection the appropriate research methodology is complex, relying on various factors comprised of: firstly, the type and nature of research; secondly, the availability and accessibility of resources; and thirdly, the examination period (Silverman, 2017). Creswell (2014) and Bryman (2016) highlighted that the overall factors and measurements defining the research methods for any academic research focuses on the nature of the research objectives and /or research problem of the study. In addition, Vogt and Johnsons (2011) noted that the methodology selected for a piece of research may not be recognised as a single approach (i.e. either right or wrong), but rather focuses on the structure of the study and the most appropriate approach for tackling the research objectives. Therefore, it is significant to establish the most effective methodology for fulfilling the study objectives, as high standards of data collection will improve the credibility of the assessment and structure the research outcomes, conclusion and recommendations. Furthermore, the selected methodology is required to channel the approaches and results of the research, as well as provide the extent of its comparability within the subject field (Saunders et al., 2015; 2016).

For the current study, the mixed method approach was considered the most appropriate for addressing the research objectives and questions, in order to ensure an in-depth examination of the underlying phenomenon. Firstly, there is a detailed literature review, encompassing: 1) academic journals and professional publications; 2) books; 3) company reports; 4) periodicals; 5) an Internet search; and 6) materials relating to specific schemes. Furthermore, Garbers (1996) stated that a literature review consists of:

> *A systematic, circumspect search to track all the published information about a specific subject in whatever terms it exits and to collect useful resources.* (Garbers, 1996, p.86)

However, McMillan and Schumacher (2014) and Grant and Osanloo (2014) identified a literature search as consisting of specific reviews of the status of information and knowledge concerning a defined subject area. The critical assessment of the literature for the current study defined the gaps in the current knowledge and specific empirical procedures in the research. According to Jankowicz (2013):

> *Knowledge is absence and does not exist in a vacuum, and research only has the value in relation to other finding studies. Research will be significant only to the extent that the results are the same as or, different from, other findings.* Jankowicz (2013, p.10)

Therefore, the literature review implements objectives one and two of the current research. The literature review encompassed the professional research reports of McKinsey (2009, 2013, 2016A; 2016B), OECD (2015B, 2017A, 2017B), and the academic studies of Inderst (2010, 2016), Branchoux et al. (2018) and Bielenberg et al. (2016), along with a number of further articles and publications addressing investment gaps and challenges relating to global infrastructure. In addition, further researchers, including Bhattacharya et al. (2010, 2012, 2013, 2015; 2016A,), Inderst and Stewart (2014), and Qureshi (2016, 2017), were considered in relation to the limited infrastructure investment in EMs and developing countries. Furthermore, the works of Della Croce et al. (2011, 2013, 2014, 2015) Oyedele et al. (2013, 2014A, 2014B), Bhattacharya et al. (2016B, 2018), and RREEF (2017A, 2017B, 2019) were reviewed in relation to unlisted PE investment vehicles and finance tools.

The research outline was based on the existing knowledge of the subject area, while recognising the key challenges, barriers, trends, and significant gaps in the field of PE infrastructure investment (PEIFI) in EIM. Furthermore (as outlined in Chapter Four), this structured the context for the empirical phase of the research formed a mixed method approach combining two primary stages. The first stage covered secondary data sources and quantitative data-outlined time series from the database discussed in **Chapter Five**, and from quantitative data moved to qualitative data (i.e. second stage of the empirical works). The second stage structured two versions of Semi-Structured Interviews (SSI-A and SSI-B), as discussed in **Chapter Six**. The plan followed a rational progression, transferring from the generalised to the specific within the context of PE infrastructure investment in EIM.

The first empirical assessment covered the investigation into the secondary data sources related to the scale and trends of PEIFI in EMs (i.e. quantitative data) obtained from the Preqin database for the realisation of Objective Three. Four primary questions were answered during the first stage of the empirical analysis:

1. Who have been the key PE investors within EMs?
2. What types of infrastructure deals tend to be targeted by global PE institutional investors in EMs?
3. Which regions/countries in EM are the majority of global institutional investors choosing to invest?
4. Which are the most targeted infrastructure project styles[3] within EMs?

The Preqin database was utilised to conduct an in-depth assessment for evaluating the PEIF investment distribution of deal flows and levels in EMs (i.e. infrastructure deal profiles) over the period in question, i.e. Q1-2009 to Q4-2019. Further analysis

[3] Refers to greenfield and brownfield project

examined the general distribution of PEIF investments seeking opportunities in EIM (i.e. fund vehicle profiles) in the period addressed, i.e. Q1-2006 to Q-4-2019.

Saunders et al. (2003) and Jankowicz (2013) highlighted that secondary data sources offer considerable advantages, including unpredicted findings allowing for the application of linear studies and comparative assessment. However, secondary data also has a number of limitations, particularly when the data fails to meet the specific requirements of the evaluation. Nevertheless, in the current research, the secondary data (i.e. the Preqin database) was improved by designing Semi-Structured Interviews (SSI) employed to apprise the methodology and draw the objectives of the study.

The second phase of the empirical assessment was constructed in relation to the interrogation of the Preqin data analysis regarding PEIF in EMs, and an understanding of the perspectives of global professional institutions and key PE investors in relation to PEIF investment in EIM. It therefore offers insights into the challenges pertaining to the degree and scale of PEIF investment in EIM. In addition, the assessment allowed feedback concerning their knowledge and experience of assessing EIMs, so identifying the critical challenges related to global infrastructure investment, and the consequent impact on the allocation of capital in EIM.

Furthermore, the second phase was structured to obtain significant insights and an in-depth understating to deliver research Objective Four (see Chapter Six). In particular, it presented the structure design for the bilateral path of SSI with professional institutions, global investors and fund managers. This followed a logical dynamic development from firstly, the overview of holistic philosophical global professional institutions observing and evaluating PEIF investment in EMs (SSI-A) and secondly, the perspective of the key investors and fund managers in PEIF investment within specific geographic locations exhibiting a significant development in the infrastructure investment industry in EM (SSI-B) during the relevant timeframe (Q1-2009-Q4-2019).

The above aspect formed a critical dimension of the current study, focused on examining the insights provided by the qualitative input and high level of understanding to structure the conceptual framework for infrastructure investment in EM (i.e. achieved research objective Five).

1.6 Thesis Structure

This thesis is organised into eight chapters. Chapter One outlines the research, concentrating: firstly, on the research background; secondly, on the aim and objectives; thirdly, on the primary questions; fourthly, the research methodology; and fifthly the structure of the thesis. The remaining chapters follow the design set out by Creswell (2014), being comprised of the theoretical, empirical and evaluation aspects (Figure 1.2).

Chapter Two centres on the attainment of Objective One and structures the theoretical phase of the research and delivers critical literature reviews pertaining to the scale and magnitude of the challenges related to global infrastructure investment. The chapter interpret the global drivers behind the burgeoning infrastructure investment gap, particularly in the context of EMs. This chapter also presents the transformation of global infrastructure investment from drivers to challenges and the dynamic target of infrastructure investment in EM.

Chapter Three discusses the attainment of Objective Two and pursues the theoretical concept, examining the infrastructure investment paradigm, i.e. the evolution from public funding to private investment. Furthermore, it examines essential infrastructure investment vehicles and alternative financial tools. In addition, it provides a comprehensive assessment of the fundamental concept and development of PEIF, and the drivers behind approaching unlisted PE investors for EM. This chapter also demonstrates the investment and financial challenges facing EM.

Chapter Four takes the first step towards incorporating the theoretical and contextual paradigms identified in chapters Two and Three. It provides an inclusive interpretation of the design of the methodology as well as the selection of the approach employed for the empirical analysis of the study (i.e. chapters Five and Six) leading to the attainment of Objective Three and Four of the research. In particular, it constructs a solid methodological framework for infrastructure investment challenges (PEIF) in EIM (Figure 4.3). The purpose of the framework is to answer the central research questions through obtain comprehensive information regarding how key actors observe the market and its various segments, as well as the methods used to exploit opportunities to pursue business. Furthermore, the model presents the underlying concerns regarding the participation of the private sector in infrastructure investment in EIM. It focuses on gaining an insight into the experience of particular investors, along with their knowledge of infrastructure assets (i.e. accessing the 'black box') within specific geographic locations exhibiting significant development in the infrastructure investment industry in EIM.

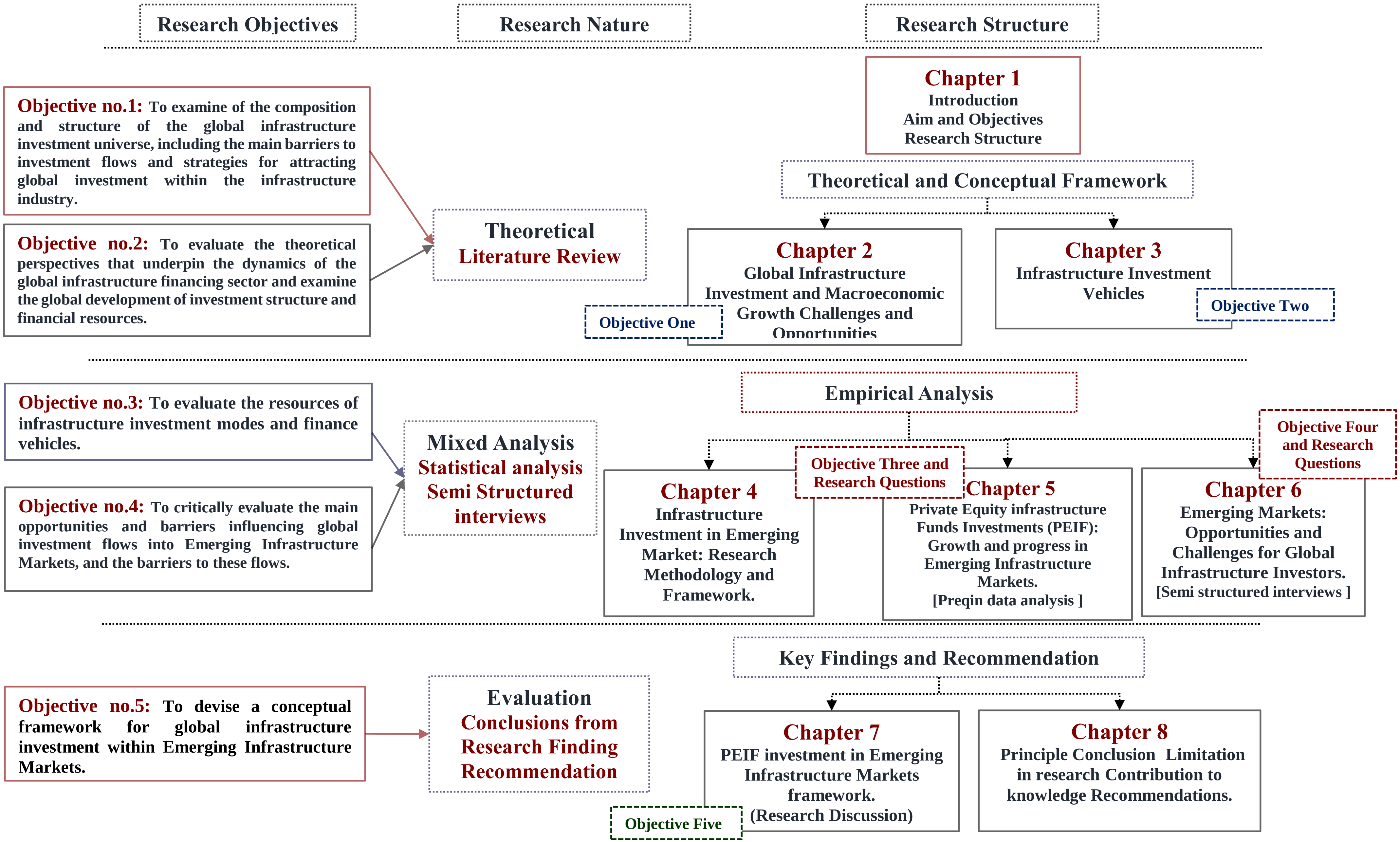
Chapter Five concentrates on addressing Objective Three and relates to the subsequent chapter. This chapter responds to the Key research questions through assesses infrastructure fund deals in EMs produced by the Preqin database and exploited as a proxy for private infrastructure investment. In addition, it analyses the pattern of growth related to PEIF within EMs. The research focused on economic infrastructure investment sectors, including: the transport sector, the energy sector (renewable energy and conventional power energy), and utilities (i.e. water and sewage services). The chapter also investigates the level of PEIF investment deals (i.e. EIM deal profiling) by identifying the key players, and the nature and types of assets in which investors are currently placing their asset allocation in EIM over the period Q1-2009 to Q4-2019. In addition, it analyses the PEIF investment vehicle, exploring whether these structures target infrastructure investment in EIM, or whether this forms part of the global infrastructure fund investment in their strategy, over the period Q1-2006 to Q4-2019.

Chapter Six is structured to fulfil Research Objective Four and examines the main factors and opportunities influencing global investment flows into Emerging Infrastructure Markets, as well as the international challenges currently influencing PE investment flows into infrastructure projects within Emerging Infrastructure Markets. This chapter also undertakes a comprehensive analysis of the key players in PE infrastructure investment in EM (i.e. answered Key question No.1), offering insights into the challenges pertaining to the degree and scale of PEIF investment in EIM. It presents a structural design for the bilateral path of SSI with professional institutions, global investors and fund managers. This chapter is therefore considered to form the core of the research and forms the next stage of the empirical research (i.e. it provides a conceptual PEIF investment framework within EM).

Chapter Seven examines the conceptual framework for infrastructure investment in EIM, employing a mixed methods integrated analysis with the fulfilment of research objective five. The framework evaluates the relationships between global challenges, barriers and constraints preventing investment in EIM (see Figure 7.3). In addition, there is a discussion of the key findings of this research, as well as the study's contribution to knowledge of the infrastructure investment industry. This is followed by recommendations addressing the constraints and barriers influencing infrastructure investment within the context of EIM.

Chapter Eight discusses the conclusion to this dissertation along with the principle findings, and highlights areas in need of further research. Figure 1.1 summarises the structure of the thesis.

Figure 1.2- Structure of the Research



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Chapter Two: Global Infrastructure Investment and Macroeconomic Growth: Challenges and Opportunities

2.0 Global Infrastructure Investment and Macroeconomic Growth: Challenges and Opportunities

2.1 Introduction

The preceding chapter outlined the overall structure of the study, including the contextual background. Chapter two centres on respond to research Sub-Q.1 (What is the impact of global investment to underpin development outcomes (economy, investment and infrastructure) in Emerging Infrastructure Markets?) and Key Q.2 (What types of infrastructure deals tend to be targeted by global PE institutional investors in EIMs?) and the attainment of Objective 1:

> *To examine of the composition and structure of the global infrastructure investment universe, including the main barriers to investment flows and strategies for attracting global investment within the infrastructure industry.*

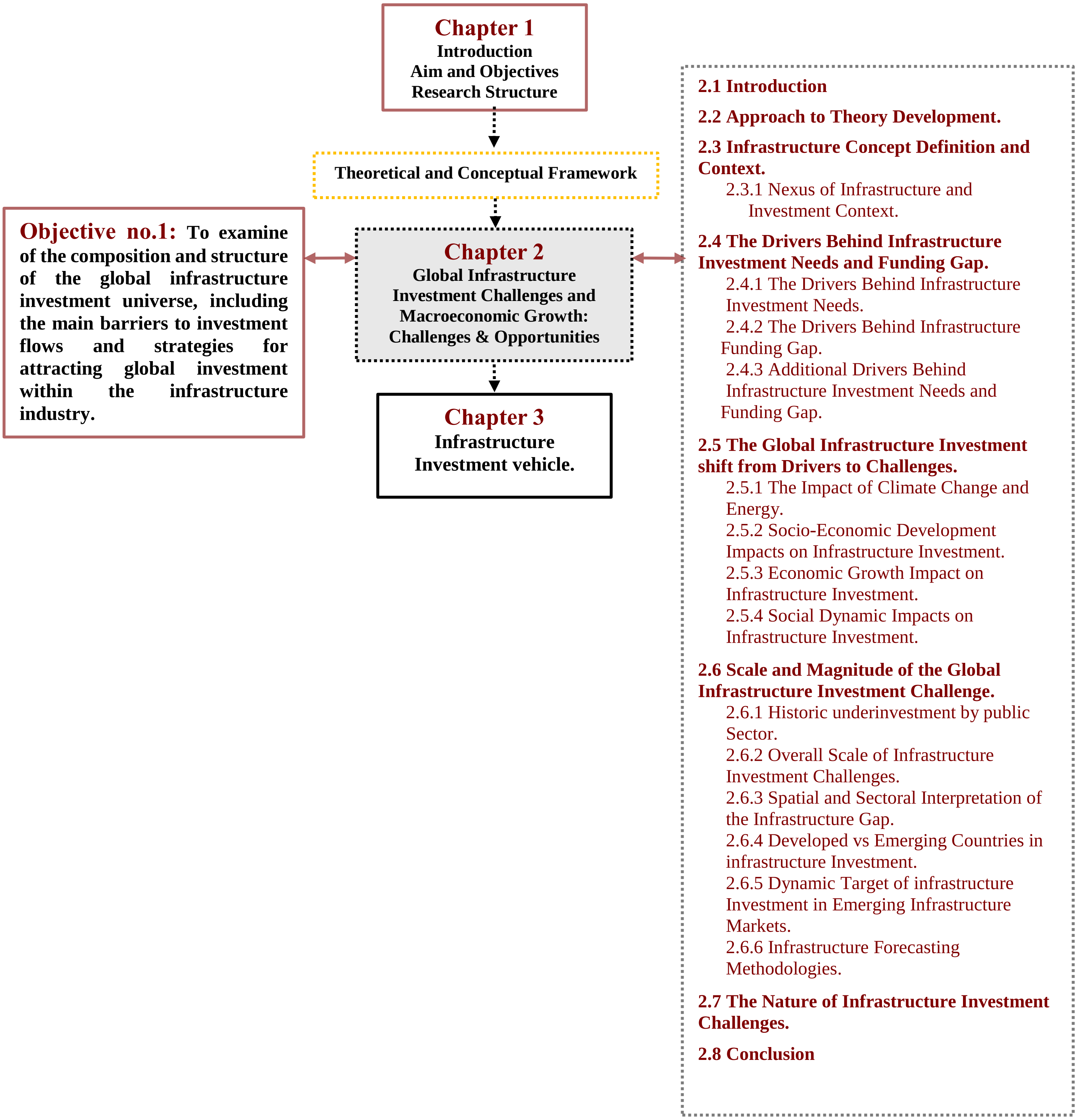
Ambitions for social and economic development are driving the expansion of infrastructure provision across nations. Furthermore, the systemic increase in current global challenges demand more multifaceted, composite, and interrelated infrastructure resolutions (World Bank, 2012). A series of academic and industry based research investigations have attempted to measure constraints affecting the infrastructure investment gap using a range of techniques and models to describe investment needs on a global scale (RICS, 2013). Therefore, it is pertinent to examine the significance of global drivers and their critical influence on infrastructure demands, including global challenges in bridging the investment gap, along with their implications for infrastructure investment, to evaluate infrastructure investment provision (Dreger and Reimers, 2016).

Global society is under great pressure to meet the threefold challenges related to infrastructure investment: global population increases; the sustainable development goals (SDGs) agenda; and the need to invest for an uncertain future, in relation to climate change (Bhattacharya et al., 2016A). A key pillar in achieving sustainable capital assets and reinforcing economic expansion is improving the efficiency of the infrastructure provision cycle. Sustainable infrastructure investment removes barriers to economic development and drives productivity and outcomes; it also enhances employment rates, increases international business, and decreases competitiveness. Nonetheless, insufficient quality of asset class provision has been argued to be central to the infrastructure investment gap (RICS, 2013; Qureshi, 2017).

In an Emerging Infrastructure Markets context, infrastructure investment demands impetus from consumer needs, and its results have the effect of increase economic activity (Moller and Wacker, 2017). Therefore, Hogenbirk and Narula (1999) and Jordaan (2010) have highlighted that policy-makers focus on the development of infrastructure investment as a critical element of economic growth and seek to create an attractive market environment to attract international investors. Moreover, the thrust of transformation growth and the increasing demand level in emerging markets has resulted from different indicators: demographic challenges, economic growth, global pace trade and investment progress, and political avenues (Waheeduzzaman, 2011).

This chapter provides comprehensive understanding of the scale as well as the dynamic nature of the global infrastructure investment challenges and imparts knowledge on the complexities and challenges which need to be addressed within the confines of the infrastructure investment gap. The Chapter comprises seven sections (Figure 2.1). Section **2.2** explain the theoretical approach developed and implemented in the study. Section **2.3** provides a comprehensive understanding of the concept of infrastructure and global investment. Section **2.4** outlines the drivers behind the identified inadequate investment into infrastructure. Section **2.5** discusses the challenges facing sustainable global infrastructure investment, with a particular emphasis on the implications of current critical trends. Section **2.6** examines insufficiencies in the provision of capital assets and outlines the global scale of the infrastructure investment gap. Section **2.7** illustrates the nature of the challenges facing global infrastructure investment, including an examination of the status of Emerging Infrastructure Markets. Section **2.8** summarizes the key points arising from the critical review of the literature concerning the challenges relating to global infrastructure investment.

Figure 2.1-Structural Context of Chapter Two



2.2 Approach to Theory Development

Empirical research addresses aspects pertaining to the development of knowledge, in particular issues such as adequacy, acquisition (epistemology), the nature of knowledge, and how it can be best understood (ontology). There are two broad approaches that are typically adopted when conducting research, i.e. positivism and interpretivism (Sauders, 2009). When aligning with a positivist approach, an objective perspective is taken, wherein only observable and measurable facts are considered valid and reliable evidence (i.e. professional and institutional reports). By contrast, the interpretivist approach collects knowledge from a subjective perspective, typically eliciting information about human experiences and perceptions (i.e. empirical studies) (Hussey and Hussey, 1997). Since there is a significant dearth of empirical research and information based insights (i.e. previous studies) addressing and targeting this subject area (i.e. infrastructure investment in EIM), as highlighted in Section 1.3 (identification of research gap), the approach adopted in this study is the **positivist approach.**

This study explores infrastructure investment behaviour in the context of EIM, and so an **inductive approach** was implemented. The chief aim of research is to understand investable behaviours in EIM (i.e. global investors and fund managers orientation towards EM). In addition, due to the extensive void in the data (i.e. the lack of understanding of global investors' perspectives towards EM in relation to the infrastructure investment industry in EM empirical studies), **inductive research** was also conducted to develop a comprehensible theory (i.e. answering questions relating to the behavioural approaches of investors towards EIM. and the infrastructure environment in EM). Finally, providing the answers for key research questions and sub-questions.

To ensure researchers acquire a comprehensive understanding, and to clarify the purpose of a study, there are three types of study to choose from; exploratory, descriptive and explanatory. According to Hesse-Biber and Leavy (2011, p.10), exploratory analysis is conducted if the study area is untouched, with the result that the data and information gathered will support "shape the direction of future research".

Meanwhile, if the research area has been previously addressed by academic researchers, an additional social aspect is sought, and the purpose of study would be to provide a more descriptive analysis. Furthermore, in the opinion of Hesse-Biber and Leavy (2011, p.12), if further information is sought with regard to the "relationship between different components of a topic" " then the research aim itself would lead to an explanatory study.

The current research area is characterised by a significant lack of information pertaining to the behaviours of global investors towards EM and infrastructure investment in EIM (i.e. academic publications). Furthermore, there is no specific path to follow to address the issues pertaining to the research. In the current situation, it is acknowledged by all parties in the field of infrastructure and investment as an opaque area. In particular, to acquire knowledge, and to understand the infrastructure investment environments in EIM in the presence of such a void **exploratory analysis** is required. Specifically, in order break down the opaque landscape, a variety of instruments were utilized to understand the issues involved in transparent markets (i.e. professional and institutions statistics and reports, academic publications). For the purpose of this research an investigative process has been implemented. This was later merged with models and theories to describe how infrastructure investment markets operate in EIM in an opaque scenario.

In summary, the approach adopted in this literature review is a **positivist quantitative approach,** constructed to permit **inductive and exploratory analysis**.

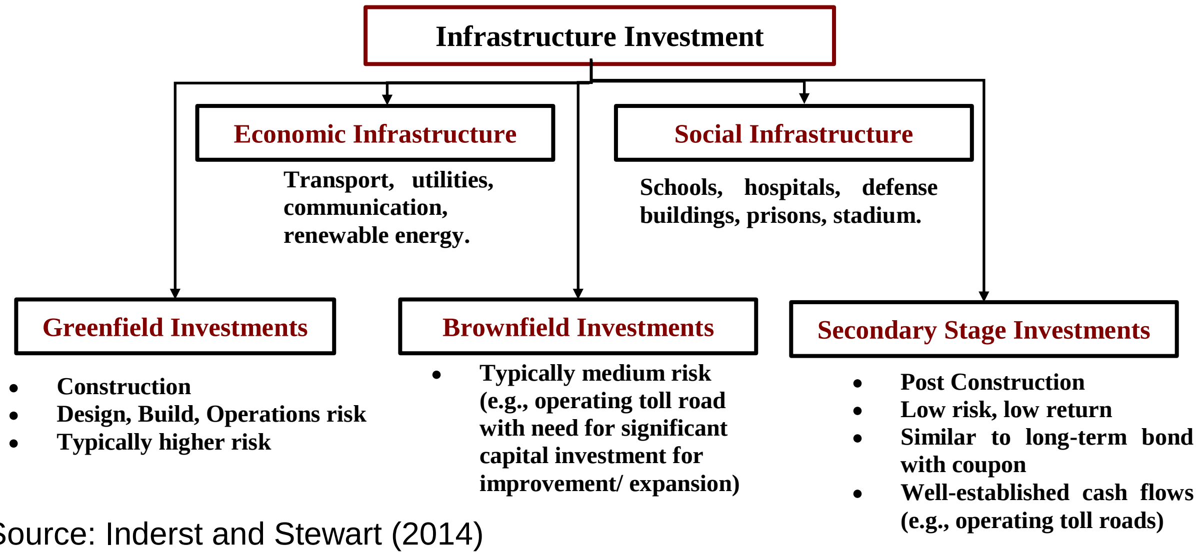
2.3 Infrastructure: Definition of the Concept and Context

The literature generally views the terms 'infrastructure' and 'capital assets' as referring to a diversity of structures utilised by industry, and in particular those relating to construction services and the production of goods (Chan et al., 2009; Houten and Zhang, 2010; Bottini et al., 2013; Bouwmeester and Scholtens, 2017).

Begg et al. (2011) considered infrastructure to consist of any physical structure supporting the growth and function of a society and its economy, including traditional construction projects in the transportation sector (i.e. roads, railways, ports and public buildings) facilitating firstly, the flow of people and goods and secondly, the delivery of public services. Furthermore, infrastructure also includes a number of technological systems and networks, alongside specific green infrastructure assets structured to underpin society by conserving the natural environment (Eriksson et al., 2017). An additional aspect of infrastructure is that it is principally focused on the needs of a society, both in terms of organisations and individuals, and is therefore funded and maintained through general taxation and/or fees charged in relation to usage, i.e. electricity networks or telecommunications systems (Regan, 2017; Brunet and Aubry, 2018). This indicates that infrastructure is predominantly a matter for the public sector, despite its assets frequently being run by private firms and construction companies under the umbrella of the public sector (i.e. government contracts).

In addition, capital assets cover a wide range of physical facilities and systems related to infrastructure. Infrastructure is comprised of two primary structures firstly, social infrastructure, which mainly supports social services and values (i.e. schools, government building, and hospitals); and secondly, economic infrastructure, whose primary objective is to underpin firstly, business actions and services (e.g. network and utility services) (Rugman and Collinson, 2012), and secondly, transport, energy, water, and digital communication (Murdiyarso, 2015). Eriksson et al. (2017) emphasised the importance of infrastructure assets (particularly airports, railways and ports) for firstly, enabling economic activities and secondly, contributing social value by allowing access to social services and faculties, as well as travel. Alongside these are a number of social infrastructure assets, (i.e. schools and other educational buildings), whose economic value contributes to the success of business by improving the education of its future workforce (Begg et al., 2011). Together, these form an essential aspect of effective contemporary society. Inderst and Stewart (2014) demonstrated the primary taxonomy of infrastructure through various sectoral (i.e. economic and social) and infrastructure investments (i.e. greenfield, brownfield and secondary market), as presented in Figure 2.2.

Figure 2.2-Types of Infrastructure Investment Opportunities



Source: Inderst and Stewart (2014)

Inderst and Stewart (2014) and Tiryaki and dos Santos (2017) highlighted that a further significant distinction between forms of infrastructure investment concerns its various forms, i.e. greenfield, brownfield, and secondary stage infrastructure. (1) Brownfield infrastructure investment takes the form of re-development, renewal, extension, or the obtaining of existing infrastructure assets, including electrifying railways, expanding roads, or upgrading communications networks. (2) Greenfield infrastructure investment focuses on structures and new constructions (i.e. new airports or hospitals), or the production of services (i.e. energy and water). (3) Secondary stage infrastructure investment represents the post construction stage, including the operation and maintenance procedures for facilities and utilities (i.e. the operation of a toll road).

Despite their equal importance for national progress, global institutional investors tend to invest in economic, rather than social, infrastructure (Bird et al., 2014; Murdiyarso, 2015; Bielenberg et al., 2016). This has been shown to principally result from the capacity of investment in economic infrastructure assets to deliver superior benefits and advantages in the form of monopolistic assets (Bird et al., 2014). Economic infrastructure assets consist of monopoly assets and services (i.e. those held by rail operators or firms providing water services), capable of offering regular benefits for institutional investors, i.e. an ability to increase the charges made for the use of such services.

By contrast, social infrastructure assets deliver services and facilities for public sectors on the bases of a fixed price, resulting in a limited ability to obtain higher levels of profit. Furthermore, social infrastructure assets are commonly delivered under a lump-sum (i.e. fixed) contract, which holds limited possibilities for growth. Therefore, social infrastructure investment is structured to fulfil specific social requirements and needs. This led Moser and Jesch (2013) to consider that social infrastructure investments can, over the long-term, provide positive risk returns over the capital cost or rate of inflation. Hellowell and Pollock (2010) and Han et al. (2020) pointed out that returns gained by institutional investors from social infrastructure assets tend to maintain an additional level of return, as stated in the original contract. The authors justified this due to the smaller number of institution investors wishing to invest in social infrastructure assets, particularly as capital assets operate under the terms of a fixed contract, so, as noted above, removing the potential to increase future returns. This highlights the importance of attracting suitable investors for social assets.

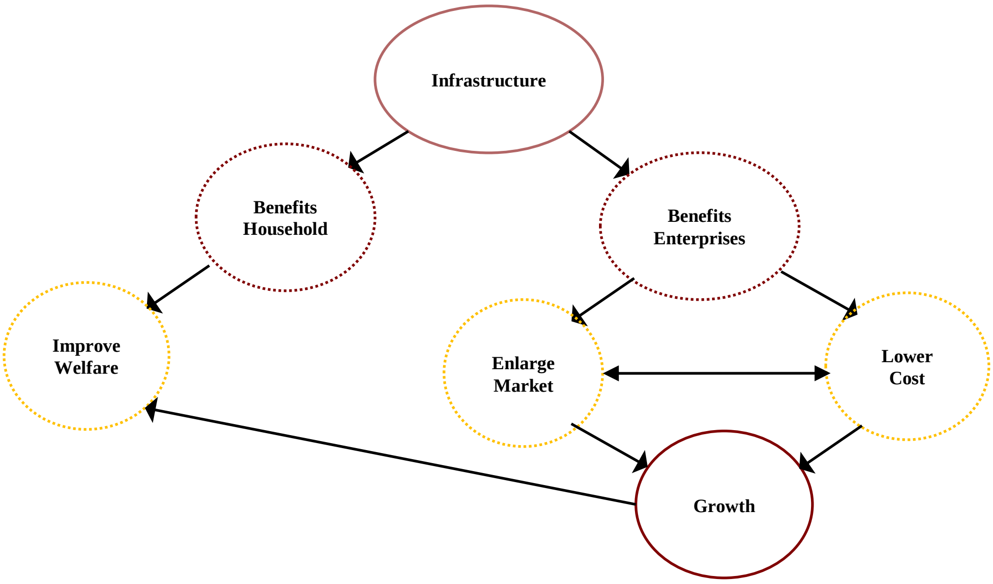
This research investigation will focus on economic infrastructure as a critical service that has a direct and indirect impact on the markets and economic development and progress, particularly in Emerging Infrastructure Markets (Esfahani and Ramirez, 2003; Farhadi, 2015; Saidi et al., 2018; Han et al., 2020). In addition, economic infrastructure is considered a perquisite of social infrastructure services (Kumari and Sharma, 2017).

2.3.1 Nexus of Infrastructure and Investment Context

Infrastructure is considered to be a key element in enabling economic growth (Baird, 2010; Bielenberg et al., 2016). In addition, infrastructure is deemed as a foundation for social functions, and public administration, with well-developed and high-functional infrastructure critical to the realisation of long-term domestic growth objectives (Czernich et al., 2011; Javid, 2019). Prud'Homme (2004) argues, however, that because of the diversified spectrum of features and services surrounding infrastructure, its definition and modality of development are variable and difficult to formally define. There are several core characteristics that ultimately determine the scope and status of infrastructure in modern nations (Prud'Homme, 2004; Sherkulovich, 2015; Tripathy et al., 2016). First, infrastructure describes capital goods that are designed to provide services in combination with other government functions. Second, infrastructure investment is lumpy (as opposed to incremental) and the relative usefulness or efficiency of unfinished infrastructure is zero. This means that incremental adjustments to infrastructure for supply–demand reasons are inconsistent with its delivery cycle. Also, infrastructure is a long-term representation of public vision which affects financing and maintenance strategies over time. Moreover, it is spatially-defined, inherently immobile, and intimately linked to the regional economic, social, and political geography. Nonetheless, infrastructure is vulnerable to market failure and shocks if left to market forces alone, thus legitimising state intervention in its delivery. Lastly, infrastructure is consumed by downstream users, thereby increasing welfare (Kim, 2006; Sherkulovich, 2015; Stupak, 2018; Javid, 2019).

In the opinion of Steckel et al. (2017) understanding the debate about correlation of infrastructure investment and economic growth is essential to gain a balanced quantitative perspective. A series of empirical studies (including Gramlich, 1994; Lee et al., 1999; Engel et al., 2006 ; Escribano et al., 2010) have found a significant positive correlation between capital assets investment and economic productivity and development. Bottini et al. (2013) recognised that adequate investment in capital assets delivers significant outcomes that generate a positive economic flow in the long term. Benefits includes raising the level of GDP, elevating the productivity scale and increasing manufacturing progression. In terms of the relationship between infrastructure and development, Prud'homme (2004) and Garmendia et al. (2004) found a significant correlation between infrastructural facilities, economic growth and social outcomes (Figure 2.3). The connection between infrastructure productivity has two channels; the local channel that provides infrastructure services strongly increases welfare and the social level; the international channel escalates enterprises' competitiveness, lowers cost and opens markets increases social welfare. Consequently the two channels have a critical influence on economic growth. This linkage is examined more comprehensively in section 2.5.2. whilst the subsequent section examines the global drivers and factors which have contributed to the escalating infrastructure investment need.

Figure 2.3-Infrastructure Contribution to Development



Source: Prud'homme (2004) and Garmendia et al. (2004).

2.4 Infrastructure Investment Needs and Funding Gap.

2.4.1 The Drivers of Infrastructure Investment Needs.

It is clear that, over the next twenty years, three central aspects will require mandatory investment: 1) energy growth; 2) transport corridors; and 3) the development of a sustainable environment (Price waterhouse Coopers (PWC), 2014; Han et al., 2020). In addition, many multifaceted and interconnected elements can influence the demands of infrastructure investment (Jenkinson et al., 2017). While the drivers behind infrastructure needs vary according to sector, Heller (2010) stated the existence of a minimum of five critical keys influencing infrastructure investment comprising economic growth, population demographics, urbanisation, environmental sustainability as well as the maintenance and upkeep of existing assets. The implications of each on infrastructure need is explored in turn.

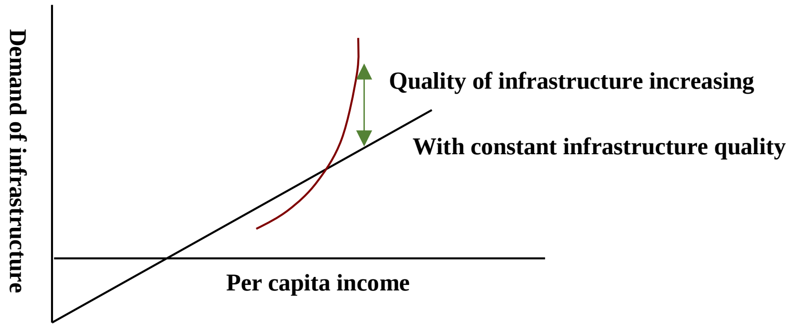
Economic Growth

The majority of economists view essential variations relevant to global economy as forming a second driver of project infrastructure needs (Fournier, 2016; Henckel and

McKibbin, 2017; Haran et al., 2020). In both developed and developing nations, infrastructure demands arise primarily from continuous high rates of growth (Bhattacharya et al., 2016B; Jenkinson et al., 2017). However, a considerable portion of global growth now originates from Emerging Infrastructure Markets, which will, over the coming years, demonstrate the greatest share of global infrastructure needs.

As discussed previously, the divergence continues to decrease between developed and developing countries continue to diminish, with the latter increasing their investments to support high rates of both short- and long-term economic growth (Fournier, 2016; Mancini et al., 2017). This continual economic growth and increase in individual incomes will, in future, result in a considerable development of public assets (Bhattacharya et al., 2016B). Heller (2010), Kumo (2012) and Han et al. (2020) identified the existence of a robust bilateral-way connection between the needs of economic infrastructure investment and economic growth. Thus, an increase in the rate of investment will escalate economic outcomes (i.e. increases in GDP, levels of employment and the creation of new businesses), will, in turn, require additional investment in infrastructure assets. However, Heller (2010) and Hall et al. (2014) highlighted a number of further elements impacting on the demand for infrastructure development, including the rise of income per capita and the quality of the infrastructure itself. According to the IMF, 2008 cited by Heller, 2010 and Warner, 2014), a positive relationship can be found between the demands of infrastructure, income per capita and the quality of infrastructure assets (Figure 2.4). Thus, an improvement in the level of the income per capita tends to increase the demand for infrastructure assets, including the replacement of existing infrastructure, thus improving the quality of capital assets.

Figure 2.4-Increasing Income Elasticity for Spatially Universal Infrastructure



Source: IMF (2008) cited by Heller (2010)

Demographic/population Growth:

Demographic change can be seen to exert a significant influence on the demand for infrastructure investment (PWC, 2014). A number of demographic elements influence such needs and projections, including the age structure of the population and the rise of a middle class (Fransen et al., 2018). Bhattacharya et al. (2016A) viewed estimates of the current size of the urban population as pointing to a historic transformation, increasing (with the exception of China) from 3.5 billion to 6.5 billion over the following fifty years. Such an increase in population results in an urgent need for increased infrastructure investment (Jenkinson et al., 2017; Regan, 2017), and in particular in relation to sectors such as: 1) energy; 2) transportation services (i.e. rail, roads and ports); 3) water treatment; 4) utilities services; and 5) telecommunications (Regan, 2017).

Urbanisation:

It is currently estimated that the majority of developing countries will, as a result of the increase in urbanization, experience an increasing level of deficit in relation to their infrastructure and structural transformation. This is demonstrated by the fact that Africa and Asia have recently shown a higher average rate of urbanization than developed countries (Madlener and Sunak, 2011; Schwartz et al., 2014). This rapid urbanisation is deemed to be a driver behind the current demand for increased infrastructure (PWC, 2014), contributing, in particular, to the increased need for economic investment. Furthermore, Madlener and Sunak (2011) identified that this increasing rate of urbanization is associated with an increased demand for energy, the impact of which depends on the degree of urbanization within different areas of developing countries. Thus, Schwartz et al. (2014) stated that the agglomeration of urbanization, along with the rate of urbanization, influences the different projections of infrastructure requirements.

Environmental sustainability:

A final critical driver influence on infrastructure investment needs is environment sustainable. According to Hall et al. (2014) and Adshead et al. (2019) climate change will pose critical influence on infrastructure sustainability. In terms of impact, hazards affect developing and advanced countries differently due to distinctions in their levels of vulnerability, which is comprised of exposure and probability of risks for a population (Azevedo and Mostafavi, 2016). There are dramatic differences in these aspects with regards to advanced, developing and low-income developing countries, with the low-income developing countries having fewer options with regards to protection, where they can live and surplus of infrastructure requirements (Yu, 2017; Adshead et al., 2019). In addition to this, rapid urbanisation throughout low-income developing countries takes place commonly in hazardous areas and areas that would commonly be undesirable for development otherwise (DeGood et al., 2016).

Maintenance/ rehabilitation needs:

Advanced economies require high levels of investment to improve existing infrastructure, in particular in response to a proportion becoming obsolete over time (Bhattacharya et al., 2016B; KPMG, 2017). However, there has also been an emphasis on targeting new investment towards developed economies, which tend to be characterised with uncertainty, leading to a reduction in the lifespan of such infrastructure (RICS, 2013; Branchoux et al., 2018). This has led the Pacific Region Infrastructure Facility (PRIF) (2013) to highlight avoiding the repair of existing infrastructure, i.e. employing the concept of 'build-neglect-rebuild'.

The above discussion illustrated the motivation behind the current research to address the significance of global drivers and their critical influence on infrastructure demands, including global challenges to bridging the investment gap. Sections 2.5 and 2.7 of this research undertake a comprehensive interpretation of these critical challenges, along with their implications for investment in infrastructure.

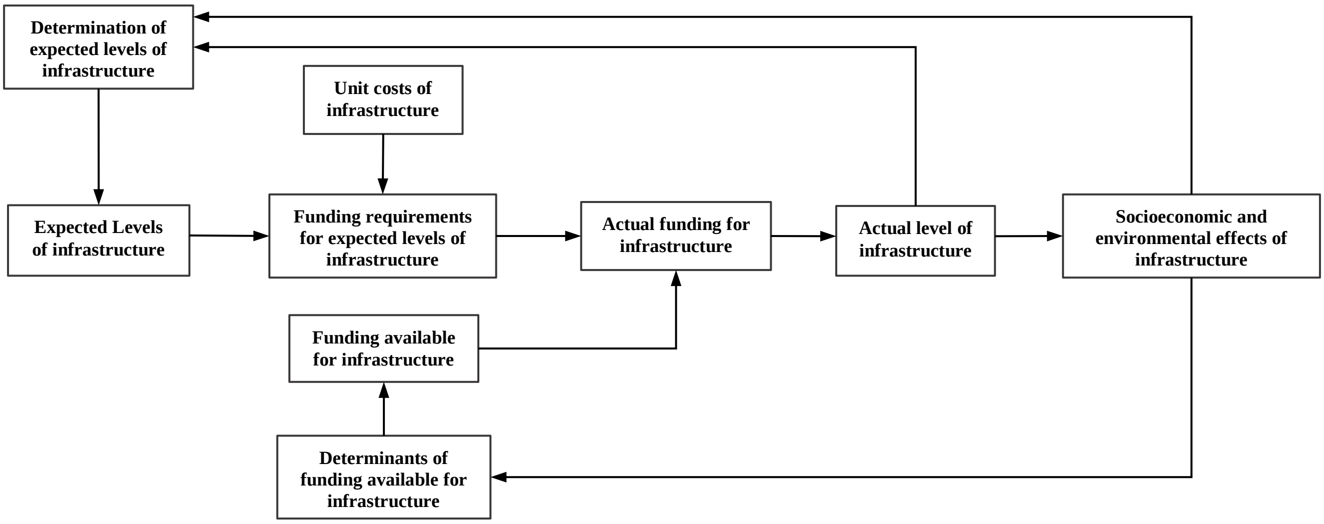
2.4.2 Factors Behind the Infrastructure Investment Funding Gap.

In general, the existing evidence indicates that, on a global basis, the current scale of infrastructure investment fails to match assessments of future needs and demands. Furthermore, infrastructure investment forecasting is a complex and multifaceted procedure. An extensive body of scholars, authorities, and governments have put considerable effort into developing policies and regulations, along with the provision of infrastructure capital assets aimed at: (1) meeting the need for public services; (2) enhancing economic productivity and output; and (3) raising social standards and values; and (4) allocating fiscal resources to fund such public assets (Percoco, 2013; Quak, 2018; Javid, 2019).

This indicates the importance of gaining an in-depth insight into infrastructure investment estimation procedures. Rothman et al. (2014) structured a conceptual framework, known as 'International Futures System-Ifs', to assess the projected need for dynamic and incorporated infrastructure capital assets on a national level (see Figure 2.5). Rothman et al.'s (2014) model is comprised of a number of steps, commencing with infrastructure needs/demands forecasting, projected in accordance with national development, while at the same time considering a number of further issues and elements, along with environmental aspects, and the degree of funding required. It should be emphasised that such estimations need to distinguish between firstly, the upgrading and maintenance of current infrastructure assets and secondly, the demand for capital assets as part of the construction of new infrastructure. Furthermore, such estimations should address the availability of financial resources matching the forecasted need for infrastructure assets. This is an essential step, due to the common incidence of an under- or overestimation of public investment requirements, along with a conflict between the demand for infrastructure investment and availability of sufficient financial resources.

This step was advocated by Sihombing (2014) and Chen et al. (2016), who highlighted the significance of ensuring the availability of sufficient financial resources to fund public infrastructure assets. Moreover, they noted that the estimation of funding requirements for capital infrastructure investment predominantly fails to meet available financial resources. It is therefore critical to reflect this estimation in the planning of infrastructure assets, in order to re-examine existing projections of capital public assets and identify those considered essential. It is notable that such infrastructure assets influence a nation's socio-economic and environmental development. As highlighted by Rothman et al. (2014), this can influence the expected infrastructure demands in accordance with economic growth and the availability of future financial support. However, any lessening of financial resources has the potential to widen the funding gap (Sihombing, 2014).

Figure 2.5-The Dynamic, Integrated, Infrastructure Modelling System in International Future Systems-IFs



Source: Rothman et al. (2014)

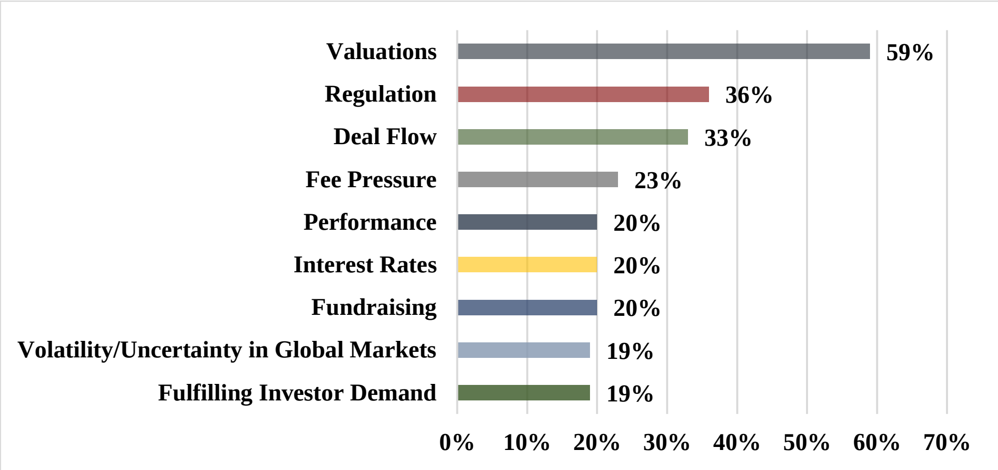
Rothman et al. (2014), Dreger and Reimers (2016) and Bhattarai and Upreti (2019) emphasised the importance of estimating the demand for infrastructure, in order to accurately forecast (and match) appropriate levels of investment. It is evident that the majority of funding for global infrastructure capital assets remains a public sector responsibility (i.e. public funding), although a considerable funding gap is still in place (McKinsey, 2016A). An importance aspect recognised by IMF (2015) concerns the inadequacies of public investment procedures, which have had a negative impact on the quality of public assets. Furthermore, the existing literature emphases a large number of elements related to reducing the gap in infrastructure funding. Public sectors are subject to a number of financial concerns, while national governments are also limited by financial considerations, as well as their existing level of debt[4] (Taylor, 2014; Ruiz et al., 2017; Bhattarai and Upreti, 2019).

As highlighted by Hellowell and Vecchi (2012) and Chen et al. (2016), global rules and regulations are considered additional drivers in expanding the infrastructure funding gap. These have a negative impact on investment in infrastructure assets and restrict the of global investors in investment procedures. On the other hand, a critical provenance is required to enable financial intuitions (and other intermediaries) to fill the funding gap by appealing to the private capital market (Duenas and Wegelin, 2011; Wyman, 2017).

However, there remain specific areas of concern relating to the transactions of institutional investors and financial organisations when it comes to the infrastructure investment gap, including: (1) issues of prolonged risk; (2) the absence of protection for public sectors, along with government support and investment security; (3) a lack of solid deals flows and provision for infrastructure assets; and (4) the absence of competition and efficiency (Duenas and Wegelin, 2011; Robins, 2013; Taylor, 2014; Ruiz et al., 2017). A survey conducted in 2017 by Preqin (2018) focussed on sixty investors and fund managers dealing with infrastructure assets, in order to establish and prioritise the challenges and difficulties inherent in infrastructure investment (see Figure 2.5). This revealed that the three critical challenges exerting a negative impact on the willingness of fund managers and institutional investors to invest in infrastructure assets included: (1) valuations (circa ~60%); (2) governance and regulation (approximately 36%); and (3) the flow of new infrastructure deals (circa 33%). Furthermore, the assessment of additional aspects attributed to deterring investors from undertaking infrastructure investment (as quantified by more than 20% of the total respondents) highlighted: (1) issues related to fees and (2) increased interest rates.

[4] A further details of government debt will examine in Section 2.6.4 Developed vs Emerging Countries in infrastructure Investment

Figure 2.6-Key Challenges Facing Unlisted Infrastructure Fund Managers in 2018



Source: “Preqin Fund Manager Survey, November 2017”, Preqin (2018A)

The infrastructure investment gap has led to significant challenges and difficulties. Both academic researchers and global governments are currently concentrating on innovative approaches to investment, primarily comprised of new financial channels and instruments. However, whilst the development of greenfield assets is central to global social and economic development, limited attention has been paid to evaluating the infrastructure investment gap pertaining to existing assets (RICS, 2013), including: (1) the impact of insufficient maintenance on the reduction in of an asset’s lifecycles and effectiveness and (2) the subsequent implications in terms of increasing the current shortage of infrastructure (Branchoux et al., 2018; Bhattarai and Upreti, 2019). While the infrastructure investment gap relating to capital public assets remains an effective assessment method (i.e. bilateral methodology) (KPMG, 2017). It is also vital to consider how the adoption of current infrastructure investment can remain an efficient option (KPMG, ibid).

Agenor (2009) and Bhattarai and Upreti (2019) indicated that, when it comes to the issue of government in Emerging Markets and Developing Countries (EMDC), planners and policy makers are faced with decisions concerning whether to invest in the maintenance, upgrading, and rehabilitation of current infrastructure, or to invest in new assets to fulfil specific present (or emerging) needs. From a theoretical perspective, Agenor (ibid) highlighted that investment in maintenance increases the strength and durability of capital assets, maintaining and developing their effectiveness and so enhancing the consistency of service delivery (e.g. electricity, water supplies and fuel services). Furthermore, Agenor's (2009) quantitative framework indicated that restrictions placed on governments and domestic authorities through their local budgetary limitations (i.e. fees for services and taxation inflows) result in concerns relating to whether it is more effective to: (1) expand investment in maintaining (or improving) current assets (including decreasing new infrastructure investment to secure current demand), or (2) decrease the maintenance of ageing and depreciated properties in order to invest in infrastructure assets capable of fulfilling long-term efficiency aims and objectives.

Conversely, capital infrastructure assets are, by their nature, capital intensive, responding to perceived efficient and effective results. As noted by Bhattacharya et al. (2015) and D'Orazio and Popoyan (2019), all infrastructure assets are considered in terms of a cost-benefit assessment confirming their value in the context of GDP growth (i.e. estimated needs compared to the costs involved). However, should the need for infrastructure projects prove underestimated and/or miscalculated, such benefits may prove inadequate. Furthermore, this infers that the cost-benefit analysis for capital infrastructure assets can potentially prove far lower than their estimation, resulting in a generally negative outcome for the economy (Dobes and Leung, 2015; D'Orazio and Popoyan, 2019).

Wright (2011) and Adshead et al. (2019) claimed that the breakdown of ambiguity has resulted in a reduction of sustainable capital assets, with Pandit et al. (2017**)** and Ghimire and Johnston (2017) noting that optimality and specificity can secure additional rigorous and targeted investment capable of obtaining sustainable results. Ghimire and Johnston (2017) and D'Orazio and Popoyan (2019) observed that the capacity to structure and develop anticipated frameworks based on lifecycle solutions can permit the analysis to structure recorded sustainability outcomes, as well as predictions. This then relates infrastructure investment to long-period benefits, so preventing a need significant trade-offs and compromises. There is also an expectation of a need to evaluate the influence of particular environmental goals in relation to sustainable technologies to enhance their performance, particularly in response to the development of network solutions (Ghimire and Johnston, 2017; Adshead et al., 2019).

An expensive body of reports from academic and professional publications have recently attempted to employ the use of economic barriers and constraints to evaluate the shortage of adequate infrastructure investment (i.e. the lack of financial resources constraining global capital investment, specifically in Emerging Markets (EM))(Global Infrastructure Hub, 2018). However, there are also a number of additional concerns relating to the deficiencies, difficulties and barriers related to such infrastructure investments. A number of researchers (including those summarised in Table 2.1) have recognised the diversity of challenges facing infrastructure investment in EMDC.

Table 2.1-Professional and Academic publications on Factors and Barriers Influencing Infrastructure Investment Needs

Professional publication	Title	Year	Barriers and factors influence infrastructure investment
Global Infrastructure Hub (GIH)	**Set your infrastructure policies in the right direction in the Compact with Africa countries**	**2018**	- Governance and institutional settings. - Investment policy and economic regulation. - Clarity and consistency of the permits and land acquisition process. - Planning and infrastructure appraisal processes. - Efficiency of government contracting and procurement. - The efficacy of infrastructure delivery, including a focus on quality and role of the private sector.
The Boston Consulting Group (BCG)	**The Global infrastructure Challenges: top priorities for the public and private sectors**	**2010**	- The private sector expertise engagement. - Quality of infrastructure investment provision. - Efficiency of procurement process. - Political regulations.
Deloitte Research Study	**Closing the Infrastructure Gap: The Role of Public-Private Partnerships**	**2006**	- PPP model is a critical tool for governments to deliver social and economic infrastructure and associate to close the gap of infrastructure investments needs.

Academic publications- Title	Author (s)	Year	Barriers and factors influence on infrastructure investment
The Global Infrastructure Challenges and the Role of G20 and BRICS	**Zia Qureshi**	**2017**	- Public strategy leadership. - Private-sector participation via PPP framework. - Investment market transparency. - Governmental institutions. - Project pipelines.
Water infrastructure as essential element for human development	**Cecilia Tortajada**	**2014**	- Policies for long period framework. - Effectiveness and efficiency authorities and institutions. - Legal and regulatory frameworks in relevant to: • Procurement process and constructions. • Maintenance and efficient use of existing assets.

Furthermore, Qureshi (2017) and Tortajada (2014) have advocated the need to overcome the constraints and obstacles pertaining to endogenous features, for the purposes of encouraging global institutional investors and creating the future global competitive agenda. Table 2.1 outlines the possibilities, enclosed by a particular context (i.e. global infrastructure investment), providing an in-depth and comprehensive overview of the dimensions aiming to address the challenges, barriers, constraints and deficiencies relating to infrastructure investment.

A considerable number of further elements have been recognised as triggering the global infrastructure investment gap. This includes the significant scale of public debt and the economic struggles experienced in EMDC, which have resulted in difficulties in both committing to, and completing, the development of an infrastructure assets scheme. This has subsequently resulted in a considerable increase in costs (Trebilock and Rosenstock, 2015; Liu et al., 2020).

2.5 The Global Infrastructure Investment Shift from Drivers to Challenges

It is clear that the agenda for development is currently targeting the expansion of infrastructure networks on a global basis, emphasising the current dilemma between the needs of complex and multifaceted infrastructure projects and the global challenges and difficulties related to structural development (World Bank, 2012; Han et al., 2020). As previously discussed, the selection of specific measurements and scales can exert an important influence on investment flows, with public sectors, in particular, being subject to intensive pressure to affirm investment in infrastructure assets able of providing a high level of financial return, alongside high levels of social value and environment benefit (Sun and Cui, 2018B; Adshead et al., 2019). Alińska et al. (2018) and Sun and Cui (2018B) emphasised three basic measurements as critical for estimating sustainable development and the growth of infrastructure capital assets: (1) social; (2) economic; and (3) environmental. Therefore, for the purposes of providing a detailed overview pertaining to the scale of global sustainable investment challenges, this section concentrates on the following aspects:

2.5.1 Climate Change and Energy Transformation.
2.5.2 Socio-Economic Development Implications on Infrastructure Investment.
2.5.3 Sustainable Infrastructure and Economic Growth.
2.5.4 Sustainable Infrastructure and Social Dynamic Influence.

2.5.1 The Impact of Climate Change and Energy Transition

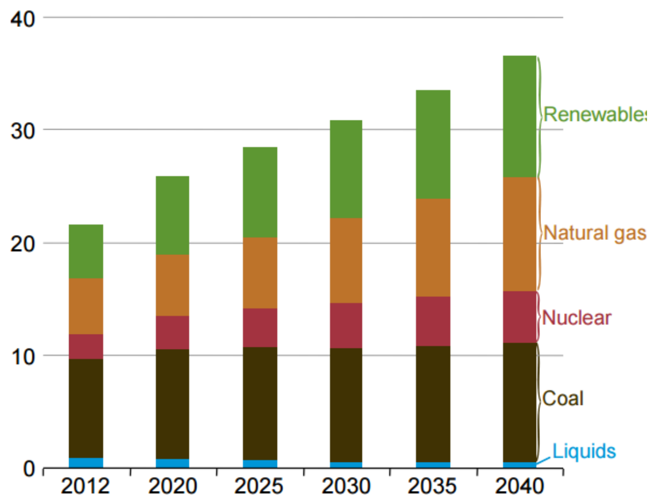
A number of issues have demonstrated a potential to influence long-term infrastructure capital assets, with the most urgent being the new wave of global warming (i.e. climate change). In the view of growing pertinence of both global warming and climate change, one of the principal concerns related to energy instability concerns the extent and nature of any resulting environmental influence (Bak et al., 2017; Shahzada et al., 2018; Zhang et al., 2019). Therefore, this section assesses firstly, the implications of global warming on infrastructure investment needs, and secondly the challenges faced by countries in implementing the concept of green growth and the transfer to sustainable capital assets.

In 2015, the countries gathered in meeting in the French capital Paris, for the United Nations Climate Change Conference, presented the requirements vital to maintaining global warming at 1.5-2 degrees Celsius (Norman, 2016). However, this will require a significant transformation of energy infrastructure projects (Jacobson and Delucchi, 2011; Adshead et al., 2019), in particularly those involved in production, transport and industry that currently give rise to Greenhouse Gas Emissions (GHG) contributing to global warming (Rummukainen, 2015). The existing global infrastructure is the key to addressing the issue of climate change, being responsible for approximately 60% of global GHG emissions. Davis et al. (2010), Bhattacharya et al. (2016B) and Qureshi (2016) explored the relationship between GHG emissions and existing assets, identifying that these infrastructure sub-sectors increase global temperatures through GHG emissions, both directly (i.e. power plants) and indirectly (i.e. motor vehicles). The concentration of GHGs highlights the required lowering of emissions to combat the scale of global warming, and therefore includes a number of implications for environmental trends (Rummukainen, 2015).

Shahzada et al. (2018) and Adshead et al. (2019) highlighted that the current worldwide concern to enhance the sustainability of energy has resulted in an increased focus on sustainability. This has led to investment in green energy projects and renewable infrastructure assets, regardless of any additional costs. However, a number of reports concerning renewable energy, including those from the International Energy Outlook (2016) and GEA (2012) have pointed out the significance of the potential reduction in the investment into green power over the next five years by government and authorities. Hood and Briner (2014) and Gielen et al. (2019) have indicated that it is thus vital to transfer energy sectors, including the setting up of a short and a long-period investment agenda.

The International Energy Outlook (2016), Shahzada et al. (2018) and Gielen et al. (2019) have indicated that renewable energy is currently being increasing recognised as an effective method of producing electricity, forecasting an annual growth of 2.9% (i.e. from 22% in 2012 to 29% in 2040) (see Figure 2.8). Furthermore, the predicted global share of total renewable energy supply is also estimated to increase by 30% by end of 2040, in comparison with other natural resources (i.e. coal and liquid fuel), which are predicted to experience a drop in usage from 40% in 2012 to 30% at the end of 2040.

Figure 2.7-World Net Electricity Generation by Energy Sources, 2012-40 (trillion kilowatt-hours)



Source: International Energy Outlook (2016)

The World Bank (2012), Brown et al. (2015), Bak et al. (2017) and Gielen et al. (2019) have all highlighted the advantages of including the concept of green growth within infrastructure investment strategies. Initially, this will promote and improve new infrastructure projects, leading to a decline in emissions and increasing energy efficiency and the capacity of current services. In addition, investment in green infrastructure assets has implications for economic development and climate sustainability, i.e. carbon capture and storage systems (CSS) and renewable energy systems (solar power plants) being used to supply power and minimising fossil fuel emissions (Brown et al., 2015). Studart and Gallagher (2018) reported that Multilateral Development Banks (MDBs) and other authorities are currently targeting their investment into green infrastructure, for the purposes of addressing the new wave of global climate change. However, the private financial market has, as yet, failed to focus on sustainable investments.

These financial considerations have a significant influence on socio-economic development. Therefore, the following section undertakes an analysis of socio-economic growth and its influence on infrastructure investment.

2.5.2 Socio-Economic Development Impact on Infrastructure Investment

The socio-economic development of infrastructure investment has several implications. Delmon (2015) and Zhang et al. (2019) noted that there is, as yet, no unifying model for the definition of infrastructure as a concept, resulting in difficulties in distinguishing its elements or utilising the concept, thus leading to various outcomes for infrastructure projects. Furthermore, the deficiencies of the distinctive approach found in the literature concerning influences on infrastructure investment has prevented assessment of the consequences of investment for both economic and social development (McDonald, 2017; Burton et al., 2019). Additionally, this connection has been identified as delivering a wide range of approaches to socio-economic development (Delmon, 2015; Zhang et al., 2019).

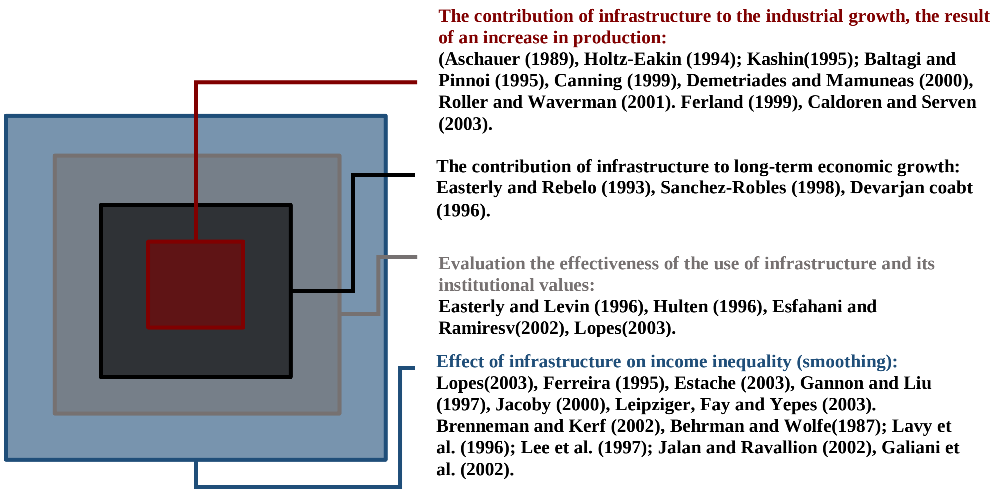
In order to introduce and identify the concept of socio-economic development, it is first vital to establish a comprehensive understanding of ‘development’ (Palvia et al., 2018). The primary measure of economic development and growth is considered to be comprised of an increase in GDP per capita (Hallegatte, 2014), whereas social development is identified as an organised and concentrated change promoting the ability of a population to lead a pleasurable, satisfied and a restful life (Midgley, 1995; Singh and Aspalter, 2008, p.2; Asomani-Boateng et al., 2015; Stec et al., 2015). Socio-economic development is there comprised of binary approaches to enhancing the economic and social measurements of civilization. Chojnicki (2010) and Litwiński (2017) recognized the notion of socio-economic development as a chain of variations defining the common features of any change and determining development procedures. In addition, it underpins the significance of socio-economic development concerning investment. Uttama (2012) examined the nexus between socio-economic development and investment strategies in the Association of Southeast Asian Nations Economic Community (ASEAN-AEC), highlighting the potential for global investment to reinforce the scale of socio-economic development in Asia. Furthermore, the ASEAN roadmap founded a long-term platform for the market system, along with economic investment, to improve the scale of socio-economic development.

2.5.3 Economic Growth Impact on Infrastructure Investment.

The literature focussing on economics (along with related academic studies) has recently recognised the implications of economic development concerning investment in infrastructure assets. As noted earlier in Section 2.6 (The Global Infrastructure Investment shift from Drivers to Challenges), economic growth has tended to form the essential driver of infrastructure investment needs and demands. This has contributed to an increase in the volume of studies concentrating on the implications of public assets for various economic actions (Égert et al., 2009; Kodongo and Ojah, 2016; Sun and Cui, 2018A). Considerable numbers of scholars and researchers have thus employed empirical instruments, as well as models and frameworks, in an attempt to measure such activities (Hall et al., 2014; Nguyen and Trinh, 2018; Sun and Cui, 2018A). A study conducted by Palei (2015) evaluated a large degree of the literature and empirical studies from the last century, in order to establish the influence of public infrastructure assets on economic growth (see Figure 2.9). This supported the conclusions of Égert et al. (2009), Calderon and Servén (2010) and Sun and Cui (2018B), indicating that investment in infrastructure assets exhibit a robust correlation with macroeconomic growth.

Furthermore, Button (1998) emphasized the correlation of linear motives with the infrastructure investment framework outlined by Biehl (1991), involving a prediction that a greater inflow of infrastructure assets can directly stimulate new economic benefits.

Figure 2.8-The Evolution of the Subject of Research of the Impact of Infrastructure Factors on Economic Growth

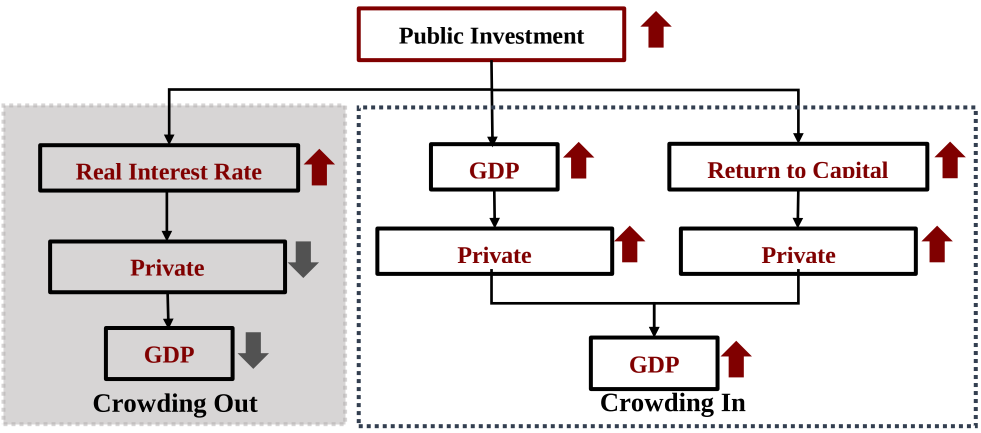


Source: Palei (2015)

Furthermore, Ross (2018) observed that this expectation includes an error known as the ‘Cantillon Effect’, i.e. that the inflow of new money into a particular region can result in a higher degree of needs in comparison to other areas. This ensures that the economy is motivated on a regional basis by infrastructure-contingent employment, although though this may have a long-term negative impact on levels of employment (Ross, ibid). Furthermore, Aromdee et al. (2005), Suhendra and Anwar (2014) and Stupak (2018) conducted a detailed review of the development paradox of the Cantillon Effect in EMDC, establishing that the causality between infrastructure investments and GDP can run in both directions (see Figure 2.10). Therefore, despite production being largely regarded as a means of transferring capital to output (i.e.

across investment in infrastructure capital assets), any increase in the rates of GDP may result in a greater need for improved infrastructure assets and amenities (Suhendra and Anwar, 2014). This can subsequently lead to a raise in interest rates, with implications for employment and capital input, as well as levels of private investment. However, Aromdee et al. (2005) stated that any increase in private investment tends to exert a negative outcome on GDP. Furthermore, issues such as ‘crowding out’ may as well lead to ineffective (or inefficient) infrastructure investments, resulting from public sectors selectively investing in resources they consider to be positively associated with economic development (i.e. shipping centres. rail terminals and roadways), while failing to develop adequate benchmarking or s predictive causal framework (Milosev et al., 2011; Pereira and Andraz, 2013; Warner, 2014).

Figure 2.9-Transition Mechanism of Public Investment



Source: Aromdee et al. (2005)

Several academic studies conducted by Aromdee et al. (2005), Suhendra and Anwar (2014) and Shi et al. (2017) have supported Aschauer’s (1989) claim that public investment has negative implications for private investment and can therefore be considered a feature of crowding out. This was reinforced by the studies of Palei (2015), Kodongo and Ojah (2016) and Sun and Cui (2018A), which recognized that investment in public infrastructure assets can exert an indirect impact on economic development and economic outputs, including: (1) an improvement in the value and quality of infrastructure assets across capital flows of cross-border and well-conditioned institutional capital assets; (2) organizational development; (3) a rise in external trade competitiveness; and (4) an improvement in industrial strategy.

However, Pereira and Andraz (2013) and Regan (2017) argued that the influence of economic growth on infrastructure public assets can include a significant level of variance, i.e. the growth and structure of financial markets and the different levels of industry, as well as social development and income levels between regions and countries. Thus, economic results can be improved by a judicious division of resources within a geographical location (Hlotywa and Ndaguba, 2017), although excess spending on infrastructure assets can exert a negative impact on economic growth, so proving detrimental to development (Shi et al., 2017).

2.5.4 Social Dynamic Impact on Infrastructure Investment

A new phenomenon has recently emerged concerning the social economy and the social outputs of assets. This has resulted in academic researchers and scholars identifying the significance of social considerations on the lifecycle of any infrastructure asset (WCED, 1987, cited by Valdés-Vásquez and Klotz, 2013; Lu et al., 2015). The essential need to maintain and develop an enhanced standard of living for all citizens has influenced the prerequisite (specifically in EIM) to structure effective economic and social infrastructure assets, with society deemed to form a major stakeholder of infrastructure capital assets. Almahmoud and Doloi (2015) and Lu et al. (2015) supported this argument by mapping out the nexus between the lifecycle of an infrastructure project and the relative social measurements, thus demonstrating a variety of stakeholders. This finding presented a critical interconnection between the needs and perceptions of stakeholders and the level of satisfaction in relation to their demands. Furthermore, there are various layers to levels of satisfaction concerning the performance of infrastructure assets. The fundamental aspect relates to the creation of a dynamic interface between infrastructure projects and a society's social values (World Bank, 2012), so identifying the interaction as contributing to the satisfaction any demands and challenges that can arise during such projects (Edum-Fotwe and Price, 2009).

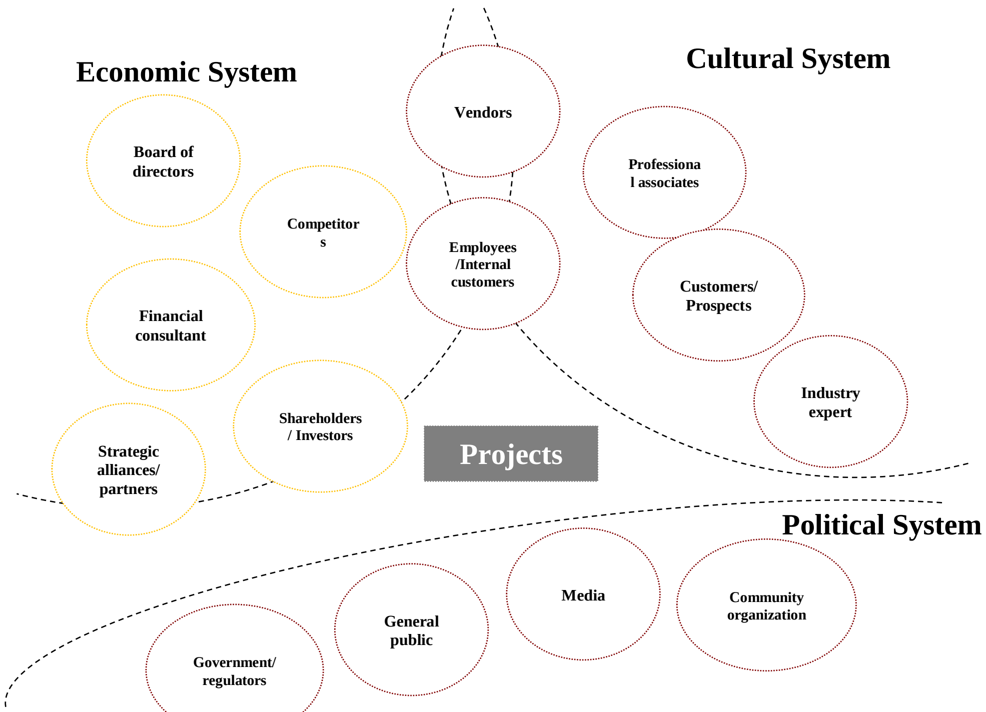
A considerable number of empirical studies have exhaustively examined the social influences on infrastructure assets within developed and Emerging Markets (EMs), alongside the direct and indirect fiscal impacts relevant to social dynamics

(Haughwout, 2002; Valdés-Vásquez Klotz, 2013; Sierra et al., 2018; Mostafa and El-Gohary, 2014; and Lu et al., 2015). This has revealed the reason for it proving beneficial to create in-depth insights into social performance and the consequent impact on infrastructure assets. Doloi (2012) and Ouyang (2014) structured a model to examine the impact of social participation and its emerging value on infrastructure assets (see Figure 2.11).

In addition, the framework drawn up by Doloi (2012) and Ouyang (2014) included three semi-interconnected separate dynamic structures (stakeholders), exerting a direct impact on an infrastructure project's short-term profits. Firstly, the economic system, which encompasses stakeholders (i.e. strategic alliance, institutional investors, contractors and infrastructure firms, along with financial consultants and advisories) having a direct interest in the lifecycle of infrastructure assets. Secondly, the political system, commonly signified by the main stakeholders consisting of government and the public sector (i.e. public assets with a direct impact on government regulations and rules, in line with its political attitudes and orientation). Thirdly, the cultural system, which concentrates on the cultural profile of a society and its influence on lifestyle. In addition, a cultural system can exert an indirect impact on economic and political systems, forming the context for the satisfaction of needs.

These three forms of stakeholder are thus deemed key to the recognition of the requirements of infrastructure capital assets, along with opportunities to implement and block future conflicts (Franks and Vanclay, 2013; Ouyang, 2014; Delgado and Romero, 2016).

Figure 2.10-Three Subsystems of Social Sustainability



Source: Doloi (2012) and Ouyang (2014)

Nonetheless, a considerable body of scholars and professional have raised concerns relating to social interventions targeted at structuring future infrastructure capital asset schemes, in particular the impact of social perceptions, which can result in high levels of doubt and uncertainty (Ouyang, 2014; Lu et al., 2015; OECD, 2019; Badi et al., 2020). This can reflect on the needs and requirements that tend to establish the public sector priorities for any investment in infrastructure assets (Zamojska and Próchniak, 2017), with social impacts aligned according to public sector provision of infrastructure assets and development (Sierra et al., 2017; Sierra et al., 2018; Badi et al., 2020).

A number of academic studies have examined the influence of society on the nature of infrastructure assets from various differing standpoints. The conclusions of Doloi (2012) were recently confirmed by empirical research conducted by Zamojska and Próchniak (2017), which emphasised the influence of the social element on investment into infrastructure assets within the transport sector, including both short- and long-term results. Furthermore, two critical aspects have also been related to the impact of various infrastructure outcomes on authorities and governments, including institutional investors, financial firms and other stakeholders: (1) social benefits deemed key to satisfying social needs, including economic activities (i.e. improving the local economy and encouraging employment); and (2) social asset drivers performing various economic functions (i.e. reducing expenditure on existing infrastructure assets and identifying long-term profits across the value chain).

Considerable recognition is currently being amassed concerning the nexus between climate change and socio-economic development (OECD, 2019). Berkhout et al. (2002) claimed that the socio-economic position remains (as noted earlier in this chapter) in a condition of persistent development. Moreover, recent empirical research by Shahzada et al. (2018) recognized the nexus between socio-economic circumstances, environmental sustainability, and energy insecurity, including their impact on the need for investment in infrastructure capita assets. It is therefore critical for governments and policy makers to consider these challenges and difficulties, particularly when establishing both short- and long-term strategies and policies. Over the short-term, it is sufficient to guarantee energy security and reduce the existing gap when it comes to energy needs. However, long-term planning needs to consider issues relating to socio-economic development and environmental sustainability in conjunction with infrastructure projections and investment planning, so as to address concerns related to climate change and energy needs. Furthermore, socio-economic development has the capability to deal with key issues relevant to global warming, alongside the provision of capital infrastructure assets.

2.6 Scale and Magnitude of the Global Infrastructure Investment Challenge

2.6.1 Historic Under-Investment by the Public Sector

A considerable number of studies have noted the widening of the global infrastructure investment gap, contributing in particular to a decrease in levels of public sector investment (Pasquali, 2015; Leviäkangas, et al., 2016; Qureshi, 2017) [5]. OECD has forecasted an annual global investment requirement of approximately 3.8% of Global

[5] A further details of the historical public investment between developed and Emerging Infrastructure Markets in Section 2.5.4 Developed vs Emerging countries in infrastructure investment.

Gross GDP. In addition, research conducted by McKinsey (2016A), recognized that the global infrastructure investment gap is currently increasing. The study noted that present expenditure on infrastructure (i.e. transportation, power, telecoms systems, as well as water and sewage services) is at approximately USD2.5 trillion, thus falling short of the predicted amount (i.e. approximately USD3.3 trillion annually) required to underpin the desired rate of economic growth over the next twenty years. Furthermore, McKinsey (2016A) observed that this investment gap is continuing to widen on annual basis, primarily due to a falling rate of global investment in infrastructure, compounded by the annual increase in infrastructure demands continuing to rise, resulting in firstly, relatively lower economic growth and secondly, depriving many global citizens of essential services (Jakob et al., 2016; Raji, 2017). The existing literature terms this difference between required and current investment as ‘the infrastructure investment gap’ (Sekandi et al., 2016; Watson, 2017).

Consequently, these historic difficulties, as well as issues related to under-investment, have contributed to an increasing division between the needs of infrastructure investment and the funding gap discussed in Section 2.4.

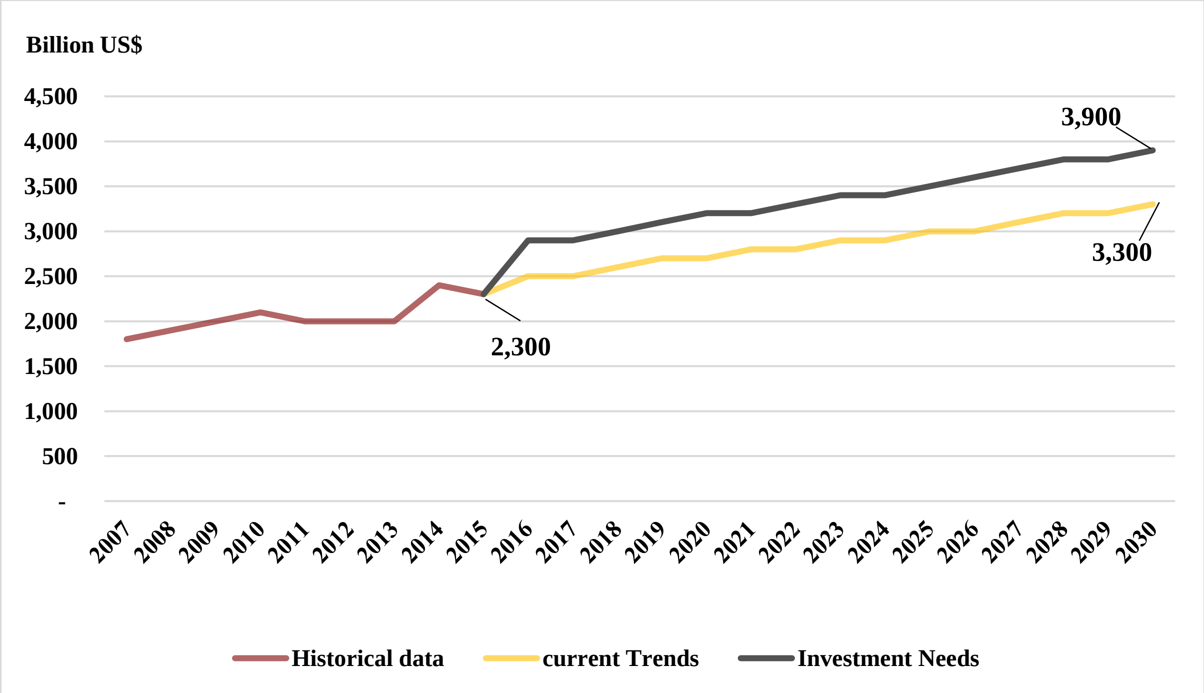
2.6.2 Overall Scale of Infrastructure Investment Challenges

The existing literature, along with professional reports, have put forward that a country’s investment in its infrastructure assets will increase by 1% in relation to a 1% increase in Gross Domestic Product (GDP) (World Bank, 1994; Calderon et al., 2015; Tripathy et al., 2016; Sekandi et al., 2016; Watson, 2017). Investment in infrastructure assets can, when adequately selected and effectively supplied, yield a benefit to cost ratio of up to 20:1. This indicates that increased investment in infrastructure, consistent with economic demands over a period of ten years, could potentially add approximately 0.6% to overall global GDP (Callghan, 2014; McKinsey, 2016A; Tripathy et al., 2016).

Global Infrastructure Outlook (GIO) and Oxford Economics (2017) performed an in-depth assessment measuring both previous and current spending trends, alongside estimating the investment demands of economic infrastructure sectors up to 2030 (see

Figure 2.12). These utilized a ‘detailed top-down statistical approach’, employing econometric models to estimate infrastructure investment demands covering seven sectors (GIO and Oxford Economics, 2017). This approach indicated that the existing rate of infrastructure investment is insufficient to guarantee sustainable growth and development (OECD, 2017B). Furthermore, it projected that investment will need to increase by 67% above the 2015 rate, reaching USD 3.3 trillion by 2030 (as represented by the yellow line in Figure 2.12). However, the current forecast indicates that an increase in infrastructure investment of up to USD 3.9 trillion will be required by 2030 (as represented by the grey line).

Figure 2.11-Global Infrastructure Spending 2007-2030 (USD billion)



Source: Oxford Economics (2017)

The historical lack of expenditure on infrastructure assets has contributed to an increased need for investment. In addition, current trends of capital assets investment are based on the demographic and economic changes predicted for each nation. The need for investment in infrastructure has been underlined by differences in economic growth between countries over the previous five years, with the rate of global economic growth being approximate 3% (Organisation for Economic Co-operation and Development (OECD), 2015B). This low level of growth has originated from a number of factors, including: 1) slower growth in productive capacity; 2) vulnerability to macroeconomic shocks; and 3) slow-level projects leading to economic risk (Pereira and Andraz, 2013; Ansar et al., 2016; Branchoux et al., 2018). Furthermore, Emerging Infrastructure Markets will encounter significant challenges and constraints in achieving spending rate each decade GIO and Oxford Economics (2017).

The necessity for global infrastructure development to fulfil sustainable growth and development has been interpreted by various publications and academic studies, although, to date, with a lack of any firm agreement (Pradhan et al. 2014; Bhattacharya et al., 2016B). Nevertheless, Bhattacharya et al. (2015) pointed out that annual infrastructure investment needs can be quantified by applying various methodologies and techniques, particularly those structured to increase rates of GDP in various regions of the world. Furthermore, Bhattacharya et al. (2016B) focussed on estimating infrastructure needs, in contrast to indicating overall estimated needs, as presented in Table 2.2. These projections were influenced by various factors, including: (1) differing forms of investment; (2) the accessibility of data in specific countries; (3) the identification of details relating to sectors and sub-sectors; and (4) the period under investigation.

According to OECD (2006), McKinsey Global Institute (2013) and UN Sustainable Development Solutions Network (UN-SDSN) (2015A) reports; to implement sectoral investment needs an evaluation method is required to forecast outlay demands across diverse economic infrastructure projects. The approach suggested is a form of "econometric modelling", which can be employed to estimate total spending demands for a group of countries. The OECD (2006) employed an econometric approach to estimate the financial requirements to develop infrastructure. The OECD projected around $33 trillion of investment would be required between 2015-2030 to pay for energy, telecoms, transport and water sectors, to assist growth. However, this aggregate estimation has since been increased by approximately $9.6 Trillion, to around $36.4 trillion, due to increasing demand level from the infrastructure sector (OECD, 2012). Based on further analysis, the projection figure increased subsequently by 60% to describe aggregate global investment demands of $95 trillion between 2016 and 2030 (OECD, 2017B). Notwithstanding, the analysis estimates that more than 50% of investment needs will be allocated for developing countries. Similarly, McKinsey (2013) forecast that global aggregate infrastructure would need around $62 trillion over a period of 15 years (2015-2030). It is anticipated that the transport sector will require the largest proportion at 42% ($25.8 trillion), followed by the energy, and water and sanitation sectors (20 and 21%).

The World Bank (2013A,B) and International Energy Agency-IEA- (2014) assessment reports were restricted to developing nations (as stated in Table 2.1). The World Bank (2013A,B) analysis estimated a total need for infrastructure investment of $14.1 trillion by the end of 2030. Telecoms was expected to require only a small share of the forecasted demands. By contrast, energy and transport sectors are dominant, at around $8 trillion. Comparably, an International Energy Agency-IEA- (2014) evaluation analysis suggested developing countries will need around $38 trillion for the energy sector for the period 2015-2030.

The New Climate Economy Global Commission on the Economy (GECE) and Climate (NCE) report (2014) utilized a sectoral investment needs assessment approach to estimating the global sustainable infrastructure required for the period 2015-2030. The NCE report addressed basic energy production and quality of energy. Therefore, a detailed division is provided in Table 2.2 for GECE & NCE (2014) analysis, to distinguish between the core infrastructure forecasted under the BAU scenario and the low carbon scenario (Bhattacharya et al., 2016B). The GECE &NCE forecasted that global investment required would be approximately $57 trillion by 2030. Notably, the GECE &NCE analysis approach includes an annual rate of global growth of 3% in their assumption. Moreover, to shift to a low-carbon capital investment scheme, additional expenditure of around 5% is required to add to the total estimation of infrastructure investment needs. Implement low-carbon strategies on energy infrastructure comprising a variety of measurements: maximizing expenditure on power plants, determining energy efficiency by implementing emerging technology and predicting energy efficiency during transition and the provision of other sustainable capital assets (GECE and NCE, 2014; Bhattacharya et al., 2016B). Therefore, the energy sector is predicted to occupy a large proportion of infrastructure investment needs around $101.6 trillion by the end of 2030.

More recently, the UN Sustainable Development Solutions Network (UN-SDSN) (2015A) report has estimated that infrastructure needs to achieve basic quantitative infrastructure services to meet new United Nations Sustainable Development Goals (the UN SDGs) (UNSDG, 2015A; UN SDGs, 2017B). Their analysis comprises additional needs for regions characterised by a low infrastructure standard, other sectorial grounds that are forecast and needed to increase GDP share as an investment to achieve an SDG standard (a comprehensive details of SDG provision will examine later). According to the UN-SDSN (2015B) provision, the Transport sector commands a large proportion of middle and low-income economies expenditure at $9.5 trillion (approximately 50% of aggregate infrastructure needs).

Table 2.2-Comparative Assessment of Infrastructure Needs, 2015-2030, US$ Trillions (2015 US$)

Source	**Coverage**	**Energy**	**Transport**	**Water supply & sanitation**	**Telecom**	**Total**
OECD (2006)	Global except for water sector.[1] Needs are additions and renewals.	3.9	6.0	17.0	5.9	**32.8**
OECD (2012)	Transport sector only.		9.6			
Boston Consulting Group (BCG) (2010)	Global, using OECD and World Bank estimates.	4.0	7.0	14.3	9.2	**34.5**
McKinsey Global Institute (2013)	84 countries that account for more than 90% of global GDP.	13.2	25.8	12.7	10.3	**62.0**
World Bank (2013b)	Developing countries only	4.0	4.1	3.2	2.8	**14.1**
International Energy Agency-IEA- (2014)	Global energy needs only.[2]	37.6				
GECE NCE, 2014 (Total Needs - –business as usual (BAU))	Global	50.4	14.8	23.1	7.7	**96.1**
GECE & NCE, 2014 (Total Needs - Low Carbon	Global					**101.6**
GECE & *NCE (Core Infrastructure business as usual (BAU))*	Global	*11.0*	*14.8*	*23.1*	*7.7*	**56.7**
GECE & *NCE (Core Infrastructure – Low Carbon)*	Global	*-1.1*				**55.6**
GECE & *NCE (Energy - Primary Generation and Use)*	Global	*39.4*	*0.0*	*0.0*	*0.0*	**39.4**
UNCTAD (2014)	Global	9.5-14.4	5.3-11.7	6.2	3.5-6.7	**24.5-38.9**
UN Sustainable Development Solutions Network (UN-SDSN) (2015)	Global, meta- analysis of other studies.[3]	5.3-5.4	9.5	0.03	5.0	**19.8-19.9**

Notes
All estimates are in US$ 2015, and adjusted for the 15 year period, 2015-2030.
1: Water sector projections include the OECD and Brazil, China, India, and Russia.
2: Energy needs include energy supply (fossil fuel extraction, power generation, transmission and distribution) and energy efficiency needs.
3: Needs are adjusted for overlap; Water sector estimates are for universal basic service coverage.

Adopted from: Bhattacharya et al. (2016B).

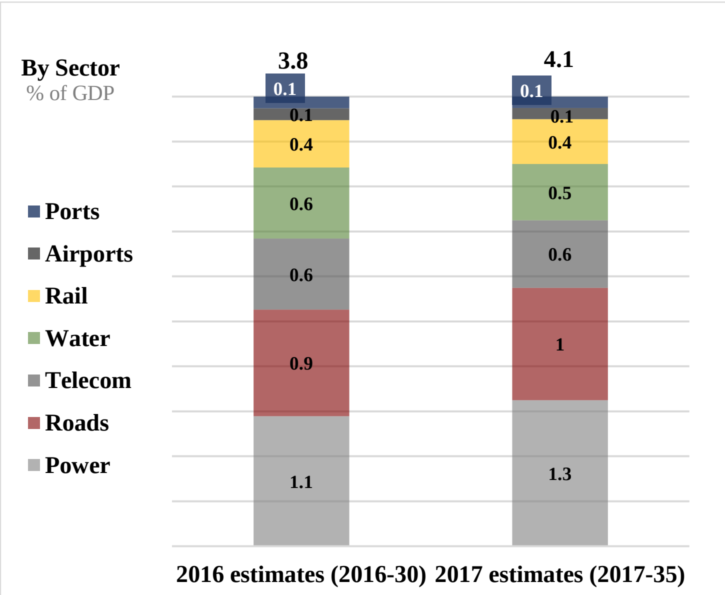
A large number of reviews and studies have indicated that a considerable degree of new and additional investment is required to minimise the gaps in infrastructure investment. However, Bhattacharya et al. (2016B) criticised previous projections of infrastructure investment needs by citing: firstly, the inability to identify the increase in infrastructure expenditure during the previous decade, and secondly, the failure to record the global drivers behind infrastructure investments needs. Furthermore, Branchoux et al. (2018) pointed out that each individual forecast is syndicated to a diversity of specific sources, echoing various underlying propositions and definitions. These estimations have been subsequently improved for the benefit of comparison. The drivers behind any differences in the indicated amounts have tended to employ a variety of assumptions (e.g. economic, demographic and urban growth) (Abiad et al., 2018).

2.6.3 Spatial and Sectoral Interpretation of the Infrastructure Investment Gap.

The foundation of economic growth lies in the infrastructure supporting vital sectors, including transport, energy, telecommunication and water (OECD, 2017B). In addition, there are a number of differences between capital assets, with some sectors having globally reached their maturity (i.e. airports, ports, water and telecommunications) (Pradhan et al., 2014), while others still require significant investment, i.e. electricity services, railways and roads (Estache and Wren-Lewis, 2009; Estache and Garsous, 2012; Estache, 2016).

A study by McKinsey (2016A) identified a widening of the global infrastructure investment gap. Annual global investment in infrastructure (i.e. power, transportation, telecoms systems and water) is currently reported to amount to approximate $2.5 trillion, thus falling short of the estimated amount required (i.e. approximately $3.3 trillion annually) to support the desired rate of economic growth over the next twenty years. The estimate of infrastructure investment sectorial needs is presented in Figure 2.12. The analysis of essential economic infrastructure includes an annual 1.5% GDP investment into transport, i.e. rail, road, ports and airports. On the other hand, primary energy/power supply chains, electricity transmission and distribution, telecommunications, water and sanitation account for approximately 30% of the total estimation (i.e. 1.1% of GDP for power and 0.6% of GDP for telecoms and water). This reflects the importance of investment into energy, buildings and transport (Chovanec, 2011; Bielenberg et.al, 2016). Nonetheless, this represents an adjustment of the estimation of economic infrastructure demands to 4.1% of GDP between 2017 and 2035, in order to maintain the needs of a longer period (i.e. nineteen years) McKinsey (2016A). It should be noted that McKinsey's (2016A) estimation was based on data relating to the infrastructure stock in 2015. In addition, the base-year price has been adjusted and updated for the 2017 prediction. Therefore, an increased rate of GDP growth has been estimated to directly increase the demand for additional economic infrastructure.

Figure 2.12-Aggregate Infrastructure Spending (Investment Needs-Economic Infrastructure)-Part1



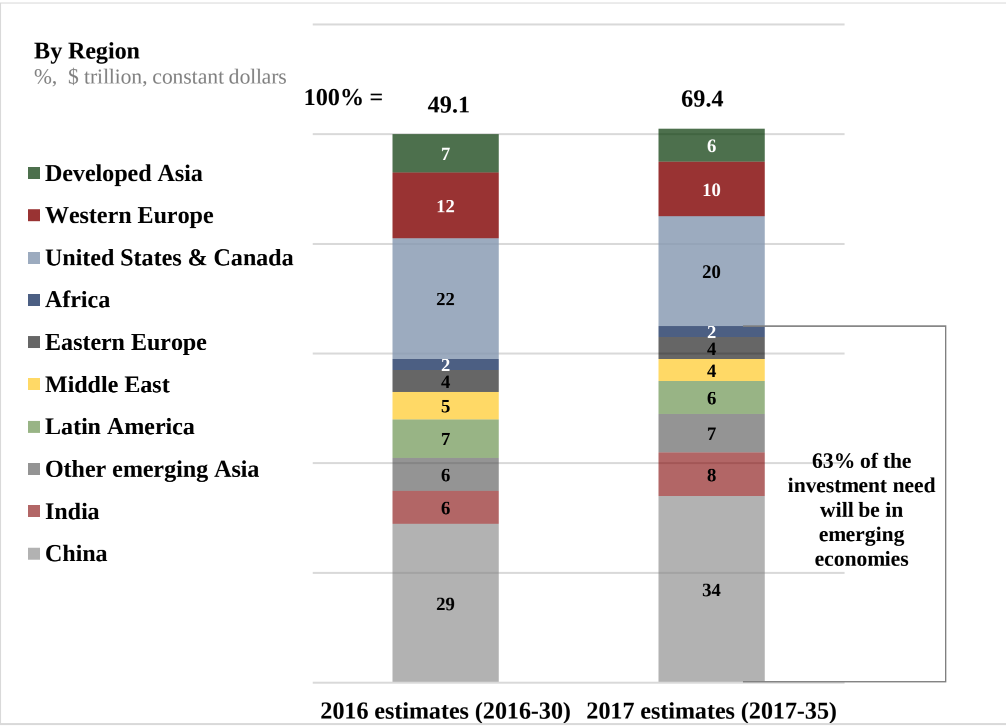
Source: IHS Global Insight; GWI; IEA; ITF, National Statistics; McKinsey Global Institute analysis (2016A)[6]

It should be noted that Figure 2.13 concerning aggregate infrastructure spending (i.e. investment needs and economic infrastructure) is continuous to Figure 2.12, which analyses predictions made across regions. Thus, 42% of global demand is considered

[6] McKinsey (2016A): GWI: Global Water Intelligence for water, HIS Global Insight (IHS) for energy, ITF: International Transport Forum for transport

to arise from the need of Asian nations between 2016 and 2030. The centre of global infrastructure projection has now shifted to China, resulting in an estimation that, between 2016-2030 and 2017-2035, there will be an aggregate need for economic infrastructure investment of $29 and $34 trillion (See Figure 2.15-Part 2). China has now overtaken the United States, Canada and Western Europe as the global leader when it comes to investment into economic infrastructure. However, it has also been projected that lower- and middle-income nations will invest between $2 and $6 trillion by 2035. In addition, the overall long-term economic infrastructure investment needs of EIMs has been estimated to account for 63% of this figure (McKinsey, 2016A).

Figure 2.13-Aggregate Infrastructure Spending (Investment Needs-Economic Infrastructure)-Part2



Source: IHS Global Insight; GWI; IEA; ITF, National Statistics; McKinsey Global Institute analysis (2016A)[7]

[7] McKinsey (2016A): GWI: Global Water Intelligence for water, HIS Global Insight (IHS) for energy, ITF: International Transport Forum for transport

2.6.4 Developed vs Emerging Countries in Relation to Infrastructure Investment

EMs are currently considered the most promising markets for global competitive corporations (Sunje and Çivi, 2008). Garten (1996: p.7) stated that EMs are “a magnate for the world’s most competitive companies from the US and abroad”. It is therefore vital to differentiate between EMs and developed countries, in order to provide a comprehensive insight for the attractiveness of EMs for multi-national corporations and global investors (Sunje and Çivi, 2008). A substantial degree of literature has examined the characteristics of EM (Bang et al., 2016), with Miller (1998) identifying the following three dominant categories of EM features. Firstly, physical characteristics relating to inadequacies of economic infrastructure. Secondly, unique socio-political characteristics concerning political instability and inadequate legal frameworks, along with unique cultural characteristics and weak social discipline. Finally, economic characteristics relating to the control of currency and the influence of governments in the economic life of a nation. A key study by Sunje and Çivi (2008) considered the macroeconomic perspective of emerging and developed economies, as detailed in Table 2.3. Their evaluation encompassed four essential dimensions: (1) economic development and growth; (2) society and economy; (3) rate of growth; and (4) space for development. There are number of important differences, with EMs characterised by the possession of considerable potential for business growth and market. A number of important aspects have been exploited by EMs. The most critical is that, in contrast to mature markets found in developed economies, EIMs signify an undeveloped market (i.e. underdeveloped macroeconomic frameworks, market institutions and infrastructure) offering opportunities for global companies and investors to play an essential role in developing these markets (Miller, 1998; Sunje and Çivi, 2008; Bang et al., 2016). However, EIMs are currently facing a lack of market stability in comparison to developed economies. This has led global companies to exercise caution in entering such a fragile market, particularly one containing a variety of risks (Percoco, 2014).

Table 2.3-Comparison between Developed and Emerging Markets

Dimensions	Developed Markets	Emerging Markets
1. Level of economic development.	High	Low/ Medium
2. State of economy (and society)	Developed/Stable	Transitional/ Unstable (Economic/Political reforms
2.1 Macroeconomic framework	Developed/Stable	Undeveloped (being created)
2.2 Market institutions	Developed	Undeveloped (being built)
2.3 Market conditions	Stable	(Un)stable
2.4 Market infrastructure	Developed	Undeveloped (being built)
2.5 Governmental involvement	Not so high	Relatively high
2.6 Cultural resistance to economy	Low	Higher
3. Rate of growth	Low	High
4. Room for growth	Narrow (matured markets)	Huge (undeveloped markets)

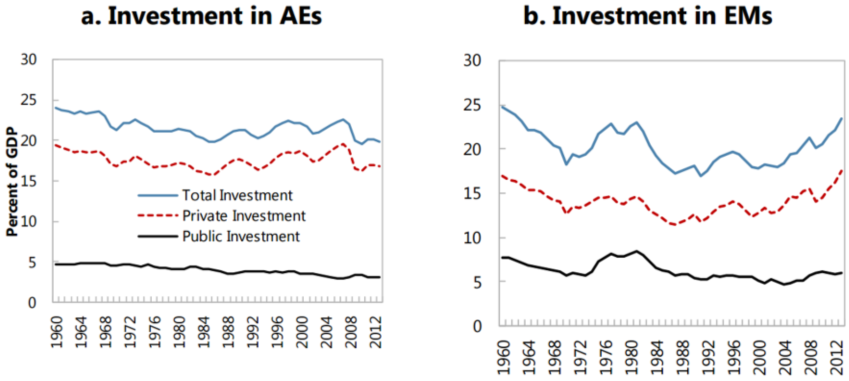
Source: Sunje and Çivi (2008)

However, Yanosek et al. (2007) claimed that this transformation can exert a negative impact on global investors and multilateral lending institutions. Instead, they were convinced of the emergence of new funding resources, particularly from local or regional private sectors, which would then play a critical role in the dominance of emerging markets. Furthermore, this would then lead to a reduced role for intermediator lending institutions, i.e. multilateral institutions (Yanosek et al., 2007).

A significant challenge structured by the increasing global infrastructure gap concerns a lowering in the rates of public sector investment during the previous thirty years (Pasquali, 2015; Leviäkangas, et al., 2016; Qureshi, 2016). In addition, there are significant variances and gaps in public investment between developed countries and EIM. Figures from the International Monetary Fund (IMF) (IMF, 2015) revealed that public investment in EMDC peaked during the late 1970s and early 1980s (i.e. at over 8% of the GDP of these economies). However, this then declined during the mid-2000s, to reach between approximately 4% and 5% of the GDP of these economies (see Figure 2.16), despite of a subsequent recovery of between approximately 6% and 7%.

This led Nguyen and Trinh (2018) to highlight the negative impact of public investment on the development of financial support for infrastructure, as well as restricting long-term economic growth. They indicated that the global economy requires the establishment of a conducive investment atmosphere to encourage private participation and attract foreign investors to EMDC. This is particularly significant as, in the context of developing economies, critical small-scale investments can stimulate private investment and increase demand for effective infrastructure (Warner, 2014).

Figure 2.14-Public Investment in Advanced and Emerging Markets



Source: Centre for International Comparisons (2013); OECD (2014); WEO; and IMF (2015)

It is essential to note that, in advanced economies, public investment in capital assets has steadily decreased over recent years, i.e. from 5% of GDP in the late 1960s the to historic lows of 3% recorded in 2015. Furthermore, Jakob et al. (2016) and Raji (2017) argued that, in the context of EMDC, this has not experienced any level of recovery. As infrastructure capita assets forms a considerably significant aspect of public sector investment, this overall decline has contributed towards an exacerbation of existing gaps in infrastructure funding (Warner, 2014; Sekandi et al., 2016; McDonald, 2017; Qureshi, 2016). In addition, the recent global fall in infrastructure investment has been attributed to the influence of the Global Financial Crash (GFC) of 2008, which forced many countries to reduce their fiscal expenditure in response to austerity measures (Jakob et al., 2016; Raji, 2017).

As highlighted earlier, McKinsey (2016A), reported the need for annual global investment into infrastructure capital assets of approximately $3.3 trillion. However, it is pertinent to recognize that, of this, EMs require approximately 60% (i.e. circa $2 trillion), while developed economies need the remaining 40% (i.e. circa $1.3 trillion)

(Renwick et al., 2018; Hussain et al., 2019). McKinsey's (ibid) research projected that, should the current underinvestment trajectory persistent, there will be an annual global shortfall of nearly $350 billion between 2015 and 2030. It is important to note that these predictions fail to take into consideration the additional investment required to meet the new United Nations Sustainable Development Goals (UN SDGs), i.e. SDG-9, which aims to: "build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation" (Pasquali, 2015; UN SDGs, 2017A, p: 36; Ali et al., 2018). According to Woetzel et al. (2016), SDGs have become drivers of environmental sustainability, placing further pressure on the demand for infrastructure investment. These needs are expected to increase in relation to the continued growth of the global population, combined with a new wave of climate change. It is therefore evident that the size of this gap will triple if the development investment requirements listed by UN SDGs under sustainable development goals are factored into this equation (McKinsey, 2016A).

2.6.5 Dynamic Target of Infrastructure Investment in Emerging Infrastructure Markets

Infrastructure investments tend to be influenced by various measures to fulfil environmental and economic challenges, with EMs requiring considerable additional infrastructure investment (Foster and Briceño-Garmendia, 2009; Calderon and Servén, 2010; and Estache et al., 2015; Estache, 2016; Hussain et al., 2019). It has been estimated that additional annual investments of up to $200- $300 billion are required to ensure an increase in green initiatives and the implementation of sustainability (i.e. renewable energy) into infrastructure projects (Inderst and Stewart, 2014; Bhattacharya et al., 2015). This can generate critical obstacles, so contributing to the currently increasingly slow-moving progress in extending EM infrastructure to secure environmental sustainability (Fay et al., 2011; Pereira and Andraz, 2013; Inderst and Stewart, 2014). Furthermore, various empirical papers and academic studies have examined a number of distinctive features of EIM likely to hinder investment in sustainable infrastructure assets, with Gurara et al. (2017) examining several indicators relating to such infrastructure investment. From an economic standpoint, the financing of infrastructure capital assets is challenging, due to the increased cost of environmentally sustainable assets, which can only be recovered over the long-term. Brown et al. (2015) addressed the issue of forecasted expense arising from the adoption of green infrastructure investment, including that relating to: (1) the adoption of new technology and an environmental business framework to deliver progress; (2) the application and implementation of the standards and measurement of conservational safeguards; and (3) the enhancement of infrastructure assets to minimise CO_2 emissions.

Global institutional investors have encountered considerable obstacles in relation to EMs, reducing their likelihood of investing in EMDC (Gao et al., 2010; Della Croce, 2011; Inderst and Stewart, 2014; Alderighi et al., 2019). The reasons for this reduction include: firstly, macro-level instability (i.e. political and social unrest and economic instability) and secondly, a lack of technical knowledge and experience. Macro level instability can lead to a weakening of returns on investment into infrastructure, with success becoming entirely a matter of chance and largely correlated to EM political and social unrest. Empirical evidence has suggested that greater economic instability results in a proportionately lower investment in EIMs. A further form of risk encountered by global institutional investors investing in EM concerns a slow rate of growth, leading towards bankruptcy. This compromises the safety of any investment, resulting in investors avoiding any involvement with a volatile economic environment. However, there remain a number of factors enhancing the rate of private investments within the emerging country, i.e. good monetary policies adopted by government, low inflation rates, and increased economic stability (Gao et al., 2010).

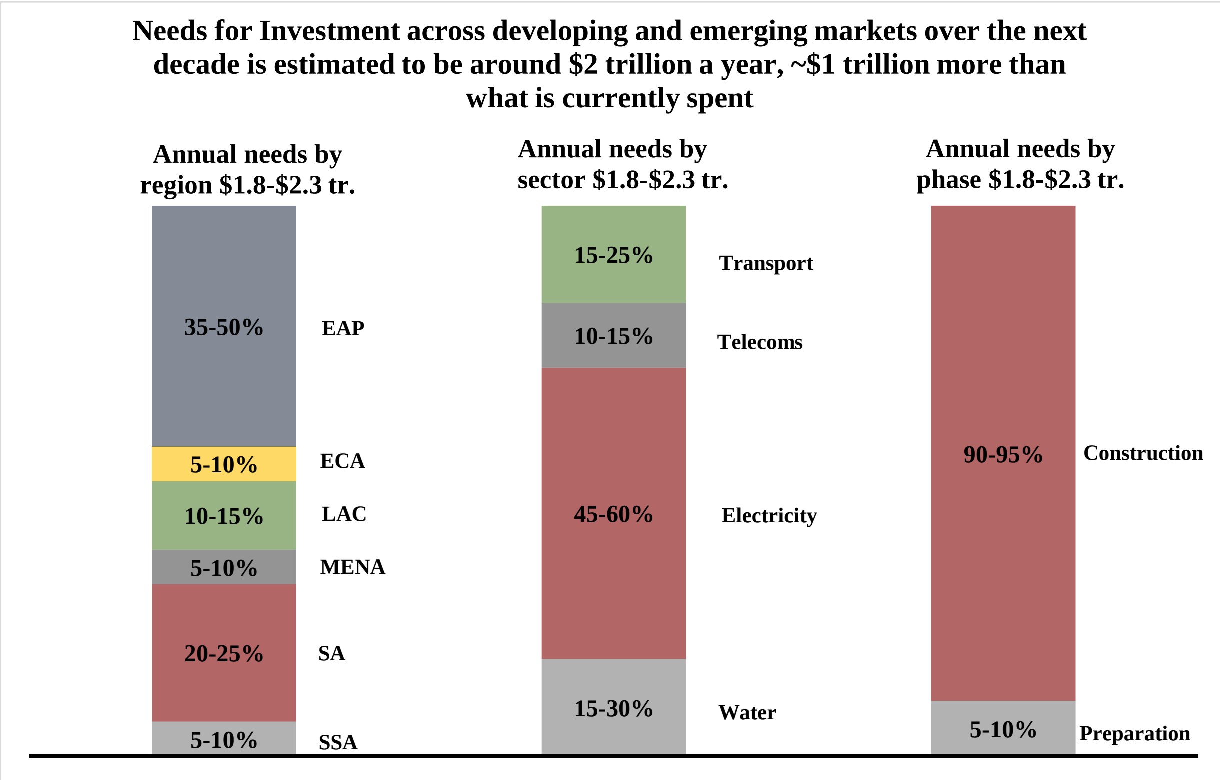
In addition, corruption represents a further political challenge leading to increased risk when investing in emerging countries. Loxley (2013), Percoco (2014) and Osei-Kyei and Chan (2017) indicated that acts of corruption in EM have been identified as a key barrier to investment in infrastructure assets, including in response to low returns. This was supported by a recent study by Wang et al. (2019), which sought to recognise the motives behind the failure of EMDC to attract global private investors. The research employed a data panel of 4,560 projects across 138 EMDC between 2002 and 2015. This concluded that indicators exerting a significant influence on attracting global private investors to EMDC consisted of: (1) public sector efficiency and ensured regulatory; (2) the application of law; and (3) the control of corruption. Furthermore, increased corruption, along with higher levels of inequality and in-efficiency of public services, contributed to the raising of investment returns. Yiu, et al., 2005; Gao et al., 2010; Percoco, 2014). However, at the macro level, the prior elements tend to lead to lower investments within the economy, resulting in lower levels of growth and increased rates of unemployment (Tan and Peng, 2003; Meyer and Nguyen, 2005). Furthermore, strong evidence has arisen demonstrating the negative influence of low investment rates, which tend to lower economic output and reduce employment. One of the methods employed to deal with this concern is to increase transparency at the national level, along with establishing set rules, regulations, policies and procedures. This can result in lowering corruption levels and increasing transparency (Delios and Henisz, 2000; Yiu et al., 2007; Freckleton et al., 2012).

Thus, infrastructure investment in EM contains a number of difficulties, as discussed in previous sections. EMs are branded by an absence of the legal frameworks required to secure effective risk management and address the potential for expropriation. In addition, there are also specific challenges and difficulties, as outlined by Tiryaki and dos Santos (2017), comprised of: (1) high levels of inconsistency in structuring policy; (2) insufficient risk adjusted returns on capital assets investment; (3) lack of effective government; and (4) risks arising from the overall environment of EIM. Furthermore, the capability of EM to fund the cost of infrastructure investment can prove heavily reliant on the ability of existing infrastructure to generate the expected benefits. As demonstrated in Section 2.2 (Infrastructure Concept Definition and Context), economic infrastructure assets form a critical and vital driver of economic development. However, as noted by Elburz et al. (2017), positive results require investment into appropriate infrastructure. The lack of infrastructure in many EIMs results in insufficient reinforcing infrastructure to permit any investments to reach their full potential (Chen, 2017).

A further critical issue concerning investment in EM is the need to support the creation of infrastructure by ensuring sufficient levels of finance, principally by means of debt (Chen et al., 2017). Overall, the size of greenfield investments, and the degree of risk, signifies that equity-only investments may fail to deliver adequate disparities between the amount of debt required to fund public capital assets and the level of debt global financiers are willing make available at an adequate rate (Buriachenko and Geraymovych, 2014; Chen et al., 2017). The capacity of global institutional investors to generate valuable benefits and high returns on infrastructure capital investments tends to be restricted by their ability to access finance. These challenges, and particularly those related to financial issues, can be exacerbated by the extent to which EM government and institutional authorities have also employed debt to fund infrastructure capital assets. As observed by Grewal et al. (2015), EIMs regularly obtain unsustainable levels of debt when endeavouring to invest in essential infrastructure projects. This can prevent governments from maintaining a country's existing infrastructure and supporting services, which can result in an increased risk of expropriation.

The estimated growth and development in EIM will result in infrastructure funding forming 65% of the total global requirement for infrastructure (Tortajada, 2014; McKinsey, 2016B; Mancini et al., 2017). Meanwhile, Ruiz-Nuñez and Wei (2015) pointed out the significant discrepancy in EMDC between the demand for, and supply of, infrastructure investment. Bhattacharya et al. (2016A) provided the following detailed estimation of the infrastructure finance gap in EMDC (see Figure 2.15, below).

Figure 2.15-Estimated Annual Infrastructure Investments in Developing Countries and Emerging Markets (2005-2030)



East Asia) including China) will require the majority of investment. Relative to its GDP. Africa will constitute a substantial share.

45-60% of investment requirements will be in the electricity sector. Including generation capacity, transmission and distribution networks

Preparation costs, including costs of design and arranging financial support, can constitute up to 10% of overall costs.

Source: Bhattacharya et al. (2016A).

In order to meet its infrastructure needs and reduce the existing financial gap, EMDC requires an annual increase in infrastructure spending of between approximately USD 1.8-2.3 trillion by 2030 (Bhattacharya et al., 2016A). However, the prediction of future investment in infrastructure assets reveals that this would not be distributed equally across EIMs, with East Asia region taking the larger proportion (circa 35-50%) of the annual requirement of other regions. Moreover, McKinsey (2012) expected the population of China to increase by 4% in 2000 to reach 61% globally by 2030, thus impacting on economic development. Similarly, McKinsey (2010) noted that, the economy of India is projected to grow by 40% by the end of 2030, which will also lead to an increase in Asia’s infrastructure needs.

Governments, policymakers, professional institutions and academics agree when it comes to the need for infrastructure investment targets, with the concentration in

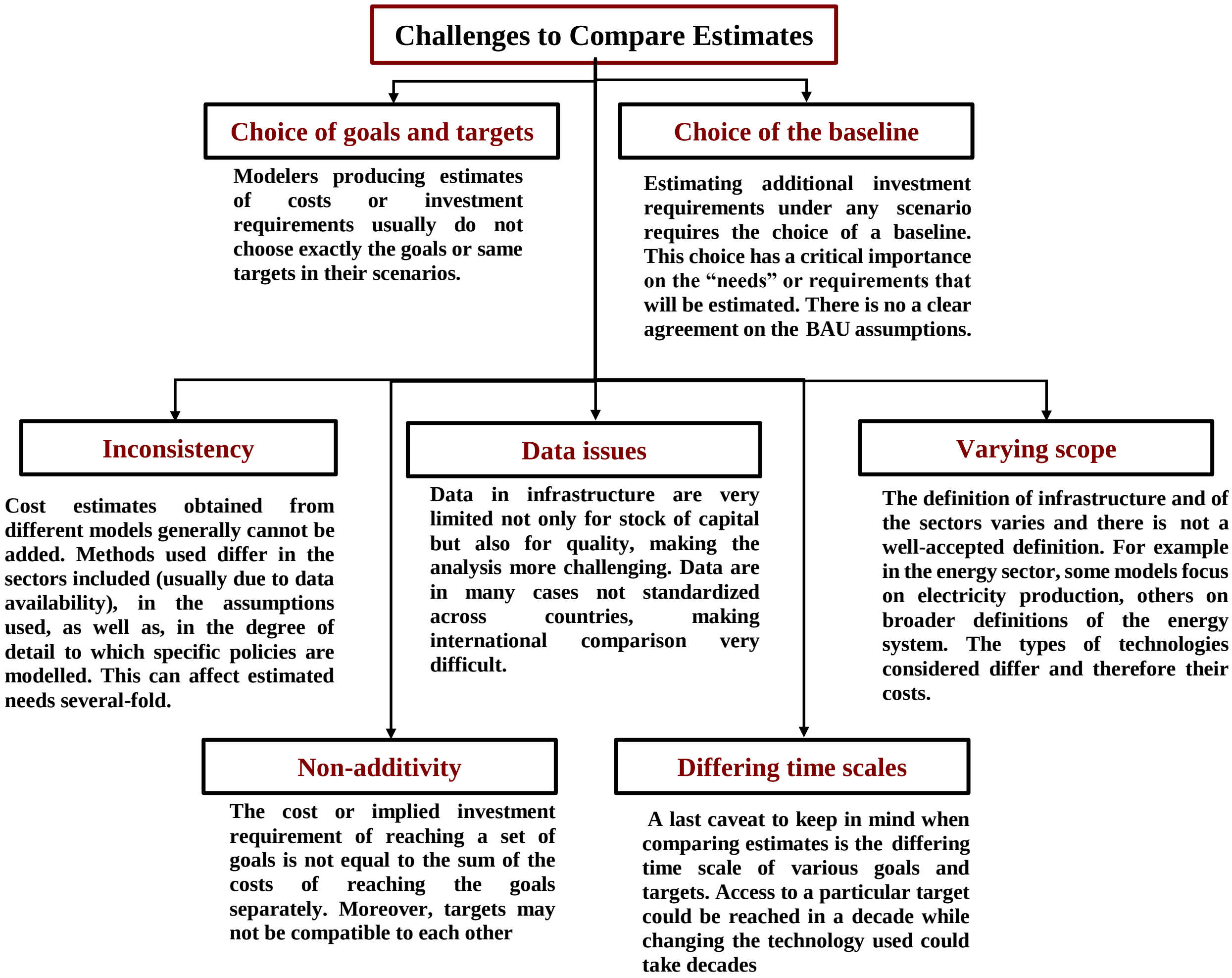
EMDC being primarily placed on the three vital sectors: (1) energy; (2) transport; and (3) telecommunications (Regan, 2017; OECD, 2017B; Branchoux et al., 2018). This recognition strengthens the view expressed by Bhattacharya et al. (2016A) (see Figure 2.17) that over 40% of annual projected spending will, in future, be directed towards investment in energy projects (i.e. power plants and electricity generation). This represents a significant percentage, thus emphasising the increased focus on EIM by global institutional investors. In addition, EM consumers are expected to benefit from strong growth in wealth and spending, being projected to drive the expected growth in consumption, which is estimated to reach USD 62 trillion by 2025 (Mancini et al., 2017; Tortajada 2014), i.e. in line with predicted infrastructure investments in EIM aimed at facilitating growth.

2.6.6 Infrastructure Forecasting Methodologies.

Assessment of infrastructure investment gaps is important to quantify the future infrastructure investment demands and to bridge the investment gap (Dreger and Reimers, 2016). Therefore, all past studies acknowledge that bridging infrastructure investment gaps and meeting demand will require additional investment on a huge scale. Despite this, a number of researchers have criticised the projections of infrastructure investment demand, from different perspectives. A range of different methodologies have been implemented to forecast infrastructure investment needs. Ruiz-Nuñez and Wei (2015) stated that there are two broad approaches employed by most researchers in the academic literature to estimate infrastructure investment demands. First, the majority of empirical studies implement the ‘top–down’ method of Fay and Yepes (2003) (i.e. the McKinsey report (2013) and a study by the OECD (2006). This technique is a form of econometric modelling intended to quantify the projection of infrastructure investment demands per sector at a country level. Second, the ‘bottom–up’ technique assesses infrastructure investment needs based on individual project data and cost of investment.

Despite the large volume of research estimating national investment needs, Ruiz-Nuñez and Wei (2015) emphasise other drawbacks and limitations, arguing that empirical studies depend on outdated data and do not account for the fluctuation in infrastructure stock. The United Nations (2012) identified seven dimensions that make comparison between infrastructure investment forecasts challenging (Figure 2.16): 1) choice of goal and target – researchers do not always set an aim or baseline when they provide an estimate of infrastructure investment requirement: 2) variable scope – there are differences in identifying the scope of infrastructure or sector; 3) data issues – there is limited availability of infrastructure information, which makes evaluation challenging; 4) Selection of benchmark: forecasting new and additional investment is critical vital for demands and has no reference baseline; 5) different timeframes – there are discrepancies between authors in regard to time scale, which makes comparison difficult; 6) non-aggregate – the total cost of estimated investment to accomplish targets is non-comparable with the sum rate of estimations; and, 7) inconsistency – it is difficult to compare cost projections of investment needs because of the different approaches and techniques employed, and differences in specific details.

Figure 2.16-Comparison of Different Criteria for Infrastructure Investment Needs Estimation



Source: United Nations (2012) and Ruiz-Nuñez and Wei (2015)

In addition to Bhattacharya et al.'s (2016B)[8] criticism, which highlighted the reasons behind the insufficiency of infrastructure investment needs forecasts, Castellani et al. (2018) argued that the majority of empirical research and studies are difficult to compare, for several reasons: 1) there is no consistency across countries; 2) different empirical methodologies and analyses are employed; 3) diverse quantitative forecasts and expert assumptions are utilised. On the other hand, Stupak (2018) noted that the historical data predicts that public investments made during a recession will have a greater impact on economic output than if the same investments were made during a period of economic expansion. Additional spending during periods of full employment

[8] Bhattacharya et al. (2016B) criticism examined in details in Section 2.6.2: Overall scale of infrastructure Investment Challenges

can lead to higher levels of inflation, and thus an increase in interest rates, which can have an impact upon short term economic output (Stupak, 2018).

2.7 The Complex and Diverse Nature of Infrastructure Investment Challenges.

The main challenges for infrastructure investment and financing arise from (as stated in Section 2.3 'The Global Growth of Infrastructure Investments Needs and Gaps') the disparity existing between infrastructure assets (Branchoux et al., 2018). One of the central challenges for modern cities concerns the rate of population ingress, and (by default) the pervasive influence of urbanisation on concentrated regional needs and developmental pressures (Wei and Ye, 2014). Infrastructure investment precipitates socioeconomic stability; however, Ameen and Mourshed (2017) and Regan (2107) acknowledged the impact of multiple planning and development challenges on both the efficiency and effectiveness of the development process. As noted previously, energy infrastructure needs to be sufficiently secure, as well as flexible and adaptable to changing population profiles, and protected from a variety of direct and indirect influences (Ameen and Mourshed, 2017). Similarly, the capabilities of various other resources (i.e. water and waste processing) must be planned and maintained, including systems capable of mitigating disruption, meeting demand, and addressing future needs (Ameen and Mourshed, 2017). Although regional governments are tasked with the provision of infrastructure solutions capable of meeting a diversified range of urbanised needs, Koppenjan and Enersink (2009) suggested that Public Service Provision (PSP) is vulnerable to multiple layers of threat, i.e. levels of coverage, regional favouritism, and agendas that are interest-serving rather than solution-serving.

Infrastructure to support transport, water supplies and treatment and health sectors are essential for any society, but core infrastructural needs tend to be focussed primarily on economic sectors, i.e. transportation, energy and technology (Qureshi, 2017). The nature of the infrastructure sector creates various barriers and limitations to public capital investment. Thus, global governments tend to underestimate the interdependency of transportation, energy and technology assets, thus resulting in substandard investment (KPMG, 2017). One of the core issues related to employing technology in infrastructure is that it assumes economic benefits can be translated at similar rates from urban beneficiaries to their rural counterparts. However, evidence from Chinese infrastructure development projects, identified by Ansar et al. (2016), confirmed that (unless endowed with sufficient momentum and scale) the net benefits of infrastructure investment can be diluted by a range of forces, i.e. cost-overruns, a lack of regional engagement, and a focus on short-term value. Although the spill over effect of modernisation and technological improvements contain the potential to equalise any inequalities in developing societies between resourced and under-resourced populations, the direct impact on infrastructure investment is unlikely to be realised without a sufficient level of regional demand and engagement (Ansar et al., 2016).

At the same time, Hall et al. (2014), Regan (2017) and Selim et al. (2018) suggested that infrastructure needs to operate as an interconnected representation of social, economic, and environmental objectives, fulfilling those aspects that are sustainable and of high-efficiency, whilst at the same time meeting critical regional needs. Policy-makers tend to relate the motives underscoring infrastructure investment to specific needs or regional advantage, in order to shape the central priorities of the planning scheme, thus legitimising particular concerns and agendas, while at the same time overshadowing the importance of other, less significant, goals (Selim et al., 2018). By benchmarking performance against the broader dimensions of the infrastructure impact model (both tangible and intangible), the central expectation of efficiency and value becomes a precondition of investment, and can shape and influence regional motives.

As highlighted earlier, infrastructure is a fundamentally complex project because the completion of infrastructure is not the overall goal; rather, the completion of the capital assets are a prerequisite for achievement of economic and social goals (Tiryaki and dos Santos, 2017). This is turn makes it complex and risky to invest public capital assets in the infrastructure industry, particularly in emerging markets and developing countries. Given the high level of associated risks, and the fact the “exhaustive risk allocation cannot be achieved through contract conditions, because all risk items cannot be foreseen at the planning stage" (Rahman and Kumaraswamy, 2005, p365; 2015), global foreign investors are vulnerable to unforeseen risks when they decide to enter the investment market in emerging countries. These risks can be exacerbated by the extent to which major infrastructure assets. Consequently, various risks emerge, which may be transferred to foreign investors with limited resources (Motaleb and Kishk, 2014; Gajsek and Rosi, 2015).

2.8 Conclusion

This chapter has examined the critical global drivers and challenges facing infrastructure investment and contributing to the achievement of the first objective of the current research:

> *To examine of the composition and structure of the global infrastructure investment universe, including the main barriers to investment flows, and strategies for attracting global investment within the infrastructure industry*.

Firstly, there was a discussion of the significant nexus between investment into infrastructure and economic development. Secondly, there was an examination of the various global drivers impacting on infrastructure investment, including challenges and barriers comprised of: (1) the new wave of global warming and climate change; (2) socio-economic development; (3) demographic shifts; and (4) urbanisation.

This chapter also explored the nature and considerable scale of the issues facing global infrastructure investment, identifying the persistent growth in existing global challenges, including the additional delivery of multifaceted and complex infrastructure assets (World Bank, 2012). This was found to result in key barriers to increasing sustainable infrastructure investment and the ability to direct funding towards green investment, due to the availability of financial resources (Bak et al., 2017). There was also a discussion of the need to improve the effectiveness of the public capital assets provision cycle, in order to form a secure basis for the delivery of infrastructure capital assets and the reinforcement of economic development (Qureshi, 2017). The discussion also identified the adverse impact and the scale-up in the infrastructure investment gap as having arisen from insufficient identification of the need for infrastructure assets (RICS, 2013). This led the current researcher to conclude that the global infrastructure investment gap is currently widening. Thus, the level of required global investment into infrastructure such as power, transportation, telecoms systems and water (reportedly around $2.5 trillion annually) currently falls short of the estimated amount (reportedly around $3.3 trillion annually) required to support economic growth over the next twenty years (McKinsey, 2016A).

Furthermore, this chapter highlighted that EIMs will require an annual increase in infrastructure spending of approximately USD 1.8-2.3 trillion by 2030 (Bhattacharya et al., 2016A). There was also a discussion of the required investment in EM as the key interest of global institutional investors, particularly as EM infrastructure investment is vital to ensuring the ability to scale-up economic development and pursue social growth. It was considered critical to deliver infrastructure assets to such countries, particularly as they frequently lack vital networks and services, and will therefore benefit significantly from investment in the construction of infrastructure assets.

This chapter therefore concluded that global institutional investors and fund managers can yield significant returns from infrastructure investment in EM, although these benefits need to be measured against the associated challenges and risks, including: firstly, the challenges surrounding economic and political instability and the level of risk in infrastructure deals and secondly, the difficulties and complexities inherent in an uncertain regulation framework and legal environments, including risks of requisition and exposure to debt (Meyer and Nguyen, 2005; Kant, 2018).

This chapter has therefore determined that, whereas infrastructure investment is critical to the success of EIM, it is equally vulnerable to a wide array of challenges and risks impacting on the aggregate level of investment, thus potentially undermining development. The subsequent chapter will examine another perspective that significantly influences infrastructure investment, namely the portfolio assets of emerging markets. It will scrutinise the infrastructure investment paradigm, and examine the myth of evolution from public to private investment. In addition, it discusses the types and forms of investment vehicles and source of finance and highlights the scale of infrastructure markets and in the context of emerging markets.

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Chapter Three: Infrastructure Investment Vehicles

3.0 Infrastructure Investment Vehicles

3.1 Introduction

The preceding chapter outlined the scale and magnitude of the global infrastructure investment challenge along with the drivers and factors behind the burgeoning infrastructure gap. Chapter Three discusses research Sub-Q. 3 (How infrastructure investment can be supported and implemented in Emerging Infrastructure Markets?) and Sub-Q.4 (What are the infrastructure investment market components that facilitate financial channels?) and the attainment of Objective 2:

> *To evaluate the theoretical perspectives that underpin the dynamics of the global infrastructure financing sector and examine the global development of investment structure and financial resources.*

Public infrastructure spending constitutes a capital investment rather than expense. Many public infrastructure projects tangible assets and/or provide a revenue stream, resulting in difficulties classifying any debt linked to infrastructure investments as identical to those used to finance government expenditure (McKinsey, 2016A). Consequently, the unlocking of public funds for investment into infrastructure lies in modifying the reorganization of these expenses by global investors and related bodies (Warner, 2014).

A number of scholars and academic researchers have investigated the techniques and mechanisms of funding public assets, identifying various factors and elements influencing the finance selection process; 1) Internal Risk Return; 2) the type and scale of a project; 3) the degree of cash flow; and 4) any economic and/or political instability (Weber and Alfen, 2010; Engel et al., 2014 and Arezki et al., 2017). Infrastructure assets can deliver a diverse set of features, i.e. an inflation-protected income flow of income and long-term stability. Investing in infrastructure thus offers surplus values for certain kinds of institutional investors (FTSE, 2015), including pension schemes and endowments seeking to address issues related to inflation.

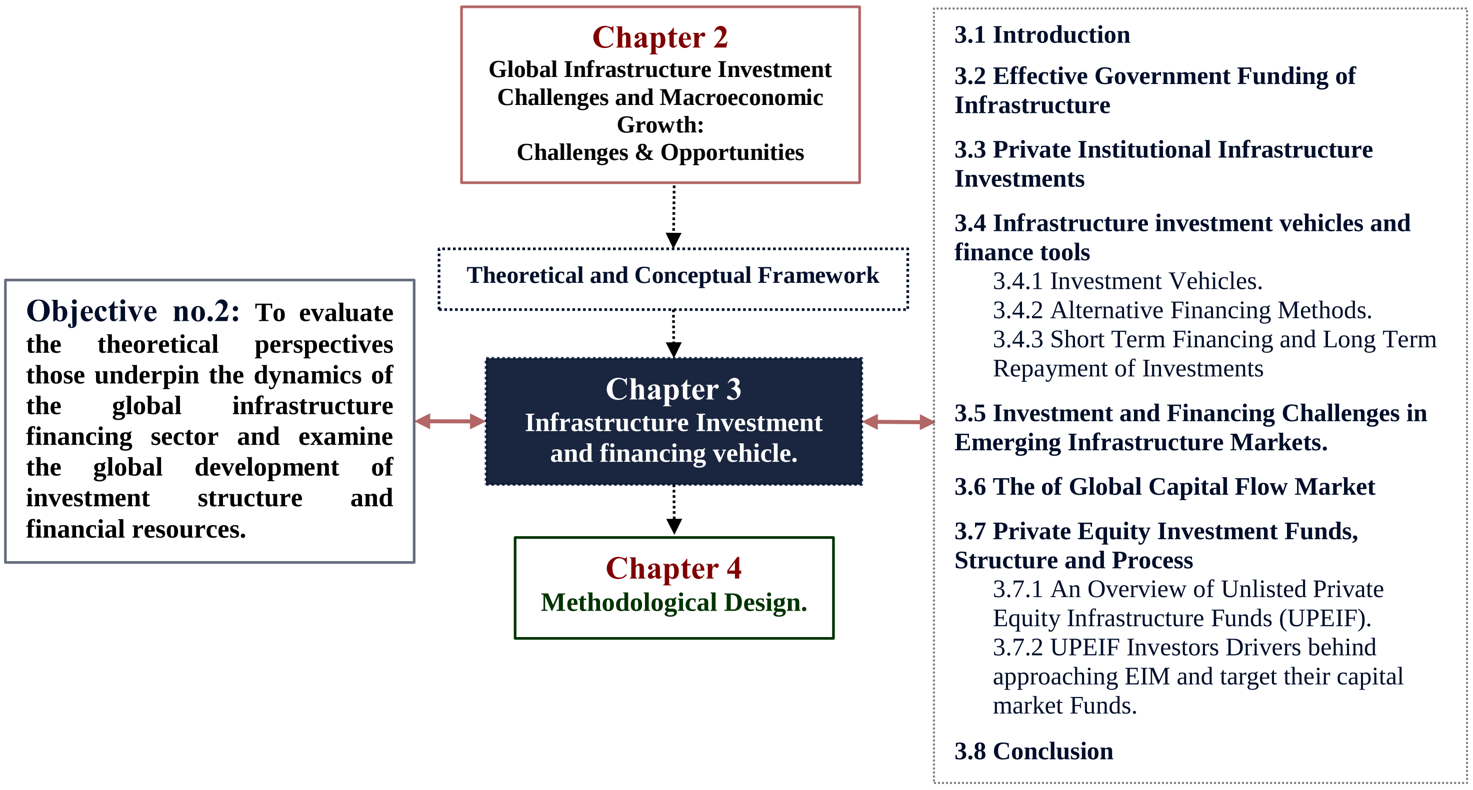
A number of professional publications have focused on the distinction between Debt and Equity, confirming Debt to be a critical tool for accessing financial resources, quantifying that between 70% and 90% of assets require some form of financing (Bielenberg et al., 2016; IJ-Global, 2016; Egler and Frazao, 2016). The Mixture of several funding instruments and tools permits infrastructure projects to obtain finance with the minimum rate of cost, thus stimulating private sector investment (McKinsey, 2016A; Egler and Frazao, 2016).

Global investors, investment vehicles and finance tools play complex and multifaceted roles, and it is therefore vital to understand both their dynamics and benefits, particularly when it comes to Emerging Infrastructure Markets. Furthermore, over the previous twenty-five years, an increasing body of literature has recognized that the private financing of infrastructure assets has resulted in a greater number of financial investors (i.e. Private Equity (PE) firms) (Gemson et al., 2012; Della Croce and Gutti, 2014). Private investors have recently begun to seek alternatives to traditional investments (i.e. Bonds and Equity) with increased opportunities and stable returns (Bird et al., 2013).

Therefore, a breakdown of the global trends of investment vehicles answers the three critical questions: (1) Who are the Key players?; (2) How they work (i.e. pathways, tools and products)? ; and (3) Which of these are the most applicable for the context of Emerging Infrastructure Markets?

This current chapter provides a comprehensive overview of global trends in the infrastructure investment market, specifically in relation to Emerging Infrastructure Markets. It identifies a variety of options available to global investors for investing in capital assets, including a recognition of the fundamentals of evaluating new sources of financing for capital assets. The chapter is comprised of eleven sections (Figure 3.1). Section **3.2** examines the historical trends of traditional public finance infrastructure (i.e. government funding) and the motivation for targeting private investment. Section **3.3** is an introductory section for private institutional involvement in infrastructure investment. Section **3.4** examines the essential infrastructure investment vehicles and alternative financial tools. In addition, this section outlines the current trend of employing a variety of instruments for infrastructure project financing, and also compares short term project financing and investment vehicles, focusing on long term repayment. In addition, it discusses the concept of two fundamental financial channels, debt and equity. Section **3.5** demonstrates the investment and financial challenges facing Emerging Infrastructure Markets. Section **3.6** presents insights regarding the global capital market flow. Sections **3.7** provide a comprehensive assessment of the scale of the private equity market globally, and also examine the fundamental concept and development of unlisted private equity infrastructure funds (UPEIF), and the drivers behind approaching unlisted private equity investors for Emerging Infrastructure Markets. Section **3.8** summarizes the key points arising from the critical review of the literature concerning existing global infrastructure investment and financing vehicles.

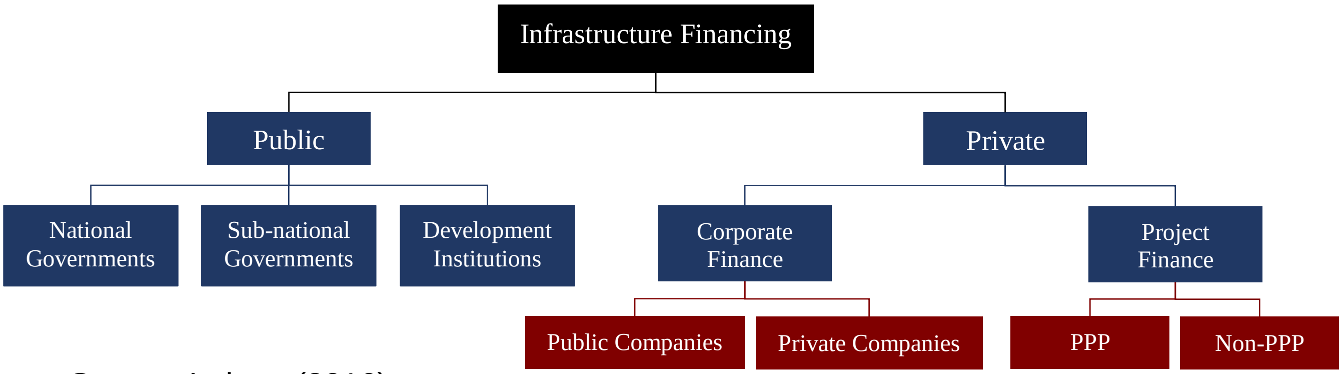
Figure 3.1-Structural Context of Chapter Three



3.2 Effective Government Funding of Infrastructure

Diverse fiscal sources are available for the financing of infrastructure (Figure 3.2) (Kolev et al., 2013; Sasana, 2015; Inderst, 2016). The Public sector is one of the main players in infrastructure investment and finance (i.e. public funds) (Della Croce and Paula, 2015). Following the Second World War, National governments have been the main source of owning, financing and providing public services (Inderst, 2016; Ferrari, 2016). However, national governments have historically created a number of new approaches, represented by sub-national governments, that may be capable of increasing financial revenue, and which include the capacity to issue infrastructure bonds (Bhattacharya et al., 2016A). Development institutions are an alternative form of public finance, encompassing a variety of development banks, i.e. Multilateral Development Banks (MDBs) and New Development Banks (NDBs). However, Chong and Poole (2013) argued that NDBs an aspect of GTEs (i.e. government or public trading enterprises), public corporations, or a government-owned corporation. In the context of the limited financial resources of developing nations, development banks become a critical source of funding for capital assets, i.e. the World Bank (Chong and Poole, 2013)[9].

Figure 3.2-Sources of Infrastructure Finance



Source: Inderst (2016)

Public finance components: 1) public expenditure, 2) public revenue (Taxes, charges, and fees), 3) public debt (national debt), and 4) financial administration (national

[9] Comprehensive information is provided regarding the development of banks in Section 3.4.2.2: Infrastructure Debt and Evolution.

budget and deficits/ surplus). Furthermore, there are various sources of Public financing, being composed of traditional budget allocations to finance infrastructure projects from the following: 1) loan guarantees and insurance options; 2) subsidies and grants; 3) revenue bonds related to particular public assets; and 4) credit enhancement instruments (Chong and Poole, 2013; Z/Yen Group Limited and WWF, 2015; Egler and Frazoa, 2016). However, governments traditionally focus on using revenue from general taxation to finance public assets (Maier and Jordan-Tank, 2014). The interpretation of public finance will limited by traditional finance tools and government debt as the major source of infrastructure public finance.

Infrastructure investments form a large part of the expense of economies, with issues of scale being a critical component of the execution of these investments (Leigland, 2018). The infrastructure investments of economies are largely funded through tax collected by government from companies and the general public (Tapiero and Kogan, 2008). The application of infrastructure investments are an example of the public benefit arising from the collection and use of these taxes (Tapiero and Kogan, ibid). Challenges of scale for infrastructure investments include: (1) the sourcing of investments; (2) their nature and role; (3) the related decisions concerning which investments to be executed; and (4) the 'returns' received from investments (Leigland, 2018). Given the scale of infrastructure investments, it is imperative for governments and economies to gain an in-depth understanding of these challenges, in order to provide an effective implementation and use of public infrastructure investments (Lakshmanan, 2011).

Public infrastructure spending has a number of debatable aspects including that capital investment creates debt and infrastructure investment results in tangible assets which provide a revenue stream, categorizing the debt linked to investment in public assets (McKinsey, 2016A). Subsequently, the most effective method of accessing public funds for infrastructure investment depends on global investors and other bodies recognizing and evaluating expenses (Sasana, 2015).

Firstly, Bhattacharya et al. (2012) noted that current international guidelines are too restrictive. The World Bank-IMF Debt Sustainability Framework for emerging markets and developing countries stated that a county's external debt should not exceed 30-

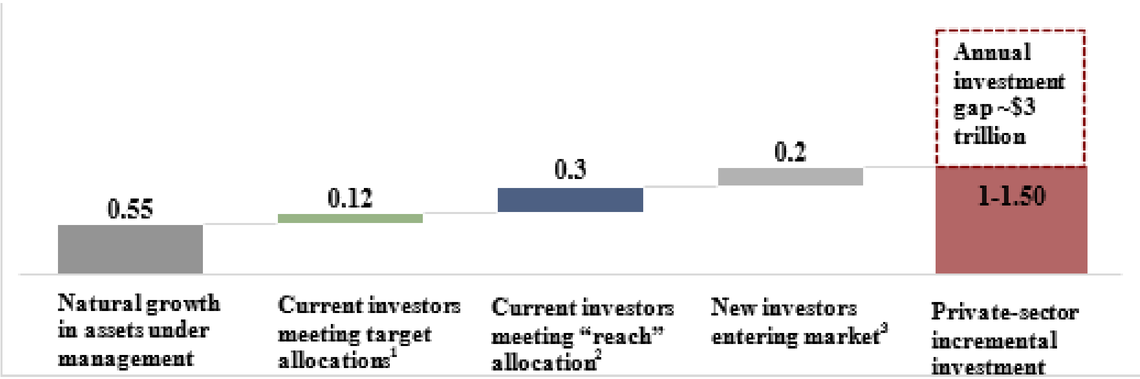
50% of its GDP, while debt servicing should not exceed 25-35% of a government's revenue. These restrictions are significant for infrastructure development, as these projects are generally financed with external capital and (unlike other forms of spending) the resultant costs may have corresponding revenues. The authors argued that such borrowing restrictions are too low, as they fail to take into account: 1) the asset creation aspect of these investments; 2) that financing costs are paired with revenues; and 3) the impact of infrastructure development on economic growth. The authors argued for the creation of a framework capable of modifying existing spending restrictions.

Secondly, McKinsey (2016A) argued for a reconsideration of the way infrastructure spending is recorded in national government accounts, recommending that, instead of recording the entire capital upfront investment as an expense, it should be treated on a public balance sheet as an asset, with its 'cost' relating to depreciation. This would align with the recording of capital spending in the accounts of private enterprises. In addition, McKinsey (2016B) stated that governments should intelligently monetize their infrastructure assets, ensuring that: (1) revenues can be optimized significantly and (2) the use of 'capital recycling' (i.e. profits from sales of revenue-generating assets) are mandated to be reinvested into infrastructure.

3.3 Private Institutional Infrastructure Investment

The importance of private institutions increased significantly during 1980s, as a consequences of involvement in public assets (i.e. privatization) and the subsequent advanced PPP structure created in the 1990es (Bhattacharya et al., 2016B). Furthermore, private investors are considered a key source to infrastructure finance, holding approximately $75 to $85 billion in assets (AUM). However, their investment shares have, to date, proved limited and been made on a small scale. This has been due to various aspects including: 1) a Lack of transparency and bankable pipelines; 2) high rate transactions and increase in prices; 3) the absence of a feasible funding structure; 4) inadequate risk-adjusted returns; 5) ambiguity; and 6) a lack of suitable regulations and policies (UNTT working group, 2013A,C; Bielenberg et al., 2016). In order to reduce the funding gap and improve infrastructure investment, investors are required to take a series of procedures to increase the quality and quantity of their financing. The private sector, in particular, plays a critical role in reducing the finance gap. Private institutional investment in capital assets could annually finance approximately 65% and75% (i.e. $1- $1.5 trillion per year) of total infrastructure spending, potentially levels of $300-400 billion annually (Bielenberg et al., 2016) (Figure 3.3). It could be possible for the private sector to close over 50% of the financial gap up and recognize sustainable and bankable infrastructure assets (Bhattacharya et al., 2016B).

Figure 3.3-Private Institutional Investors Could Fill up to Half the Financing Gap



[1] Weighted average target allocation = 5.96% across investor groups.
[2]'Reach' allocation defined as 8% weighted average across investor groups.
[3]Assumes 60% of non-infrastructure investors begin investing at a level comparable with current peer allocations.

Source: Preqin Infrastructure Online, Funds and Limited Partnership Investors (June 2015), cited by Bielenberg et al. (2016)

Previously, public capital assets have, at times, resulted in ineffective investment outputs, attributed to variety of aspects: (1) a negative political influence on the allocation and distribution of resources across sectors and (2) government favouring short-term political advantage over long-term aims (Mitchell, 1993 cited by Noring, 2019; Estache 2001). In addition, governments face a variety of constraints and difficulties in relation to investment infrastructure including increased raised public debt to in relating to GDP and an inability to deliver the required services in time (Della Croce and Paula, 2015).

There are two main categories of private finance (Figure 3.2): Firstly, institutional investors who represent $350-$400 billion annually and usually invest as a part of a wider perspective portfolio of ‘infrastructure project financing’ (Bielenberg et al., 2016). Secondly, investment as an aspect of strategic initiatives i.e. ‘Corporation Investors’ (Inderst, 2016). The concept of corporation financing is to fund part of the capital investment for a specific project and acquire funding based on the balance sheet of the private company, rather than the project. Project finance is a contractual financing structure specifically designed for infrastructure projects, and takes the form of a long term-financing approach based upon limited fiscal resources. It therefore tends to be employed in PPPs. There is a more detailed examination of these two forms of private financing and a comparison in Section (3.4.2 Alternative Financing Methods).

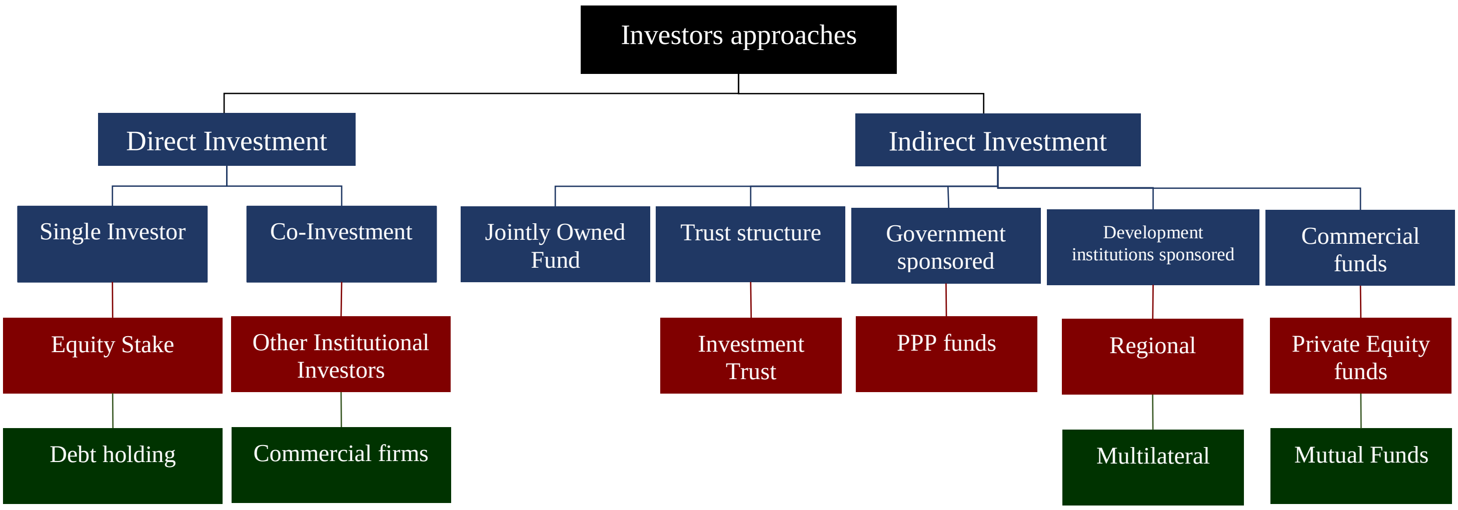
3.4 Infrastructure Investment Vehicles and Finance Tools

Over the previous twenty-five years, there has been a growing body of literature recognizing the importance of acknowledging the importance of investment into capital assets and alternative sources of project finance (Inderst, 2010). Certain academic researchers have drawn their definition of capital asset investment from the investment features of specific projects (Inderst, 2009). Estache (2016) defined investment as capital expenditure (i.e. Capex) required to provide services. Martin and O’Brien (2017) stated that investment consists of quantifying the inflow of expenditure employed when transferring infrastructure assets, or maintaining existing assets. This section therefore focusses on an examination of: (1) investment vehicle; (2) various methods of financing; and (3) Short term financing vs. Long term investment.

3.4.1 Investment Vehicles

There are a variety of infrastructure investment forms and vehicles. With the industry currently advancing, and knowledge of class assets knowledge becoming increasingly accessible, existing investment vehicles are developing, resulting in more innovative forms of investment. Institutional investors in infrastructure assets can be pool their resources and approach infrastructure investment in two distinctive ways, i.e. direct or indirect (i.e. via investment funds) (Figure 3.4) (Inderst, 2013,2016; Inderst and Stewart, 2014)**.** Beeferman (2008), cited by Lara-Galera et al. (2017) drew a distinction between these two approaches. Beeferman (2008) and Rickards (2008) identified **direct investment funding** as constituting a proposal to undertake direct control and offer an opportunity for possessing (or renting) assets over a long period of time, as in the case of conventional power energy companies and toll roads. As highlighted in Chapter Two, infrastructure is by nature intensive, resulting in additional capital requirements for single or group investors (Inderst and Stewart, 2014; Bitsch et al., 2010). This has led to the existence of distinctive methods of direct infrastructure investment funding, allowing institutional investors to perform in different ways to individual investors (i.e. private holding of infrastructure institutions and equity stake), or group investors (i.e. co-investment), invest directly into specific capital assets/projects (i.e. Special Purpose Vehicles (SPV), joint ventures (JV)) (Inderst and Stewart, 2014; Egler and Frazoa, 2016). **Co-investment** is a method of direct investment in which institutional investors form an alliance with other kinds of investors to establish a consortium to invest in capital assets (Sharma, 2012). There are diverse forms of investment partnerships, including: (1) syndicates (consisting of several investors working together to implement a large scale infrastructure project), or (2) an investment alliance with commercial banks or professional companies (Inderst and Stewart, 2014).

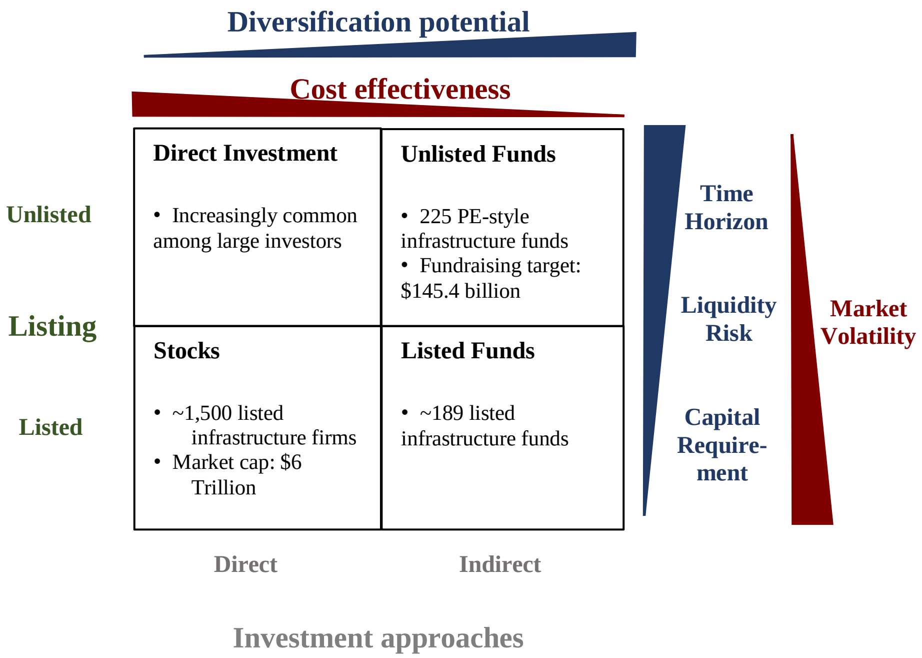
Figure 3.4-Infrastructure Investment Approaches



Source: Inderst and Stewart (2014)

Investment approaches define the following: (1) cost effectiveness; (2) capital requirements; (3) diversification potential; (4) time horizon; and (5) resulting liquidity risks. According to Bitsch et al. (2010) and Rothballer and Kaserer (2011), the need for high volume capital over a long-life span for an individual asset class leads institutional investors to take both regulatory and political risks, as well as the liquidity risk illustrated in Figure 3.5. These risks have a critical impact, due to the significant correlation between constancy of cash flow and political and regulation instability (Lara-Galera et al., 2017).

Figure 3.5-Most Common Forms of Infrastructure Investment (Infrastructure Investment Options)



Source: adopted and augmented from Bitsch et al. (2010) and Rothballer and Kaserer (2011)

As shown in Figure 3.5**,** direct investment in unlisted infrastructure assets involves a significant quantity of funding capital, due to firstly, the large scale of such infrastructure projects and secondly, capital being committed over a long period of time. Moreover, institutional investors are required to sustain the risk of liquidity and the frequent absence of diversification. However, listed infrastructure stocks offer institutional investors the potential to reduce their capital commitments. Furthermore, investment in listed assets (i.e. listed securities) are functional over a short time period and deliver higher rates of liquidity and exchangeability (Bitsch et al., 2010; Rothballer and Kaserer, 2011).

On the other hand, as explored earlier in Figure 3.5 and (Figure 3.4), **indirect investment funds** are fundamentally designed to supplement diversify for the fund managers of a portfolio of infrastructure assets. Moreover, indirect investment allows access to unlisted infrastructure assets, as well as specific assets (i.e. PPPs) otherwise unavailable to small- and medium sized institutional investors. As with listed infrastructure stocks, **listed funds** can be invested with a minimum amount of capital and allow for a short-term time frame (Bitsch et al., 2010; Rothballer and Kaserer, 2011). However, **unlisted funds** remain immune to market instability and deliver constant returns.

3.4.1.1 Infrastructure Investments Characteristics

Infrastructure assets are globally recognized by their features including scale, higher investment costs, inflexibility, and longevity (Oyedele, 2014B). The attraction of capital assets as a sources of investment is pertains to various unique features considered to act as a critical channel for the delivery of services and to stimulate the growth of economy, so increasing outputs (Della Croce and Sharma, 2014). Global investors are tend to favour financial and economic characteristics such as: 1) giving pricing power (i.e. an inelastic demand for services); (2) economy of volume (i.e. low variable cost and high rate fixed cost); (3) and the low operating cost of infrastructure assets rather than their physical merits (Inderst, 2010). These are considered financially attractive, due to a high rate of return, as well as stability in the face of economic fluctuations and a low rate of default.

A number of researchers and scholars have mapped out various features of infrastructure investment (Mills, 2007; Beeferman, 2008; Stevens, 2008; Inderst, 2009; Lara-Galera et al., 2017). Beeferman (2008), Newell and Peng (2008), Della Croce (2011/2014) and Lara-Galera et al. (2017) classifying characteristics associated with infrastructure and other categories of asset as follows: (1) the nature of the asset; (2) asset availability; (3) dynamic acquisition; (4) liquidity; (5) fixed income; (6) growth; (7)

volatility; and (8) typical return expectation per annum post fees. The number of obstacles to any attempt to break the monopoly of the market features of variety of infrastructure assets reflects the fact that their fiscal performance is largely protected from the changes of the economic cycle, representing asset availability. Infrastructure expenditure for delivering services tends to be characterized by difficulties in accessing new competitors within the industry. Consequently, these circumstances create critical barriers for any new potential participants (Della Croce, 2011; Della Croce, 2014; Lara-Galera et al., 2017).

Where there is a stable and growing demand for critical services, along with regulation of patents and of business, and the presence of long-term contractual security revenues, the investment will be defensive. This reflects a strongly inelastic demand for the service, which can be considered as having a reasonable rate of risk. In addition, the dynamic features of investment associated with two main aspects: (1) political benefits (i.e. competitive tenders) and (2) The consequent impact on economic development and social welfare. Various elements represent income, including: (1) maturity, i.e. the long and duration of infrastructure assets invites concessions in response to expectations of a long-term protection agreement concerning revenue. (2) High income (pertaining to return and underpin by government); and (3) low rate of risk (Beeferman, 2008; Della Croce, 2014).

While previous historical studies have defined the characterises of infrastructure investments, recent research is in agreement that some of features have remained stable over time. Infrastructure investment as a real asset category is characterised by: inelastic demand; high barrier to entry resulting in uncompetitive status; predictable, steady cash flow; inflation-linked cash flow (i.e. income); attractive risk–return portfolio; and long-term assets with monopolistic power (RREEF, 2017A; Babson, 2018; Watson, 2018).

3.4.1.2 Infrastructure Investment: An Innovative and Alternative asset Class

Institutional investors have become highly active in line with public sectors in the provision of capital for infrastructure funds and ventures (Clark et al., 2012; Clark, 2017). Therefore, the financial sector introduced infrastructure projects as innovative alternative assets in contrast to conventional assets (e.g., bonds and equity) and initiate alternative assets (e.g., venture capital, real estate and buyout), which will reduce various risks and generate new sources of constant return (Inderst, 2009; Andonov et al., 2018; RREEF, 2019). However, a number of arguments have been raised regarding whether infrastructure can be deemed as an alternative separate asset class (Ilmanen and Kizer, 2012; Blanc-Brude 2013; Blanc-Brude et al., 2017). Though infrastructure is viewed as a distinct asset class, not all infrastructure assets are the same (Bird et al., 2013). Infrastructure as an asset class is extremely diverse within sectors (i.e. primary sectors versus sub-sectors) compared with other asset classes (Inderst, 2009). This was shown by Bianchi et al. (2017) and Blanc-Brude et al. (2017), who argue that the notion of infrastructure investment as an alternative asset class is misled. In addition, the authors claimed that class assets do not provide do not provide portfolio diversification merits to the existing selection of asset allocation.

As discussed previously, several external trends view infrastructure as a separate asset class due to its distinctive investment features, such as long-life assets; stable, income slow; high barrier to entry; and low competitive market, (Bianchi and Drew, 2014; Oyedele, 2014A; Chobra et al., 2018). Meanwhile, Oyedele (2014A) suggested that infrastructure can be seen as a separate asset class, characterized by unique features, highlighting that a number of elements drive infrastructure as separate asset class, including the fact that it exhibits an assurance of support for a sustainable investor’s investment in infrastructure; has strong correlation with economic stability, namely an appropriate performance of the infrastructure system.

However, Bianchi et al. (2014) argued that infrastructure investment cannot be considered a separate asset class, since global infrastructure assets offer a low rate risk adjusted return over other asset classes, such as a diversified portfolio of global stocks. Moreover, it exhibits a systematic risk and return that differs from other assets (Bianchi and Drew, 2014). Consequently, both empirical and professional studies demonstrated results that supported the research of Bianchi et al. (2014), and viewed infrastructure as a Hybrid Class (Finkenzeller et al., 2010; Chobra et al., 2018; Chambers et al., 2018; RREEF, 2012; 2019). According to Chobra et al. (2018), the fundamental principle of asset classes is that they are characterized by a linear combination of different asset classes, or a contradictory specification and low connection with other assets classes. Thus, the benchmark of an asset class is a critical element in the approach to strategic asset allocation. The value depends on the long-term implications of the asset class on a risk and return portfolio. Indeed, global investors encounter difficulties when allocating an alternative assets portfolio. According to Finkenzeller et al. (2010) and Reddy (2016), despite the low risk adjusted return, a number of investors favour the allocation of alternative assets in various approaches, including income securities portfolios, direct real estate property, or infrastructure assets, or a combination of these (Table 3.1) (Finkenzeller et al., 2010; RREEF, 2017A).

Similarly to real estate, infrastructure is a real asset class, namely illiquid assets, that is characterized by a long term cash yield, a level of inflation protection, and a low correlation with other asset classes. McKinsey (2016B) and Babson (2018) outlined the distinction between unlisted infrastructure and unlisted real estate investment, specifically regarding transparency, costs, and complexity. The majority of the infrastructure sector plays a critical role and provides essential services. Therefore, the infrastructure asset is highly visible and exposed to various type of risk: regulatory, political and reputational risks. Real estate faces the same issue, except for iconic buildings (e.g. heritage buildings). Accordingly, these features increase the complexity level, and the costs associated with investing in and operating infrastructure assets compared to real estate assets. Infrastructure market data is rare and disconnected, due to the range of variation involved, thus the transparency of infrastructure assets is low (McKinsey, 2016B; MSCI, 2017).

Table 3.1-Infrastructure Investment in Comparison with Other Asset Classes

Asset Class	Analogies with infrastructure	Comparative strengths of infrastructure
Real Estate	Real asset class	Higher barriers to entry and market risk protection
	Cash flow indexation potential	Exposure to economic cycle more limited
	Cash yield as key return component	Higher long-term cash flow predictability
Fixed Income	Long-term cash flow predictability	Asset Control
	Limited market risk	Stronger inflation hedging potential
	-	More limited interest risk exposure
Private Equity	Asset control	Long-term investment horizon
	Scope for management improvements	Higher barriers to entry and exposure to market risk
	-	Ongoing distributions and capital appreciation
Listed Equities	Asset ownership/control	Long-term cash flow predictability
	Capital appreciation potential	Higher barriers to entry and market risk protection
	-	Lower liquidity, but lower volatility potential

Source: RREEF (2017A)

A considerable volume of literature has explored Private Equity as a core assets class, identifying correlation with other alternative assets (World Economic Forum, 2015; PWC, 2017D; Jacob et al., 2018). Private Equity and infrastructure share common features as an asset class, namely their inherent illiquidity, and their possibilities for the enhancement of capital assets, in terms of capital appreciation (Blanc-Brude et al., 2016A; RREEF, 2017A; Chambers et al., 2018). However, infrastructure as a class of asset is characterized by 1) a lower rate of vulnerability to market risk and economic cycles than private equity, and 2) a more balanced cash yield (RREEF, 2017A).

3.4.1.3 Drivers Behind the Selection of Alternatives Investments

As discussed previously, the infrastructure investment industry creates a range of investment vehicles. Bitsch et al. (2010) and PWC (2017D) stated that global investors are not only targets when it comes to their portfolio (i.e. the ultimate share of their infrastructure assets investment), but also the method of investment they undertake within the capital assets sector. Moreover, a variety of drivers behind the selection of alternative investments (i.e. fiscal instruments and pooling mechanisms) include: (1) the nature of the assets (i.e. listed or Unlisted, Debt or Equity) and (2) availability (i.e.

tax conditions and regulations) (Della Croce and Sharma, 2014; Della Croce and Paulla, 2015; FTSE, 2015). Furthermore, a range of elements behind infrastructure funds exist in the infrastructure investment industry that are represented by risk and return elements, and category of assets classes (PWC, 2017D). Thus, a breakdown of a risk/return profile compared with the classification of other assets classes that positions infrastructure in context with various possible strategies is crucial (Figure 3.6) (Russ et al., 2010; Inderst, 2010; Inderst and Della Croce, 2013; Moss, 2014; Sharma and Knight, 2016; and UBS, 2017). The risk/return profiles of the infrastructure investments chart illustrates four aspects of such an assessment, namely Risk, Return, Proportion of Return from Capital appreciation, rather than income, and investment horizon. Furthermore, the alternatives assets classes, namely real estate, private equity, and infrastructure assets, fall into three categories: core plus, the value added, and opportunistic (represented as the investment horizon).

In the risk/return spectrum, infrastructure investment is ascribed a range of risks, according to the stage of development, namely low-risk as a fixed income to high-risk as an unstable of PE. **Core infrastructure** assets refers to entirely operational projects with the capability to yield a fixed predictable cash flow and defensive assets, and encompasses contracted power, utilities, and transportation. Consequently, core infrastructure exists under a low risk/return profile. According to Inderst (2010), the rate of return varies, based on the range of projects that exist under this strategy, namely circa 9-6% of IRR to toll roads, and 15-25% IRR power generation. The majority of these asset's strategies have a diminished disclosure to industry demand, and their risk-return drivers are considerably disconnected from other assets classes (Bahçeci and Leh, 2017; PWC, 2017D; Jacob et al., 2018). A number of researchers observed that institutional investors tend to invest in a low risk/return profile, which is to say they seek long-life assets with a mitigated risk level (Moss, 2014; PWC 2017D; Bahçeci and Leh, 2017; RREEF, 2017B). In addition, a considerable number of investors favour the prospect of fixed cash flow in the long term, compared with a high scale of return in the short term, for example 8-12% for railway stands. This paradigm can be placed within the investment horizon of core infrastructure, discussed previously (Inderst, 2010; Jacob et al., 2018).

According to Sharma and Knight (2016), when investing in economic core infrastructure, the brownfields infrastructure assets class represents a low level of risk/return investment among the unlisted PE in the advanced market, whereas investment in greenfield core infrastructure in emerging markets can be correlated with a VC investment, and is a risky form of PE. Indeed, Duvall et al. (2015B) asserted that a number of institutional investors, or limited partners, have no desire for greenfield assets when deciding to invest in Emerging Infrastructure Markets, rather they prefer to concentrate on brownfield infrastructure projects, due to the fact that emerging markets exhibit severe irregularities in terms of information for global institutional investors.

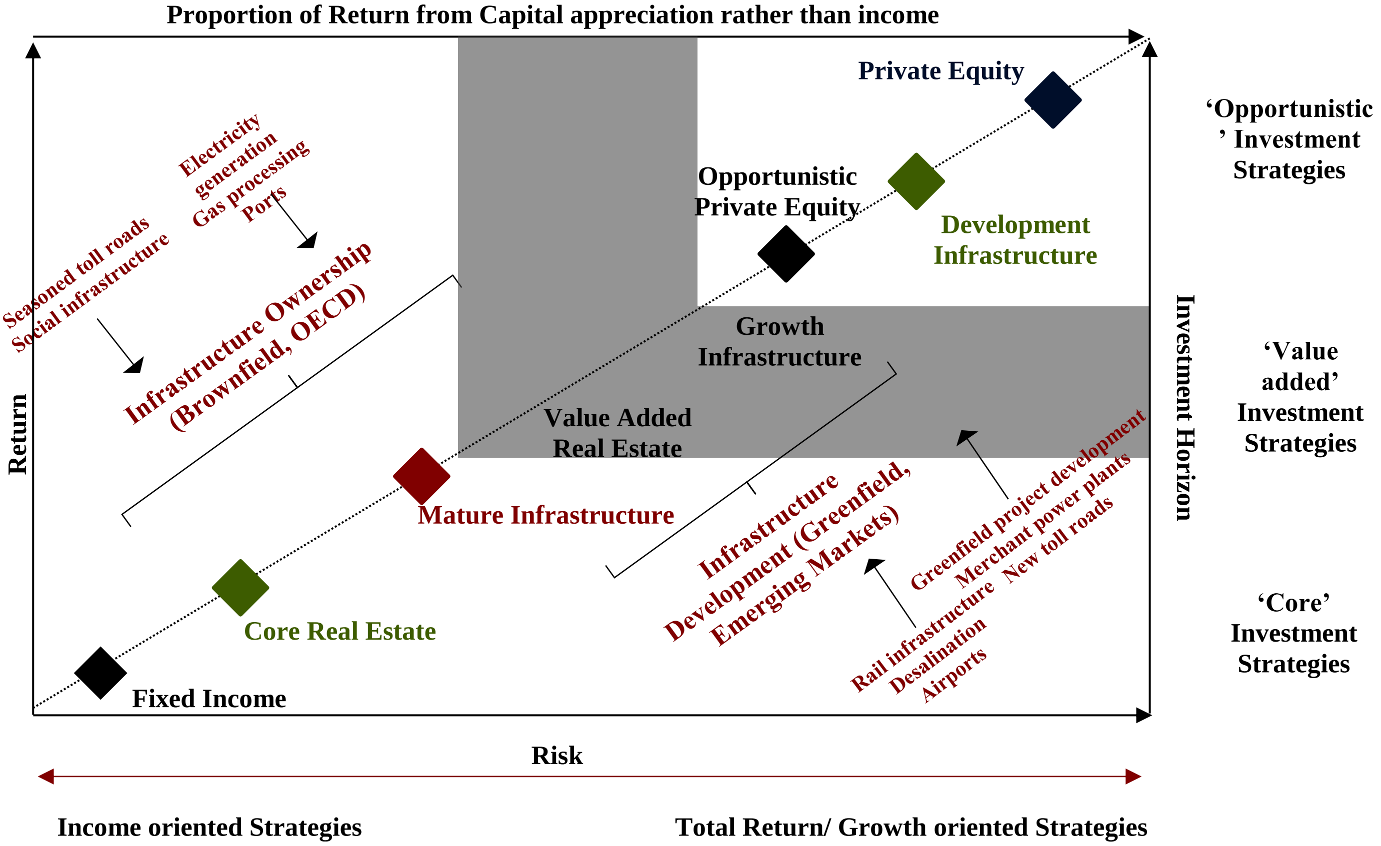
Core-plus infrastructure strategy is characterized with risk moderate return, namely disclosure to risk demands. In addition, the funds are normally invested in infrastructure projects that require a mid-high value addition (Annamala et al., 2014; Moss, 2014). Analogous to core economic infrastructure assets, a Core-plus infrastructure strategy only differs in terms of the following features: (1) its semi regulated nature, and (2) its vulnerability to the economic cycle (PWC, 2017D; Jacob et al., 2018).

Another segment of infrastructure includes **Value Add** investment strategy (Figures 3.6). This form of strategy emphasizes income growth and possible appreciation, and is considered to possess a medium-to-high risk/return (RREEF, 2007). Infrastructure growth is situated within this form of strategy. The concept of Value Added strategy investment means that the investors can engage in the process of expansion by exploring the industry to a higher level, increasing their risk, and yielding a higher rate of return, as demonstrated in Figures 3.5 (Annamala et al., 2014; RREEF, 2017B).

As illustrated in Figure 3.6, Mature infrastructure can be positioned within the borders of Core infrastructure and value added investment strategy. The driver behind this strategy is that the mature infrastructure can include the income return that is based on the features in the core investment strategy, and is associated with capital growth probabilities, in tandem with the value added investment strategy (Moss, 2014; UBS, 2017). In addition, mature infrastructure encompasses brownfield assets with the related merits of (1) regulated revenue and return that contributes to reduce the income instability, and (2) its depiction of a relatively low rate industry risk (RREEF, 2017B).

The third strategy in the investment horizon is **Opportunistic** investment strategy, the mechanism of which searches within the segment of capital market inadequacies to be exploited, with a focus on overall return (RREEF, 2007). The development infrastructure assets positioned under this strategy involve a higher level and variety of risk, for example market risk, and leverage risk; are less defensive in nature; and possess greater growth capabilities of return. Thus, this form of strategy is preferred by investors. However, this form of strategy also has a significant emphasis on capital that yields a greater level of return. The concentration of investment is primarily on growth and scaling up asset value (Annamala et al., 2014; RREEF, 2017A; PWC, 2017D; Jacob et al., 2018). Furthermore, Jacob et al. (2018) highlighted the fact that a significant portion of greenfield projects invest in opportunistic investment strategies, and overlap with the PE asset class.

Figure 3.6-Risk/Return Profiles of Infrastructure Investments



Source: grouped from different sources: Russ (2010); Inderst (2010), Sharma and Knight (2016) and RREEF (2017A)

Nevertheless, cash flow remains key to the success of the partially or completely privately financed class of assets. The paradigm in structuring the scale of debt and equity is to utilize the maximum level of debt permitted by the project cash flow (Kumari and Sharma, 2017). Nonetheless, a correlation can be observed between equity and cash flow, with the minimum level of equity assets leading to a maximum level of risk to the cash flow. Unbalanced cash flows can have a particularly negative influence on lenders (i.e. increasing the risk of non-repayment) and investors (i.e. a lack of dividends) (Della Croce and Yermo, 2013). Global investors are therefore now seeking to find innovative financial tools and resources to guarantee and protect their assets' cash flow and generate the maximum rate of return.

3.4.1.4 Investors in Infrastructure Funds (Key players)

There has recently been increasing interest in infrastructure assets, with investors attracted to the prospect of constant returns and security from issues related to the financial market (Preqin, 2018C). A number of researchers have attempted to identify the major players within the infrastructure investment industry (OECD, 2015B; Bielenberg et al., 2016; Preqin, 2018C). A range of elements are involved in determining different classifications of infrastructure investors: (1) investors can be classified according to their desire for risk as an objective of the return; and (2) the infrastructure funds' strategic concentration, in terms of open-ends funds, core brownfield funds, and separate infrastructure accounts (PWC, 2017D). Furthermore, Çelik and Isaksson (2013) noted that institutional investors tend to be diverse and can be initially identified by their mutual characteristics and legal entities. Nevertheless, their legal forms differ and cover various different structures. Bielenberg et al. (2016) categorised those primarily involved in funds, based on their risk profiles and regulatory status. They identified Banks ($40.2 trillion in AUM) as the main source of debt for infrastructure investment projects, representing the majority of private infrastructure debt markets (OECD, 2013; RREEF, 2017B). They stated that banks contribute to syndicated loan markets or act as the primary lender. However, the 2008 GFC reduced their contribution to the financial cross-border market (i.e. restrictive capital requirements) as a result of the new Basel III regulations and Solvency II rules (Deloitte, 2013).

Furthermore, recently emerging key funders in infrastructure investment have underpinned the trend towards playing a proactive role, however, the most important are the Investment companies ($29.0 trillion in AUM) (Bielenberg et al., 2016). Furthermore, Bielenberg et al. (2016) stated that such institutional investors underpin these trends and are now shaping the future of sustainable infrastructure ventures: firstly, by establishing a solid portfolio, emphasising both infrastructure and sustainability and secondly, by increasing investment in infrastructure and becoming involved during the early phases as an equity partner (i.e. rather than a limited partner).

On the other hand, infrastructure and private-equity funds ($2.7 trillion in AUM) include both listed and unlisted PE. These funders are crucial for economic growth, due to their employment of long-term investment involving endowments and foundations ($1 trillion in AUM). Companies such as infrastructure operators and developers ($3.4 trillion in AUM) also forms significant aspects of the infrastructure finance industry (Bielenberg et al., 2016). Developers and operators consist of large scale companies supporting infrastructure businesses by fulfilling capital requirements (i.e. up-front capital), thus supporting the longevity of the construction lifecycle and the complexity of the project. Nevertheless, Clark et al. (2012) and Della Croce and Yermo (2013) considered the dominant players in the global financial market and infrastructure investment industry to be Public Pension Reserve Funds (PPRFs) and SWFs. The AUM of these institutional investors is constantly increasing, and in 2018 there were $7.45trillion, and $28 trillion, respectively, on the global scale (Preqin, 2018B; OECD, 2018C).

In the context of EIM, institutional investors (i.e. investment companies, insurance companies, pension funds and SWFs) are critical players modelling sustainable infrastructure ventures and the investment industry (Bielenberg et al., 2016). However, despite the growth institutional investment in managed assets, their level of investment remains marginal (OECD, 2015B). Furthermore, Hendriks (2017) stated that Emerging Markets Multi-National Enterprises (EMNEs) are currently increasing their participation, in the form of a foreign investors, and have thus become essential for EIM Private investors include multilateral financial institutions and international agencies such as the United Nations, the World Bank, and the International Monetary Fund (IMF) (PWC, 2014).

3.4.2 Alternative Financing Methods

Another aim of this chapter is to identify the variety of global finance methods and, more specifically, to explore the range of finance instruments through which infrastructure investment can be undertaken. To do this, it is critical to provide a comprehensive insight into fiscal instruments and channels. The subsequent sections investigate the evolution of infrastructure debt and equity, respectively. However, first, a historical background to financial instrument expression will be provided.

3.4.2.1 The Growth of Financial Sector within the Investment Context

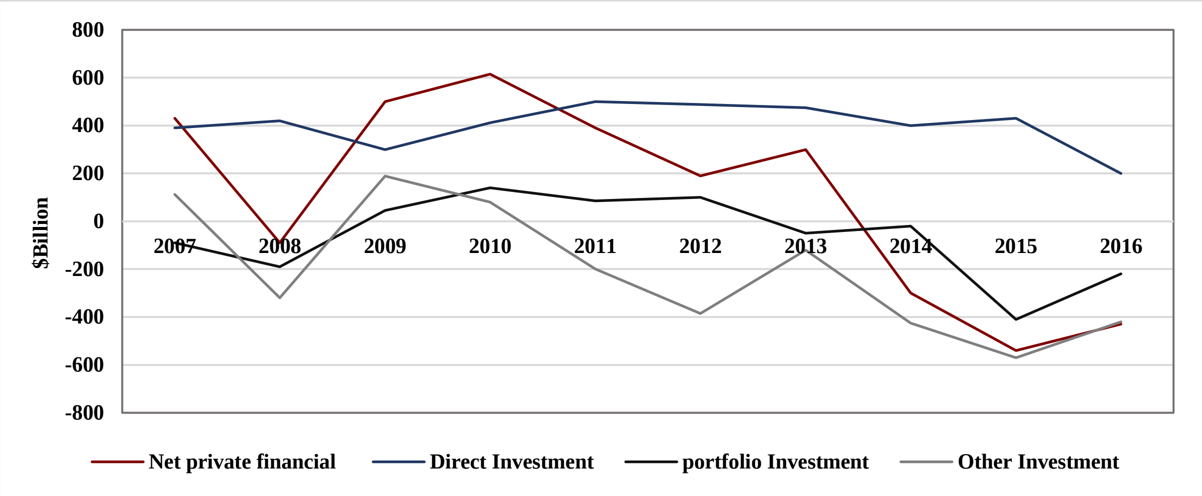
The term ‘financial instrument’ has, to date, been employed for explicatory flexibility. In addition, the expression has become an ambiguous ‘umbrella term’ for a range of fiscal options contributing to reduce difficulties in accessing funding (Pack and Saggi, 2006; Brown and Lee, 2017). Mazzucato (2013) and Macfarlane and Mazzucato (2018) argued that finance is not neutral, and that forms of existing finance can impact on both the investment vehicle, and the nature of the activity that exists.

The infrastructure finance market’s inherent lack of disclosure of information is due to the key players in the market, for example investors and governments, who do not favour sharing details of their financial performance, or their benchmarks, specifically in the infrastructure assets investment market (Duvall et al., 2015A, B). Therefore, it is challenging to capture the financial development of the infrastructure investment industry. However, in recent years there have been considerable changes to the financing of mega infrastructure projects globally, with the conventional path of long-term bank debt continuing in a number of markets, albeit with solid regulation and policy in the banking sector (PWC, 2013).

In the context of EIM, the financial system transformed significantly following the GFC, resulting in a severe drop in the net private financial flow, as illustrated in Figure 3.7 (IMF, 2017). In 2010, the net private flow recovered and reach a rate of $615 billion, yet in subsequent years, it decreased further, turning to negative rates between 2014 and 2016. According to Timmis (2018), the structure of private flows in EIM has transformed, and is now directed to portfolio flows, namely specifically debt flows.

Furthermore, the International Monetary Fund (IMF, 2017) conducted an in-depth assessment of private flow forms of investments that encompassed three primary forms: direct investment, portfolio investment, and other investments, that indicated what was essentially cross-border bank lending. The figures demonstrated that direct investment rates remained comparatively constant during the period examined, within the range $300 billion to $500 billion, however other investment, captured by bank finance, withdrew sharply and represented the main driver behind the broad increase in private finance net flows in EIM According to the World Bank Groups (WBGs, 2018), international banks, particularly those in the Europe regions, minimized their cross-border lending, to de-leverage stress in the aftermath of the financial crisis. In contrast, between 2008 and 2014, the net portfolio flows scaled up, due to their reaction and response to the uncommon monetary policies that they encountered from advanced economies. The UN (2017B) report justified the cause of the high rate of portfolio investment development in EIM, arguing that it was due to high interest rates and competition in advanced economies, which in turn directed them to re-adjust their portfolio by targeting emerging markets.

Figure 3.7-Net Private Financial Flows to EMDE by Type,2007-2016



Source: IMF (2017)

Furthermore, a historical assessment of infrastructure investment indicates that the provenance and nature of finance has evolved in line with economic transformation, and the de-regulation of the global capital market (Greenwood and Scharfstein, 2013). Thus, a historical evaluation of the growth of the financial system is necessary, in order to obtain a comprehensive view of the past trends and drivers that influenced the development process globally. Thomson Financial Securities Data (TFSD)/Project Finance International (PFI) (n.d.) conducted an in-depth assessment of the growth of financial system in infrastructure project within the last twenty years timeframe and encompasses three primary measurements namely: debt, loans, and bonds (Figure 3.8). The data was compiled from diverse range of source obtained from commercial banks and financial consultants, and the subsequent evaluation was based on regional forms, namely the Americas, including Latin America, Asia Pacific, Europe, and the Middle East and Africa regions, with global figures resulting from the regional figures.

From a broad perspective, during these 20 years, the magnitude of the **Debts capital market and Loans** finance market globally outperformed and the growth rate increased substantially by nearly three-fold, from $131.7 billion in 2000 to $328.7 billion in 2018, and from $110.8 in 2000 to $282.6 billion in 2018, for debt and loans respectively. This was reflected in the magnitude of global primary growth of infrastructure projects, and of the financial market in various countries and regions. Moreover, the data revealed a similar performance for the global debt and loans markets.

Despite the drawback in the global debt financial market for year 2002 of $76 billion, the first part of the period examined, namely 2002-2008, witnessed a sharp raise of more than threefold for the debt markets, and fourfold for the loans markets, from $76 billion to $246.5 billion for debts, and from $62 billion to $250.5 billion for finance loans. The rate of increase was due to progress in the Asia-Pacific and Americas project loan markets, despite the drawback of the dollar currency, and the increase in global debt, outside the United States of America (U.S.A). However, the peak rate and progress were suppressed by the GFC of 2008, with global credit markets and economic status influencing deals flows, which dropped more than approximately 50%, from $246.5 billion to $114.5 billion in the debt markets, and from $250.5 billion to $139.2 billion in the project loans markets. The drawback was therefore persistent and and had a considerable impact, as evidenced by the previous years' figures of $101 billion in 2003, $114.5 billion in 2004, $166 billion in 2005, and $210 billion in 2006.

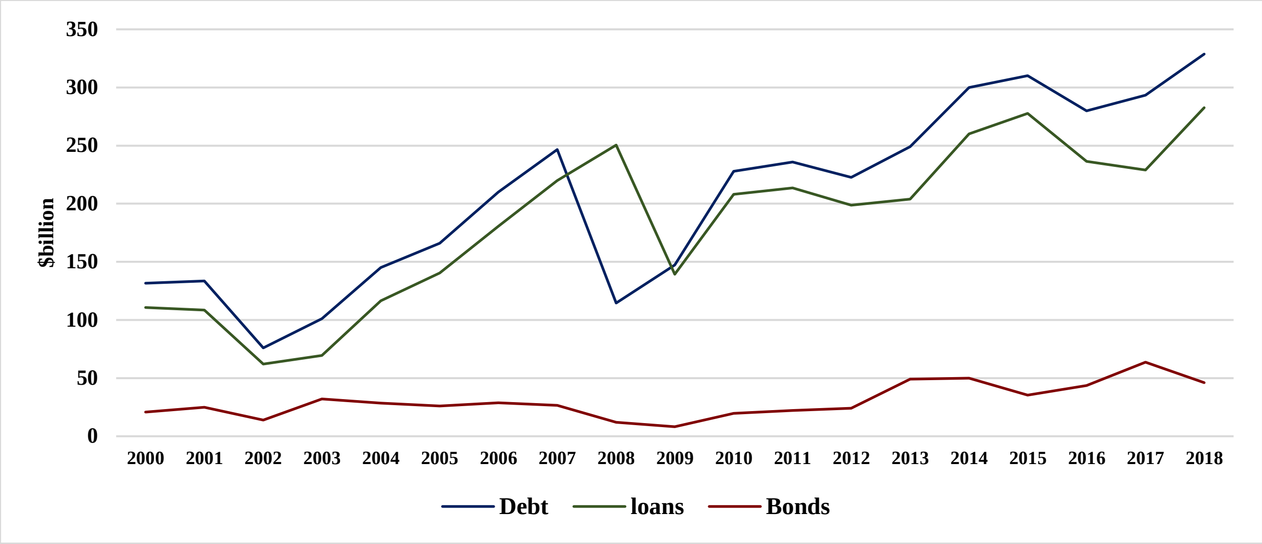
According to the TFSD/PFI (n.d.) data, global projects finance in the **debt and loans** markets have, since, 2009, experienced strong annual levels of financial growth, while the infrastructure investment market increased significantly for the second ten years of the examined period, namely 2009-2018. This development was the result of the deeply financed commitments of the financial banks and institutions, and in particular, the collaboration between the multilateral project finance fronts, which overlapped the commercial finance sector, where investment motions escalated in Emerging

Infrastructure Markets by more than $27 billion, equating to almost a third of the total project finance market.

Furthermore, as Figure 3.8 illustrates, the project finance market globally was relatively stable for the years 2010-2013, in which infrastructure project deals in the loans and multilateral funding market within the range $150 billion to $200 billion, were comparable with those prior to the GFC years, namely 2003-2007. In 2010, the involvement in projects in the emerging markets continued to rise to $29.1 billion, with backing projects aggregating $46 billion. Meanwhile, the projects finance loans and debt markets consistently increased on a global level. For instance, the key reasons for the voluminous loan rate in 2014 were led by the Americas region, namely: 1) drive by U.S.A. project finance market that accounted for 70% ($31.4 billion) of the total loans finance globally; and 2) Latin American countries, namely Brazil, Peru, Mexico, and Argentina, recording that their project finance loans market aggregated by $21.6 billion.

In contrast, in the context of the **bond market**, notably, the bond market exhibited a broad spread comparison in the global capital market since 2012, with an increased value achieving almost $50 billion. Particularly, for the last five years of the period examined, bond issuance in the infrastructure project universe has increased slightly, and retained a hold on its position, with an average range of approximately $45 billion. Nevertheless, the infrastructure project global bond market had a low rate, compared with the global loans and bonds projects finance market, as a result of the tightened regulations and conditions of commercial banks, in terms of the increased credit conditions, due to the pressure from global institutional investors, and the threat from the bond industry. Remarkably, it was found that, global aggregate bond had a significant performance in 2017 (i.e. $63.7 billion of finance project market). These figures were volumed up by the markets of advanced countries, namely the U.S.A, Canada, and the United Kingdom (UK), while new markets, such as that in Mexico and the Malaysian market, appeared in EIM, and captured global investors and financial institutions. According to the TFSD/FDI report (2018, p. 2) the termination of commercial banks' borrowing in infrastructure project finance has long been forecast, however, "That said, by year-end changes in the global debt capital markets meant banks were more competitive than bonds in the marketplace".

Figure 3.8-Global Project finance Volume, 2000-2018($billion)



Source: Thomson Financial Securities Data (TFSD)/Project Finance International (PFI), 2000-2019 reports

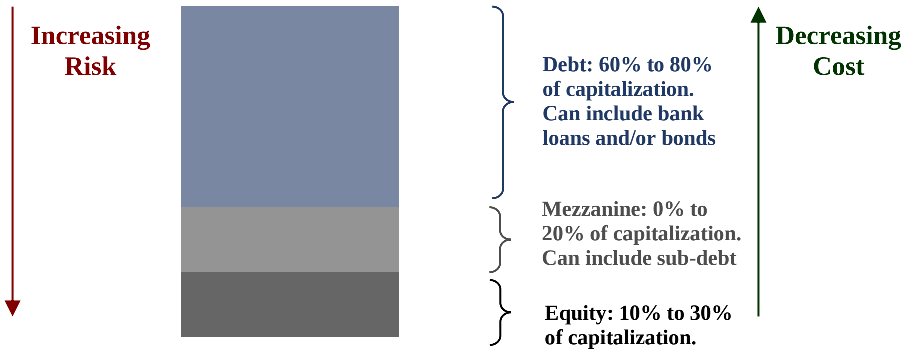
However, the TFSD/FDI data has a number of insufficiencies: 1) a discrepancies between the number of deals that individuals bank reported, and their published version, in terms of a lower/higher figure when they submitted to TFSD/FDI; 2) the TFSD/FDI figure concentrates on the assessed performance of the arranged deals, not underwriting commitments deals; and 3) the data is limited to financial advisory mandates of over $20 million.

Furthermore, Della Croce and Yermo (2013) and World Economic Forum (2018), noted that the 2008 banking crisis had a negative impact on the infrastructure industry, due to the additional constraints set on bank debt levels and the absence of fiscal lines within the capital market. Indeed, the financial market is currently progressing, however the use of banks for project financing has experienced an increasing numbers of drawbacks since the 2008 GFC, due to: (1) higher liquidity and capital conditions under the new Basel III regulations and Solvency II rules; and (2) Banks being required to decrease debt levels through the amendment procedures of balance sheets. This has resulted in the financial markets being under considerable pressure to develop new financial methods (Deloitte, 2013; Della Croce and Gatti, 2014).

3.4.2.2 Infrastructure Debt and Evolution

Debt and Equity are both aspects of infrastructure investment forms and shape fundamental instruments of finance. The growth of capital markets demonstrates advances in finance, including the creation of new financial channels to stimulate increasing number of investors to response the demand for public assets and reduce the current gap between demand and fulfilment (Della Croce and Gutti, 2014). Debt is represented as the most typical finance instrument for project financing and the current large global project debt has tended to be financed by banks. Common capital assets have a high rate of leverage, as opposed to the instability of cash streams and the readiness of the sponsors of infrastructure projects to tolerate a high level of debt (Beeferman and Wain, 2012). Debt as a finance tool can have long lifespan, capable of extending over the life of an asset and commonly incurring low operating risks (Scheinkestel, 1997; Della Croce and Gutti, 2014). Therefore, debt makes up between 70% and 90% of the capital of aggregate infrastructure projects (Figure 3.9) (Weber and Alfen, 2010).

Figure 3.9-Financing Instruments



Source: Weber and Alfen (2010)

Infrastructure investment is multifaceted and complex industry, and as a result, the alternative sources of finance in the form of the high determinants and quantity among the diverse financing sources are represented by the **Loan-to-Equity ratio (L/E)** (Chen et al., 2015). Consequently, the L/E is critical for determining the scale of performance capacity for infrastructure finance, and for evaluating the capital adequacy of the range of participants, namely the institutional investors, financial institutions, and MDBs (Murphy, 2015). Nonetheless, in the opinion of Lewis and

Scheck (2015), institutional investors are bound by various debt-finance channels to tailor their financial selection to their investment requirements, in terms of (1) their approach to the bank loan market, (2) to the public institutional capital market, and (3) to the debt private placement market.

However, inherent in these markets are a number of features that impact the adequacy of infrastructure financing approaches, and the comprises necessary: (1) the flexibility to adjust to variations across the lifecycle of the project; (2) the level of interest rate structure and intervals proposed by the financial participant, who borrows a range of financial products to suit the project revenue and debt profile; and (3) the nature of the performance risk and the risk desire of the target institutional investors (Lewis and Scheck, 2015).

A more recent study by Barbiero et al. (2018), introduced three channels of debt that control investment efficiency: 1) debt model structure skewed across short-term maturities; 2) credit market instability (i.e. distress), which is able to neutralise the rigid role of debt in investment; and 3) a high level of debt is associated with a decline in the level of investment.

Finance suppliers

As a result of project financing contributors increasing their engagement, and new entrants emerging in the industry, the approaches to financing are becoming increasingly demanding and challenging. As previously highlighted, due to the increasing need for additional privately finance for infrastructure projects, and the variety of finance instruments across sectors, financial expertise and professional institutions are emerging in the markets to supply a range of finance tools. This section explores the range of existing global and regional finance providers for infrastructure projects.

(1.1)Conventional/Commercial Banks:

The primary role of the financial sector is to earmark capital effectively. This denotes that banks should target their investment capital in the sectors of corporations and industries that have a prospect of a higher rate of return (Hassan et al., 2016).

Commercial banks have played a traditional role in project finance transactions since 1930s, and have overwhelmingly financed in all capital sectors, namely transport, natural resources, utilities, power, and energy (Forrester, 2001; OECD, 2013), while private finance for large scale investment project tends to consist of bank loans and bonds (Regan et al., 2017). Furthermore, Forrester (2001) claimed that, together with their conventional role in project finance transactions, new services are emerging in Commercial banks for the infrastructure projects industry, namely (1) construction financing, (2) working capital finance for infrastructure projects globally, (3) financial consultancy services, and (4) the ability to act as financial intermediators for long term fixed-rate financing. This has consequently engendered an increase in the competitiveness in financial markets.

However, several researchers depicted a number of constraints and challenges that prevent commercial banks from becoming involved in the global capital markets, which is to say in finance infrastructure projects: (1) drawbacks of credit quality; (2) the up-scaling of competition in investment market mutual funds; (3) the instruction conditions of minimum risk based capital demands; (4) the competitiveness of investment banks, namely in structure and syndicate loans; and (5) restricted procedures in the aftermath of the GFC-2008, namely the re-scheduling of debts (Forrester, 2012; WEF, 2016; OECD, 2018A).

(1.2) Multilateral development Banks:

The financial sector plays a critical role in bridging and delivering financing for investment. Moreover, a number of suppliers have a key role as a source of long-term finance, namely the capital markets, financial institutions, and financial investors (OECD, 2013). Over the last century, a significant number of multilateral development banks, or financial agencies, have been founded with one common purpose: to support the economic development of countries by providing a range of financial tools to underpin the government, and/or private investors (Nelson, 2018). In the opinion of Arezki et al. (2017) and Bhattacharya et al. (2018), Multilateral and regional development banks plays a critical role in minimize jointly governments shortfall and market deficits. In addition, they are able to contribute to filling the infrastructure funding gap by playing a major role in reducing the infrastructure equity shortage, and can be integrated with the 2030 development agenda, namely SDGs (Duvall et al., 2015A; UNCTAD, 2017; OECD, 2018D).

The majority of the funding of MDBs at the early stage of investment came from public sector projects. However, over time, with the progression of economies, they moved from the public sector to a market-based model (De Luna Martınez and Vicente, 2012). According to Macfarlane and Mazzucato (2018) and Bhattacharya et al. (2018), the driver behind initiation of MDBs was the setback of the securities markets and the cut back of private banks loans (i.e. finance large-scale, long-term and valued infrastructure investment), particularly within the period of the recession. According to Humphrey (2015) and Larionova and Shelepov (2016), there were a number of core reasons behind the emergence of MDBs, namely firstly, the persistent absence of infrastructure investment, specifically in core infrastructure, in terms of basic infrastructure in the EMDC. The New Climate Economy Global Commission on the Economy (GCEC) and Climate (NCE) report (2016) estimated that the global need for infrastructure projects could reach $90 trillion over the next 15 years. As highlighted in the previous chapter (Section 2.6.5 Dynamic Target of Infrastructure Investment in Emerging Infrastructure Markets), a significant share of the infrastructure investment of between 35-50% of the annual requirement compared with other regions, must be directed to the East-Asia Region (Bhattacharya and Romani, 2013; Inderst and Stewart, 2014).

Secondly, Humphrey (2014, 2015) claimed that the increased participation level of the private sector in infrastructure is limited for a range of reasons, primarily obstacles pertaining to cost, and the various forms of risk in EMDC. Consequently, MDBs are situated to measure these challenges and/or limitations, namely the risks in portfolio infrastructure investment projects, and have merged the capabilities of obtaining long periods of risk with a robust market capital entrance. In addition, MDBs have the ability to facilitate the flow of global investors' financial resources in EMDCs' infrastructure through their financial instruments, namely by syndication and pooled lending, reinforcing the infrastructure loans securitization, and credit improvement for infrastructure project bonds (Humphrey, 2018).

Another motive behind the establishment of MDBs was the deep variance gap of EIM locations as an engine of global development and growth, and their participation, or representation, in MDBs and other conventional financial organizations (Larionova and Shelepov, 2016). For instance, the strategy in China initiated in the last decade seeks to play a critical role in global growth by participating in the MDBs industry, and the country has a 4.5% share in IBRD, a 20% voting share in NDB, and a global economy portion that surpasses 16% (IMF, 2016; Engen and Prizzon, 2018).

There have been an academic attempts to framework the role of MDBs in EMDCs in a number of ways. Firstly, MDBs have been key sources for increasing capital investment over existing alternatives finance tools. Secondly, they have contributed to underpinning some developing countries, in order to overcome a number of barriers and failures to access private financial markets, including (1) a scarcity of developing countries entering the private capital markets, with World Bank (WB) (2013) reporting that 20 middle income countries entered the private finance markets, compared with 115 middle and low income countries; and (2) due to the long horizon of the investment period, the cost of capital financing is relatively high (Bhattacharya et al., 2016A). Thirdly, MDBs scale-up collaboration between financial institutions and themselves in a number of ways, including (1) partnerships in the formation of finance structures that have ability to unplug investment at scale; (2) creating platforms for infrastructure project compositions, and for the implementation of standard benchmarks; and (3) they represent highly efficient capability platforms and instruments for assisting institutional foundations, reinforcing countries' policy, and leveraging finance by delivering technical assistance (Bhattacharya et al., 2018).

3.4.2.3 Equity Infrastructure Finance Revolution.

The global growth of the financial system is now rapidly evolving (i.e. the body of instruments providing fiscal resources to deliver infrastructure), in response to the global geopolitical transformation and economic development (Prada, 2014). Similarly, the private financing of public infrastructure projects has recently been substantially improved (Gemson et al., 2012). Equity finance is now an accepted as a private sector instrument for financing infrastructure (Egler and Frazoa, 2016). Within the equity finance system, capital is raised by selling company stocks or infrastructure assets to institutional investors, while shareholders obtain revenue from the institution related to the infrastructure assets.

Equity constitutes capital supplied by institutional investors in exchange for dividends (i.e. share payments) related to the number of shares provided by the equity (Della Croce and Paulla, 2015). Equity typically forms 30% and 10% of project capitalization. Creditors may call for a higher rate of equity, in response to any foreseeable future decrease (i.e. a fiscal recession) (Egler and Frazoa, 2016). Equity financing is represented by companies selling stocks or infrastructure assets to investors. Shareholders' dividends are all subject to a debt financial commitment, i.e. debt holders are given first claim on the assets and cash flow produced by the firm (Gemson et al., 2012; Schroders, 2017). This finance instrument is therefore viewed as risky, due to equity holders receiving no return when there is insufficient income to pay debt holders (Figure 3.9).

A number of publications have agreed that capital assets require a considerable degree of debt over equity, due to the high level of leverage with residue in equity (Inderst, 2009; Maurer, 2017; Schroders, 2017). The standard leverage ratio for infrastructure debt-to-equity is 75:25 or 90:10 (OECD, 2014; Sasana, 2015; Maurer, 2017). Therefore, institutional investors tend to seek out methods of attracting equity contributions, or participants to purchase bonds issued by infrastructure firms (Inderst, 2009).

However, the 2008 GFC proved that, despite the existence of rapidly developing financial tools, even high levels of long-term resources are capable of being diminished (Prada, 2014). In terms of fill the infrastructure equity gap, Duvall et al. (2015A) stated that several infrastructure assets face deficits in finance, because the amount of equity is not sufficient to attract the necessary debt to accomplish the transaction.

3.4.3 Short Term Financing and Long Term Repayment of Investments

A considerable amount of literature has recently grown up around a comparison between long-term investment and the short-term financing of projects, by identifying the merits and demerits of both, and examining them from: (1) various perspectives (i.e. financial institutions and authorities, global investors and governments) (2) different levels (i.e. macro and micro level, global and local status) (Lane, 2014; Peria and Schmukler, 2017); and (3) the correlation with risk (Table 3.2). The fundamental differences between financing infrastructure project and investing in capital assets is that the former is short-term whereas the latter is long-term (Della Croce and Paula, 2015). Financing instruments has terms to maturity typical ranging from 3-7 years, which are much shorter than the life of a concession. Therefore, financing instruments may leave project companies with refinancing risks (ICMA, 2015). On the other hand, investing in infrastructure is a very long-term investment as assets are normally valued based on cash flow model that spread more than 30 years (as interpreted in section 3.4.2 investment vehicles).

Due to longer tenor, infrastructure investments are considered significantly risker than infrastructure financing instruments. **Long term finance investments** transfers risk to the funding supplier (i.e. global institutional investors, capital markets and banks), due to their responsibility for enduring changes in payments (defaults), along with other unpredictable fluctuations in financial markets (i.e. interest rate instability).

Short term finance, on the other hand, transfers the risk to end-user creditors (i.e. governments and corporation), due to their obligation to continuously liquidate their debt (Peria and Schmukler, 2017). The UNTT (2013A) working group argued that short-term project finance is significantly associated with long-term investment. Thus, in order to finance long-term and large-scale infrastructure projects, the needs of a global investor must change in response to financial market incentives. Any change in short-term benefits raises the rate of systematic risks and hinders long-term investment. On the other hand, Clark and Urwin (2008),Clark et al. (2012) and Clark (2017) claimed that institutional investors tend to favour methods of reducing the attractiveness of short-term solutions, while also creating strategies to identify the merits of long-term obligations through delivering an opportunity to recognize the objectives of long-term investment.

Table 3.2-Long-Term Investment Vs Short Term-Finance Dimensions

Author(s) Year	**Investment –long term -Overview**	
Beeferman (2008)	variety of dimensions	Long duration of illiquid-assets: operating concession (Nature of assets), Asset Availability (monopoly market), Acquisition Dynamic (procurements, rules and regulations, political and social influences), Liquidity, Income (inflation/GDP growth relative), Growth (level of development assets), Volatility, and Typical return expectation per annum post fees.
Inderst (2010)	Infrastructure equities and bonds	Investment held infrastructure equities and bonds for many years, resulted to treat infrastructure as a distinct asset class.
Caselli (2010) cited by Dziekoński and Ignatiuk (2015)	Tradeability of shares	Illiquid
	Monitoring of management by shareholders	Active/direct
	Role of market for corporate control	Low
	Access to capital	1. Early stage: access limited to set of financiers with highly specialised skills 2. Later stage/buy-outs: closer to competitive market but active monitoring skills required
	Asset specificity	Firms with highly specialised assets
	Project valuation	Restricted range of techniques (e.g. where early stage investments do not pay dividends) and/or need for greater range of sensitivity analysis because of greater uncertainty of cash flows
	Investment decisions	Multi -stage
	Information availability	Private information widespread and difficult to reveal, hence requirement for close monitoring of managers
Clark et al., (2012)	Long-horizon	-Time horizons for infrastructure investments far beyond exceed the time horizon of the typical investor.
	Scale and complexity	Large scale of infrastructure creates barrier to entry other investors.
	Economic benefits	Competitive advantages, stable cash flows, diversification potential and capability to deliver a hedge opposite to inflation.
Oyedele (2014A)	physical structure	Recognized by its features (scale, higher investment costs, inflexibility, and longevity)
Blanc-Brude (2014)	Benchmark	Create roadmap (i.e. benchmark) to characterized the long term investment in infrastructure equity and debt.
Jinks et al. (2019)	Solvency II regulation	- Influenced on investors and emphasised the short horizon over the longer horizon

Finance- Short Term -Overview		**Author(s) Year**
-Difficult to meet financing supply (generate cash flow after many years) -Different financing instruments for different phases of infrastructure finance (i.e. planning phase employ debt)	Finance complexity	Ehlers (2014)
Transfer the risk to the end-user creditors (i.e. governments, corporation.	Risk	Peria and Schmukler (2017)
Liquid	Tradeability of shares	Caselli (2010) cited by Dziekoński and Ignatiuk (2015)
Passive/indirect	Monitoring of management by shareholders	
High	Role of market for corporate control	
Competitive "anonymous" capital market	Access to capital	
Generally relatively low	Asset specificity	
Application of a wide range of techniques	Project valuation	
Single stage	Investment decisions	
Private information is rare; provision of public information is mandatory	Information availability	
-Limited financial resources structure (i.e. represents a loans structure that depends primary on the project's cash flow for repayment) -Project finance overcome host country's risk	Financial resources & Risk environment	Annamalai and Jain (2013)
-Increased the cost for finance infrastructure projects. -Basel III regulation increased the risk rate in terms of banks	Financial sector regulation changes	Hellowell and Vecchi (2012)
-Variety of risks: project risk, financial risk (i.e. inflation) -No consistent standard for the design of a project finance models (project individuality)	variety of dimensions	Yescombe (2014)
-Banks loans dominate private infrastructure finance	Banks Finance	Inderst (2016)

Continue- Table 3.2- Long-Term Investment Vs Short Term-Finance Dimensions

Author(s) Year	**Investment –long term -Overview**	
Bianchi et al. (2014)	variety of dimensions	-Long term finance. -Long-term reward/risk behaviour -limited number of indexes (and associated history) associated with long term infrastructure assets (i.e. investing in listed infrastructure assets).
Fabozzi, and de Nahlik (2012)	variety of dimensions	-Encompass fundraising and a shift in ownership. -Different phases of project where cash flow paradigm are employed.
Gatti (2013)	variety of dimensions	-Long-term assets with long economic life. -Stable, predictable operating cash flows. -Frequent natural hedge against inflation
Warren (2014)	variety of dimensions	-Private equity funds where capital is committed for 10-years -Pools of money are earmarked to support expenditures
Martin and O'Brien (2017)	economic features	-Long-term assets with long economic life. -location-specific – often remain in fixed geographic locations for long periods of time. -Market power: subject to natural monopolies where there are high fixed costs and increasing returns to scale.

Finance- Short Term -Overview		**Author(s) Year**
- Loan side: equity investors, banks and other borrowers invest on the specific basis of a stand-alone valuation of a single infrastructure project (SPV). -Equity side: Capital assets financed of balanced sheets	Equity and Debt sides	Della Croce and Gatti (2014)
-Project finance is the exact opposite of this investment approach (i.e. limited period and distinctive financial structure).	financial structure and period	Gatti (2013)
-Financers religiously square their books at the end of each day. -Investors who constantly update their portfolio is not long term investors and called "long-term as a series of short-terms" investors. -Short-term investors will obtain investment methods that concentrates on information that assists in predicting near-term outcome.	variety of dimensions	Warren (2014, P.5)

Finance- Short Term -Overview		**Professional publications**
-Financial regulations impacted on diverse nature of infrastructure finance and encompasses various forms of financial tools and intermediaries (e.g. Basel III capital regulations).	Range of Financial regulations	Financial Stability Board (FSB, 2018)

Long term investment and Short term finance Comparison (i.e. Long Term Finance)
UNTT working group (2013A): short term-project finance is considerably associated to long-term investment
Clark and Urwin (2008) and Clark et al. (2012): temptations of global investors to choose between long-term investment and short-term finance.
Group of Thirty (2013): long term finance approach: -Channel adequate supply financing with long-term maturities to achieve the growing investment demands. - Confirm the long-term finance provided by institutions with long-term horizons. -include cross-boarder vision of financial tools to underpin he long-term investment.
Opazo et al. (2014): -Global institutional investors invest in long terms assets and holds short-term finance (i.e. debt) as a ways to reduce risks and inadequate regulation and institutions -in terms of developing markets: an attempts to develop long-term financial market for institutional investors.
Beck (2016): a number of dimensions to scoreboard for long-term finance : -private credit to GDP (encompass short and long term financing). -Cross-border infrastructure funding for long-term finance. -long-term finance is associated to the financial structure debate (i.e. bank or market based financial structure to be consider).

Chen (2018) stated that infrastructure consists of two critical features: firstly, the lengthy economic lifespan of capital assets and secondly, the considerable up-front investment involved in capital expense. Lane (2014) identified various reasons behind the risks related to infrastructure investment return in Emerging Infrastructure Markets. Firstly, the long-term period of payment for diverse infrastructure projects reflected the need for investors to run the project within an environment containing a high level of unpredictability, in contrast to short-term (i.e. smaller) financing projects. Moreover, Lane (2001, 2004, 2014) stated that the degree of long-term foreign debt liabilities is significantly related to trade openness and the level of product/capita and influence on infrastructure investment payback.

While some investors such as the multilateral financial institutions and the international agencies may not require as high financial returns as investors, the achievement of adequate returns is still a requirement for the investors (Ansar et al, 2016). The interest of investors in funding infrastructure projects are partly determined by the extent of the financial returns that would be achieved in the funding of the investments versus the risks that would be received by the investors in their investments (Blanc-Brude, 2014; PWC.com, 2020A). The result is that some types of infrastructure investments are more attractive for investors and these can lead to changes in the strategy of the investors in relation to their activities as the investors would be keen to invest in infrastructure projects that provide sustainable profit margins (PWC.com, 2020A). The size of the infrastructure requirements has implications on investor sentiment and interest for investments as the large-sized projects can provide the investors with significant economies of scale (Bianchi et al., 2014; PWC.com, 2020A). For the longer-term infrastructure projects, the investors are able to plan over a longer period of time and are able to leverage the portfolio of investments (Bianchi et al., 2014; Blanc-Brude, 2014; Oyedele, 2014A).

Secondly (as highlighted in Chapter Two), infrastructure investment has been influenced by various types of risks (i.e. political and economic instability), while little difference can be seen in their level of return, particularly in developing and emerging Markets (Buckley et al., 2010; Anderson and Sutherland, 2015). In emerging countries, the economic situation tends to be volatile and unstable, increasing the level of investment risk. Infrastructure returns on public assets are characterised by a strong correlation with the local macroeconomic atmosphere (Rahman et al., 2015). Therefore, the public assets of emerging countries are below the par hedging properties for local investors. Consequently, in order to boost investment into infrastructure, there is a need to syndicate foreign equity inflows, which global investors are able to use to direct structure equity stakes in capital assets and reduce the level of risk by sharing it at a global macro-level (Lane, 2014).

As previously discussed in Chapter Two, emerging countries have considerable need of additional infrastructure investment to meet demand. Hence, it is necessary to allocate, on a global level, efficient capital to ensure investment funding over long periods from global investors, i.e. developed economies (Dobbs et al., 2010). Nonetheless, there remain diverse relationships between global capital flows and infrastructure investment. This highlights the reasons why global financial integration is an instrument for assisting the longevity of investment by sharing global risk and allocating efficient capital, i.e. in countries with a lower capital stock and high rate of volatile outcomes (Aghion et al., 2005).

3.5 Investment and Financing Challenges in Emerging Infrastructure Markets

The establishment of a sound framework to ensure sustainable financial funding to address the infrastructure requirements of countries forms a critical activity for the policy makers in governments (Gerli et al., 2017; White and Wahba, 2019). According to Ray (2015), Emerging Infrastructure Markets traditional non-resources infrastructure project financing is influenced by a combination of credit market positions: 1) the absence of liquid debt and maturity capital market that creates an increased dependency on financing infrastructure assets with traditional bank loans; 2) the conventional financing structure in EIM is characterized by flexibility across regions, and overall provides banks with the rigidity to develop new structure financing strategies; and 3) the high rate of inflation across regions yields high interest rates.

Such a gap in the literature is significant in light of evidence showing the strong returns of appropriate infrastructure investment on Emerging Infrastructure Markets. This relationship holds in general due to the lack of effective infrastructure in these countries, and thus the productivity and supply side benefits of most types of investment project (Tiryaki and dos Santos, 2017). At the same time, this relationship has also been revealed in the effect of market spillovers from financial markets, including harming economic growth in the Emerging Infrastructure Markets (Fukuda and Tanaka, 2017). However, the evidence does also show that infrastructure investment remains a strong source of returns in Emerging Infrastructure Markets, particularly when it can help integrate their firms into global value chains, improving their value creation and reducing the vulnerability of the economy to future shocks (Bass, 2016). This thus helps to establish infrastructure investment as a viable method for Emerging Infrastructure Markets.

The large funding requirement has several challenges as the requirements are integrated and linked with the laws, regulations and policies that are developed in countries, across local and national governments (PWC, 2014). The governments and the multilateral financial institutions need to work collaboratively in the development of an attractive investment environment such that the public and private investors would be keen to work with governments in a stable political and financial macro environment but also involves the guarantees of proper deployment of infrastructure financing, and the mitigation of political risks for the investors (Ray, 2015; PWC, 2017A). Another important feature is that the policy makers need to focus on the minimization of the macro economic shocks which impact the global institutional investors. The establishment of an attractive investment environment in the form of relevant and effective investment policies, national peace, and political and economic stability provides outside investors the opportunity to be interested in the funding of the infrastructure requirements of economies in different markets.

Furthermore, as highlighted previously, in the developed world some provisions of Basel III rules for banks dictate to restrictive capital requirements for infrastructure investments. Certain provisions of EU’s Solvency II rules also prevent insurance companies from committing capital to infrastructure (Della Croce and Gutti, 2014; Bhattacharya et al., 2016A). Furthermore, White and Wahba (2019) stressed that once state agencies in EIM establish a solid foundation for funding, a call for variance mechanisms will create private investment via debt financing and land value capture tools.

3.6 The Scale of Global Capital Flow Market

The capital market plays an essential role in economic development by pooling global capital for long-term investment. Nonetheless, in the context of EIM, the capital market remains behind global development (Philippon and Reshef, 2013). Since EIM are expected to expand over the next 10 years, it is crucial that there is a substantial liquid capital market to fund and finance the future development.

The capital market plays a critical role in financing infrastructure for global institutional investors across various region (RREEF, 2017B). As highlighted earlier in this chapter, the number of global institutional investors is gradually increasing, and they are allocating assets to infrastructure as an asset class. In addition, as the mega players, namely sovereign wealth funds and pension funds, enter the market and increase their appetite for direct investment, more funds are available (Duvall et al., 2015A). The existing pool of capital is considerable, and McKinsey (2016B) estimated that over $5 trillion a year is available for infrastructure investment (i.e. dry powder). However, Duvall et al. (2015A) argued that the availability of capital is not the only obstacle that faces infrastructure investment, since the money must be employed in appropriate infrastructure projects.

Furthermore, capital market played a key role in elevating long-term regional currency financing, and a number of observers suggested that developments with local and regional capital market incorporation are slow-moving and essential to redress agendas (Regan, 2017). In the context of EIM; traditionally, capital flows towards EIM have primarily encompassed foreign direct investment (FDI); although, equity portfolios and bank associated flows to EIM have been significantly boosted (Lauterbach et al., 2014; Byrne and Fiess, 2016). Furthermore, Araujo et al. (2017) claimed that private capital inflows in EIM correlate with three conceptual cycles namely: 1) local and regional business cycles, which are associated with the analysis of economic foundation; 2) local and regional financial cycles, as indicators of the circulation of credit volumes, interest rates, and asset prices; and 3) Global financial cycles as captive movements of global liquidity and global risk.

In terms of managing the receipt of global private capital inflows into Emerging Infrastructure Markets, a number of studies have increasingly expressed interest in the nature of the capital flow market and attempted to identify the causes of these flows and their impact on long-term investment in capital intensive assets (Gardiner et al., 2013; Park, 2013; Laeven, 2014; Byrne and Fiess, 2016; Regan, 2017). For instance, the Asian Bankers Association (ABA, 2010) has highlighted that deficits in infrastructure investment, as aggravated by modifications to the Basel III rules (i.e. apply new liquidity and capital capability requirements that restrict the capacity of banks to supply limited long-period loans). Meanwhile the banking industry has historically played a critical role financing and constraining capital capability demands that might have negatively influenced lending in the future (i.e. infrastructure borrowing) (UN-ESCAP, 2017).

However, according to Ray (2015) and Laeven (2014), capital market developments impact positively on the infrastructure investment process, namely: (1) enhanced access for long interval loans (i.e. up to 85% of project costs); and (2) running maturity risk and interest rates related to long-periods of investment in infrastructure. Furthermore, a number of researchers have attempted to frame the significant impact of mature and capital liquid markets associated with infrastructure investment in EIM in a number of ways: 1) supply solid finance alternatives and options for capital intensive assets; 2) grow capital flows exhibiting a strong association with foreign direct investment inflows; 3) and improve the integration of capital markets and increased efficiency and openness (Park, 2013; Rodriguez, 2015; Regan, 2017).

Foreign inflows of capital are conveyed from advanced economies to Emerging Infrastructure Markets and involve a number of dimensions for economic growth; for instance, minimizing credit restrictions and increasing investment resources. In addition, approaches to global funds improve financial capital allocations efficiently and effectively (Ahmed and Zlate, 2014). In addition, Igan and Tan (2015) and Igan et al. (2016) explored inflows and development correlations that are robust in regions with solid functional banks. Furthermore, there has been a reduction in output volatility;

although, this connection has been more widely observed in equity inflows rather than debt settings. However, this association collapsed during GFC. Furthermore, Annamalai and Jain (2013) believe that the main characteristics of regional financial structures are that they can be utilized to underpin and enhance capital flows and reduce the landscape of risk: 1) divide incorporation (i.e. enhance transparency and governance); 2) finance restructuring to control any limitation of local/regional legal systems; and 3) high leverage (i.e. enable borrowers to minimize waste and free cash flows).

Annamalai and Jain (2013) and Igan et al. (2016) found these features (i.e. solid economic prospects and financial capital flows) exhibited preferences that have an impact in terms of the capability application of larger projects by stimulating foreign capital (i.e. global institutional investors) in EIM.

Despite global capital flows holding a numbers of merits that might contribute to economic development and financial capital growth, a number of empirical studies have argued that global capital flows in EIM can raise of number of issues; they document complex and disorganised structures regarding the real impact of these, and transfer economic resources into assets that on occasion slow rates of growth and productivity (Reis, 2013; Benigno and Fornaro, 2014; Igan et al., 2016).

From an investment fund perspective, robust evidence has been observed that funds inflows (i.e. investment pressure) and accelerates capital allocation. Research conducted by Lauterbach et al. (2014) reported that increasing funding inflows, as evaluated by committed capital for PE funds can be associated with stagnating performance. The authors observed a greater intensity of stagnation and a higher scale of capital investment per financing channels. In addition, they witnessed a 100% increase in funding inflows (i.e. PE investment) associated with a 76% increase in the staging intensity of financing channels.

3.7 Private Equity Investment Funds, Structure and Process

Institutional investors are now becoming highly active in line with the public sector when it comes to the provision of capital for infrastructure funds and ventures (Clark et al., 2012; Clark, 2017). There is a large body of empirical research pertaining to diversification methods and vehicles for investment into infrastructure. Investments into assets take place in Listed and Unlisted investment vehicles (Sharma, 2012; Della Croce and Sharma, 2014; Lara-Galera et al., 2017). To date, PE infrastructure investment is the most recognizable vehicle capable of accessing core economic infrastructure is (Della Croce and Sharma, 2014).

A number of researchers have attempted to identify PE funds/investments from various perspectives. Blanc-Brude and Hasan (2015, p.16) defined infrastructure PE investment from a contractual point view, as a privately held shareholding in companies, established to build, operate and maintain specific infrastructure venture or networks. Dziekoński and Ignatiuk (2015) viewed PE funds as a delivery method for equity capital from financial investors to unquoted firms (i.e. those not listed in the stock exchange market), with a significant opportunity to increase. Døskeland (2018)[10] concurred, introducing PE funds in response to the degree of investment in the market realized by financial intermediaries. Furthermore, Gilligan and Wright (2014, p.14) introduced PE funds as a form of “investment club”, in which the primary investors are institutional investors, including: (1) investment funds; (2) pension funds; (3) insurance companies; (4) banks; (5) funds of funds; (6) endowments funds; and (7)PE funds managers.

On the other hand, Figure 3.10 illustrates two approaches to PE investment commitment, as illustrated in the PE investment cycle: (1) direct investment (i.e. controlling equity buyout or debt mezzanine positions in established firms) and (2) indirect investment, i.e. investing as limited partners in a number of conventional PE funds (such as funds of funds) without the use of an intermediary (Huss, 2005; Herasym and Segura, 2006; McCourt, 2016). Døskeland (2018) claimed that some

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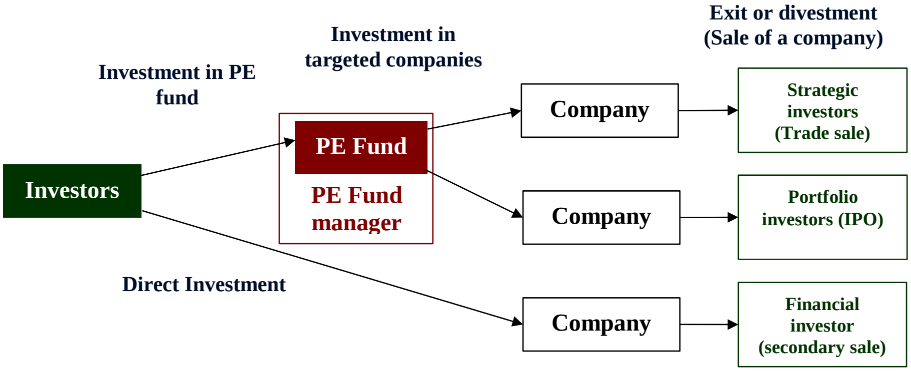
[10] Europe and USA use various terminologies to describe PE: (1) in the European context, PE indicates the entirely professional investment market in unlisted companies and incorporate BO and V.C.; and (2) in the USA, PE is seen as an alternate to buyout. The total market normally indicates PE and VC (Døskeland, 2018).

institutional investors are characterized by a lack of an ability to drive PE investors in PE deals. Therefore, the direct investment approach is required to perform in combination with PE funds or investors.

Figure 3.10-Private Equity Investment Cycle



Source: Herasym and Segura (2006)

The majority of PE funds are structured as Limited Partnerships (LP), known as external investors due to their limited role (i.e. liabilities) associated with scale of their investment funds. PE is managed by the General Partners (GP) of funds, generally large scale institutional investors with potentially un-limited responsibilities towards such funds (Gilligan and Wright, 2014). This results in GP receiving annual management fees, typically around 1.5%-2% of the committed capital. Additional fees carry interest (i.e. performance-based incentives), generally 20% of total profits (Metrick and Yasuda 2010; Sørensen et al., 2014). These investors provide the majority of the capital along with LPs, typically over a period of ten years (Inderst, 2009; Metrick and Yasuda, 2010; Døskeland, 2018).

Global investor institutions (i.e. PE firms) implement specific procedures when committing to investment in advanced countries. Nonetheless, additional evaluation techniques are required to guarantee this investment in the context of EIM and developing markets. As illustrated in Figure 3.11 European PE and the Venture Capital Association (EVCA), cited by Herasym and Segura (2006, p.9) and Lerner et al.

(2012B), introduced typical PE investment breakdown procedures encompassing a number of essential stages, as outlined below.

The First stage: the PE firm identifies and seeks investment opportunities (i.e. selecting country as opposed to sector). The duration period for the first and lateral stage is approximately one year and is referred to as the ‘marketing period’.
The Second stage: this includes the analysis and assessment procedures for the investment prospects (i.e. risk and return, funding and financing instruments).

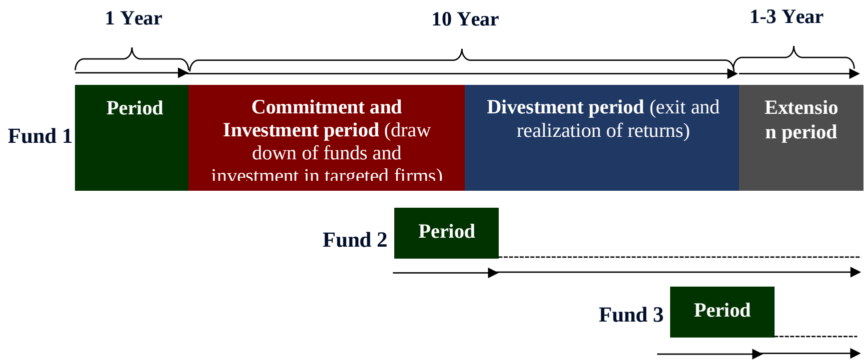
(Stages Three and Four are known as ‘commitment and investment’ and have a lifespan of approximately five years.)

The Third stage: this allocates investment and conducts all the required procedures to close each deal within the agreed period. From a financial aspect, the commitment stage is crucial for the assurance of the available liquidity and cash flow (i.e. draw down or capital calls) and the transfer into funds.

The Fourth Stage: this consists of construction and maintenance, in which the PE investors are responsible for the control and monitoring of the investment

The Fifth Stage: this is known as the ‘divestment period’, which generally lasts for a period of five years. During this stage, it is the function of PE investors to sell (i.e. exit) the investment and distribute the return across the LP investors. Herasym and Segura (2006) introduced three forms of exit investments: (1) trade sale; (2) secondary sale (i.e. sale the investment to financial investors or PE fund); and (3) initial public offering (IPO). There appears to be a consensus between academic researchers and professionals concerning the importance of the two critical stages relating to the evaluation and analysis of the investment stage and exit investment stage (i.e. second stage and final stage) in the investment mechanisms (Herasym and Segura, 2006; Lerner et al., 2012A,B; Dias and Macedo, 2016).

Figure 3.11-Stages of Private Equity Investments

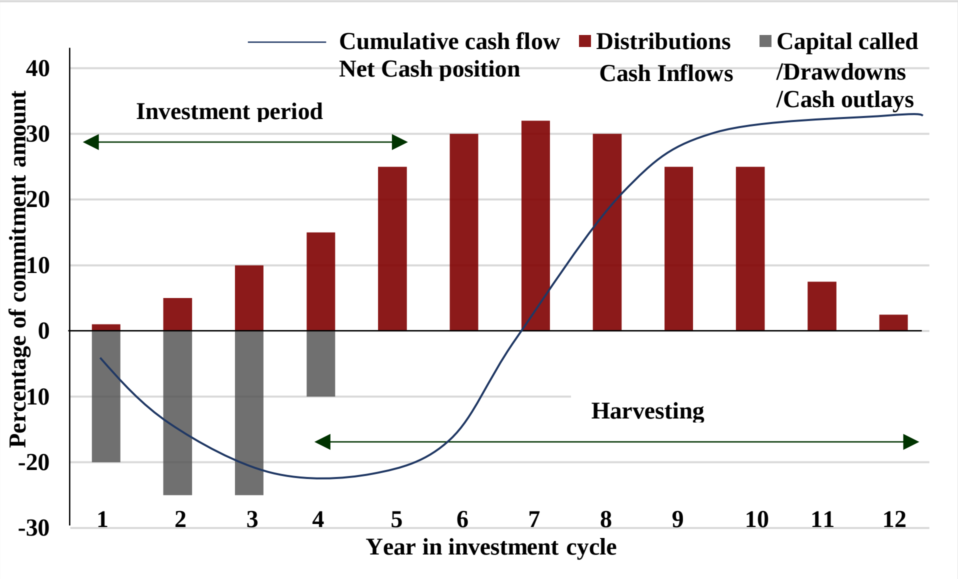


Source: Herasym and Segura (2006)

As highlighted earlier section in this chapter, PE and infrastructure share a number of inherent characteristics (i.e. illiquidity; high return expectancy in the long-period; higher risk), with the possibility for enhancement of capital assets (i.e. capital appreciation) (Dias and Macedo, 2016; Blanc-Brude et al., 2016A; RREEF, 2017A; Chambers et al., 2018). Nonetheless, Mucha and Hassan (2010) and Morgan (2018) stressed the need for PE investors to focus on three critical features: (1) risk assessment; (2) cash flow requirements; and (3) return required. The commitment of a PE fund is predominantly a long interval investment, with a contractual life span of between ten and twelve years, and an alternative expansion of between three and five years. As demonstrated by Figure 3.12, common investment exists in the public market committed capital that is not promptly utilized. However, distributions can vary in terms of scale and period, and may also appear across the lifespan of the investment (Huss, 2005; Kaplan and Stro¨mberg, 2008; McCourt, 2016).

Nonetheless, Morgan (2018) emphasized that PE investors need to ensure the availability of cash flow (i.e. liquidity) to fund capital for investment. Døskeland (2018, p.79) suggested 'Vintage diversification' as a method to secure cash flow, i.e. the use of ***PE funds' negative net cash flow*** during the early stages of investment (i.e. the capital call or ***cash outlays***), followed by positive PE funds in the lateral stages of the investment life span (i.e. the existence of a fund's portfolio or ***cash inflows***), as shown in Figure 3.12. The 'J-Curve' depicts the pattern of investment to realize PE funds across the life-span (i.e. from expectation to completion). Furthermore, the concept of 'vintage diversification' indicates PE investors engaged in a number of funds of diverse vintages, resulting in the capital call for new entrant funding that can be acquired by the supply of vintage funds (Døskeland, 2018). Robinson and Sensoy (2016) stated that vintage diversification underpins the investment process by reducing the level of risk related to funding liquidity, demonstrating that the total capital distribution or cash inflow can lead to the procyclical net PE cash flow.

Figure 3.12-Typical Annual Cash Flows of a Single Private Equity Fund and Illustration of the "J-curve" of PE Fund Cash Flow[11]



Source: Augmented from J.P. Morgan (2018) and Døskeland (2018)

Brunnermeier and Pedersen (2009) noted that the concept of PE is based on two forms of illiquidity capable of influencing both return and risk: (1**)** ***funding liquidity*** indicates the readiness of institutional investors (e.g. PE investors) to acquire financing for their investments and (2**)** ***market liquidity*** correlates with volatility and is identified as flexibility regarding the selling off of infrastructure assets (Døskeland, 2018). Furthermore, illiquidity commitments are commonly made over a long period of time (i.e. they typically reach maturity after a period of between ten and fourteen years) (Buchner et al., 2014; Longstaff, 2014). Therefore, PE investors seek a premium relating to public markets, regardless of the position of the economy in the business

[11] Additional source of reference:
http://www.venturechoice.com/articles/why_n_how_to_inv_in_priv_equity.htm [Accessed 19-7-2019]

cycle (Jordaan, 2018). Furthermore, PE investment is characterized by a lack of opportunity to re-invest (or retrieve an investment) in comparison to other alternative asset-classes. In addition, investors have a limited opportunity to sell their PE investment, due to being bound by their investment contract. Despite the development of a secondary market for such investments (i.e. enabling institutional investors to sell their PE investment), there remains a negative correlation when it comes to interest, in which discounted deals and market cycling are associated with incurring additional costs (Huss, 2005; Mucha and Hassan, 2010; Buchner et al., 2014; Morgan, 2018).

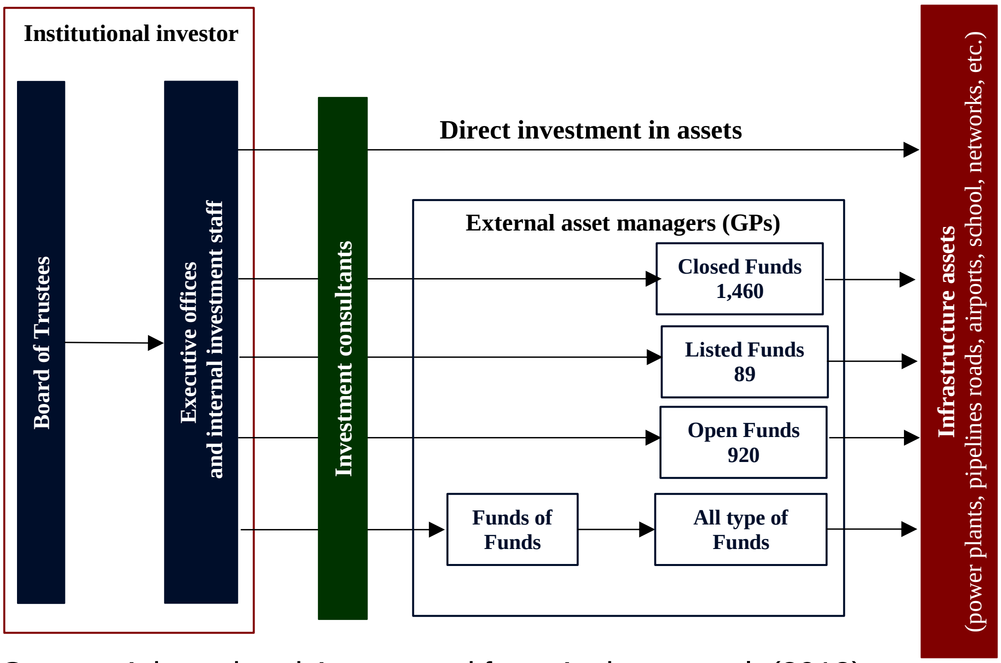
The issue of PE illiquidity has led to a need for PE investment to achieve high estimation Returns. Sørensen et al. (2014) and Døskeland (2018) considered that a PE investment return differs from a public investment return as follows: (1) that, as noted above, PE inherently appears as an illiquid asset, which requires a higher estimation return in comparison to public equity investment; (2) the PE average investment varies in comparison to average public equity pertaining to distinctive attributes (e.g. geography, scale, sector, and growth opportunities); and (3) PE investment is associated with a higher rate of risk, including being influenced by systematic silent risk elements found in the market (i.e. incomplete markets). The incomplete market correlates to the risk of illiquidity (i.e. the PE investment assets cannot be sold prior to maturity). Moreover, PE returns are initially associated with a large number of caveats, as presented in Figure 3.14. PE funds illustrate negative returns during the preliminary years of investment, when costs related to start-up and fees occur, as well as planning for an investment strategy plans. This refers to the J-curve effect, depicting the pattern of return PE investors can anticipate across the life-span of PE funds (i.e. from expectation to completion), as shown in Figure 3.14 (Morgan, 2018). Mucha and Hassan (2010) and Døskeland (2018) considered that the investment return can generate the mature company portfolio during the lateral years, thus increasing the value of the investment with a realized return. Roggi et al. (2019) agreed that a significant return from PE assets class tends to be realized when PE has been transferred to public equity. However, a number of academic researchers have agreed that, alongside the use of capital investment funds, the features and structure of PE firms have a positive influence on the scalability of returns (Robinson and Sensoy, 2016; Silanes et al., 2013; Harris et al., 2014).

3.7.1 An Overview of Unlisted Private Equity Infrastructure Funds (UPEIF)

The development of infrastructure investment and the persistent desire of institutional investors to invest is associated with the increased growth of infrastructure funds. Variety forms of funds have been evolved to provide alternative options to meet the global investors satisfaction and reflect the evolution of capital markets maturity level of different structure of investment (Della Croce and Gutti, 2014; Panayiotou and Medda, 2014). As highlighted in Section 3.4 (Infrastructure Investment vehicles and Finance tools), there are a number of forms of infrastructure funds for institutional investors to invest in, including listed and closed funds, as illustrated in Figure 3.13 (Andonov et al., 2018). In addition, in terms of unlisted infrastructure structure of funds, Panayiotou and Medda (2014) focused on three main funding structures involved in infrastructure investments: (1) PE funds, (2) hybrid structures, and (3) open-ended structures. These main funding structures are an aspect of as indirect methods of equity investment in infrastructure (Egler and Frazoa, 2016). However, PWC (2017D) argued that PE funds and specialist infrastructure funds are the chief players in the infrastructure investment market.

According to Andonov et al. (2018), the majority of global institutional investors disclose infrastructure assets across **closed funds**. This form of fund adheres to the concept of the PE funds mechanism as it is raised with a limited timeframe, as discussed previously.

Figure 3.13-Investing in Infrastructure



Source: Adopted and Augmented from Andonov et al. (2018)

The **Open-ended** structure has been developed to address the illiquidity and short-term issues pertaining to PE, enabling long-term institutional investors to meet their liabilities (Panayiotou and Medda, 2014; Egler and Frazoa, 2016; Klugman, 2019). In addition, this form of fund is characterized by a lack of fixed term, which means that investors can invest and withdraw at any time (Jacob et al., 2018). However, this structure also includes a number of defaults: (1) concern regarding costs; (2) the calculation being based on Net Asset Value (NAV[12]), which varies between funds. Despite the significant shift towards infrastructure closed-end funds, open-end infrastructure investment strategy is currently a niche market, with the potential to grow in tandem with the infrastructure fundraising market (Egler and Frazoa, 2016; Klugman, 2019).

Another form of infrastructure funds strategy has been developed in the form of **Hybrid structure funds** to permit institutional investors to invest over a risk/return vision, namely accumulation investment with a long and short term (Probitas Partners, 2009). This form of investment allows greenfield projects to yield a higher return in the middle

[12] NAV= the value of unrealised investments, or as yet not acquired investments, (Huss, 2005; Harris et al., 2013), or AUM less dry powder (McKinsey, 2019).

of the investment period, and avoids risk following completion by placing it in the market (RREEF, 2012; Panayiotou and Medda, 2014). However, the funds structure has disadvantages regarding the absence of a transaction price method for the investor (Haward, 2012). This reflects the Preqin universe (2019) analysis of the infrastructure funds in the market breakdown.

Another form of infrastructure fund strategy known as **'fund of funds'** was developed in 2008, and involves investing in assets of infrastructure funds, instead of investing directly in infrastructure assets (Panayiotou and Medda (2014, p. 426). The aim of this strategy is to achieve a range of benefits by creating a diverse portfolio, and increasing the rate of return at the same level of risk. However, this form of strategy represents only a small element of the overall fundraising strategy for infrastructure.

3.7.2 UPEIF Investors within Emerging Infrastructure Markets

Over the previous decade, PE investment has been recognized by EIM as a critical contributor to economic growth, in a similar way to that experienced by developed economies (Yeadon, 2014; Zeisberger and Mae, 2019). A number of researchers have attempted to framework factors impacting on global investors, with the aim of attracting them to target the capital markets of EE (Blundell-Wignall 2007; Groh, 2009; Pries and Berla, 2015). Groh (2009) introduced a number of elements aimed at increasing the attractiveness of EIM for global investors: (1) capital set aside for funding various types of infrastructure class-assets (i.e. the vital need for financing, particularly from non-quoted firms); (2) considerable prospects for growth and economic development (i.e. high growth rate); (3) exploration of capital through the use of financial institutions' expertise in dealing with capital investments involving a level of risk; (4) adequate stability to establish a successful PE market to underpin investment, competitiveness and development in emerging countries; and (5) capital EIM risk being lower in comparison to developed economies. Moreover, Blundell-Wignall (2007) noted that global investors (i.e. PE companies) are attracted to industries characterised by the availability of stable levels of cash flow across the economic cycle.

This was supported by research conducted by Jover and Malambo (2014), which assessed the elements that are attractive to global PE institutions investors in emerging markets. The results demonstrated that majority of global PE funds investors are attracted to EIM by their high potential for returns, and rapid economic development. In addition, they found that 1) the more the country was undersupplied with infrastructure assets, the more attractive it was for PE investors; and 2) various key aspects of economic sectors, including the financial development market, and growth of the private sectors, presented significant prospects for the global PE funds investors.

However, recently a growing body of evidence has begun to highlight the existence of various measurements (i.e. physical, economic and financial) of the benefits and factors capable of attracting global investors and ensuring continued investment into infrastructure assets in place of project finance in EIM (Mackay-Fisher, 2012; Oyedele et al., 2013; Rothballer and Kaserer, 2011; Bhattacharya et al., 2016B). As highlighted in previous sections, PE investment is characterised by being transformational and accompanied by value added features. Herasym and Segura (2006) described the further benefits of PE investment flows from global PE investors generated in EIM as follows: (1) an accumulation of PE playing a critical role in the development of the economy (i.e. underpinning and catalyzing the local private sector and enhancing the financial market); (2) Global PE investors promote efficiency (i.e. the most effective business practices); and (3) an increased competitiveness within the local market and target sectors.

Alongside investigating the potential to increase the appetite of investors for investing in EIM, a number of researchers have attempted to identify critical aspects influencing the investment decisions of global investors in emerging countries and developing markets (Mingo et al., 2018). PE transaction forms a key element related to further crucial features, i.e. the quality of regulation and the establishment of contract mechanisms (Lerner and Schoar, 2005; Kaplan and Strömberg, 2008; Khoury et al., 2015; Buchner et al., 2018). Herasym and Segura (2006) stated that PE investment procedures in emerging markets and developing economies (EMDE) have encountered a number of challenges. The public sector initially viewed PE as new asset class with short-period portfolio flows associated with a high rate of instability.

Consequently, PE investment experienced a lack of underpinning, preventing any expansion into EIM. In contrast, Yeadon (2014) argued that the low rate of new market returns, and political and economic instability, raises questions regarding the attractiveness of emerging markets' private equities.

Minardi et al. (2017) stated that the rationale behind PE firms (i.e. global investors) is the allocation of further resources to emerging markets, due to: firstly, intensive competition for PE and VC deals in developed countries (i.e. maturity markets) and secondly, the relatively low cost of deal is in emerging markets than developed economies. Groh (2009) highlighted that investment procedures from global institution investors creates geographical source bias. Mingo et al. (2018) confirmed that the geographical focus of global investors tends to be influenced by the growth of emerging markets. In addition, emerging markets are characterised by small geographical distances and low rates of centralization, and are therefore more attractive to global investors, particularly PE firms.

As a highlighted in the previous chapter, EIM has an inherently distinctive nature, prompting global investors to follow a number of different caveats to develop their PE funding and investments (Meuleman and Wright, 2011). In addition to the general risks associated with PE investment discussed earlier in this chapter, Bhattacharya et al. (2012) and Schwartz et al., (2014) introduced classifications of various scales of risk likely to be encountered by emerging markets over the lifespan of an infrastructure project: (1) external risks, including global volatility (i.e. banking and energy crises); (2) macroeconomic and political risks (i.e. regulatory, interest rates, inflation and exchange rates); 3) Sector risks (i.e. market, demand and technology); 4) specific project risks (i.e. technical, financial, operation and construction); and (5) further aspects of risk (i.e. environmental).

However, EIM have begun seeking silent features, and reviewing their investment instruments and strategies since the 2008 GFC (Xiang, 2018), as the GFC affected EIM and caused them to seek alternative tools and more secure investment ranges for pensions funds. According to Xiang (ibid.), unlisted private equity funds, investment in infrastructure delivers benefits for both parties, the global PE investors, and the emerging countries. Due to the fact that the financing gap for global infrastructure is wide, and there is an increasing demand for capital assets in EIM, there is a pressing need to improve and expand financial methods and channels. Consequently, investing in infrastructure assets by employing the pension funds approach can generate a 'win-win' situation for both sides.

3.8 Conclusion

This chapter provides comprehensive interpretations of the investment paradigms, finance instrument evolutions, and the nexus between investment vehicles and finance instruments and tools and contributes to the achievement of the first objective of the current research '*To evaluate the theoretical perspectives that underpin the dynamics of the global infrastructure financing sector and examine the global development of investment structure and financial resources'*. Furthermore, the separation between investment mechanisms and finance instruments allows to examine the various aspects of infrastructure investment from a global perspective.

Specifically, this chapter explored the following aspects. Firstly, there was a discussion of how those involved in financing various classes of assets are currently increasing their participation and level of experience through the use of emerging new instruments, methods and entrants to this area. This ensures related techniques become more composite and multifaceted, while also being effective and efficient. Secondly, there was an examination of the merits and demerits of current trends of financial tools, methods and mechanisms, in response to growing calls for supplementary private sources of finance for infrastructure projects and the variety of approaches to finance diversity of capital assets across sectors. Finally, it highlighted the existence of a variety of investment alternatives and vehicles.

Furthermore, an in-depth assessment delivered of the fundamental concept and development of unlisted private equity infrastructure funds (UPEIF) and the drivers behind approaches to unlisted private equity investment in Emerging Infrastructure Markets. EIM tend to concentrates on the growth of infrastructure investment, and seek to create an attractive market environment, in order to attract international investors and fund managers (Jordaan, 2010). However, despite of the infrastructure investment that has been observed with low interest rates and risky in EM, global institutional investors have still tended to seek infrastructure investment in Emerging Infrastructure Markets. Currently, several factors exist that have hindered and limit global infrastructure and institutional investors from investing in Emerging Infrastructure Markets: 1) capital intensive assets are associated with high transaction costs, and distinctive financing arrangements as well as procedures to form bankable assets; 2) the J-curve (i.e. profit profile) is deeper in EIM, investors are required to tolerate this for several years in captive investment funds; 3) absence of a secondary market to refinance (or sell) infrastructure assets, added difficulties when transferring investors' portfolios; and 4) an infrastructure characterised by long-period loans and financing, and difficulties turning portfolios into cash flows (i.e. monetization). These factors augment the platforms' level of risk, and increase the infrastructure investment gap in EIM as compared to that in other economies (Ahmed and Zlate, 2014; Lee, 2017; Alexander 2018).

The following Chapter (i.e. Chapter Four) exhibits the methodological model employed in the research.

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Chapter Four: Infrastructure Investment in Emerging Market: Research Methodology and Framework

4.0 Infrastructure Investment in Emerging Market: Research Methodology and Framework

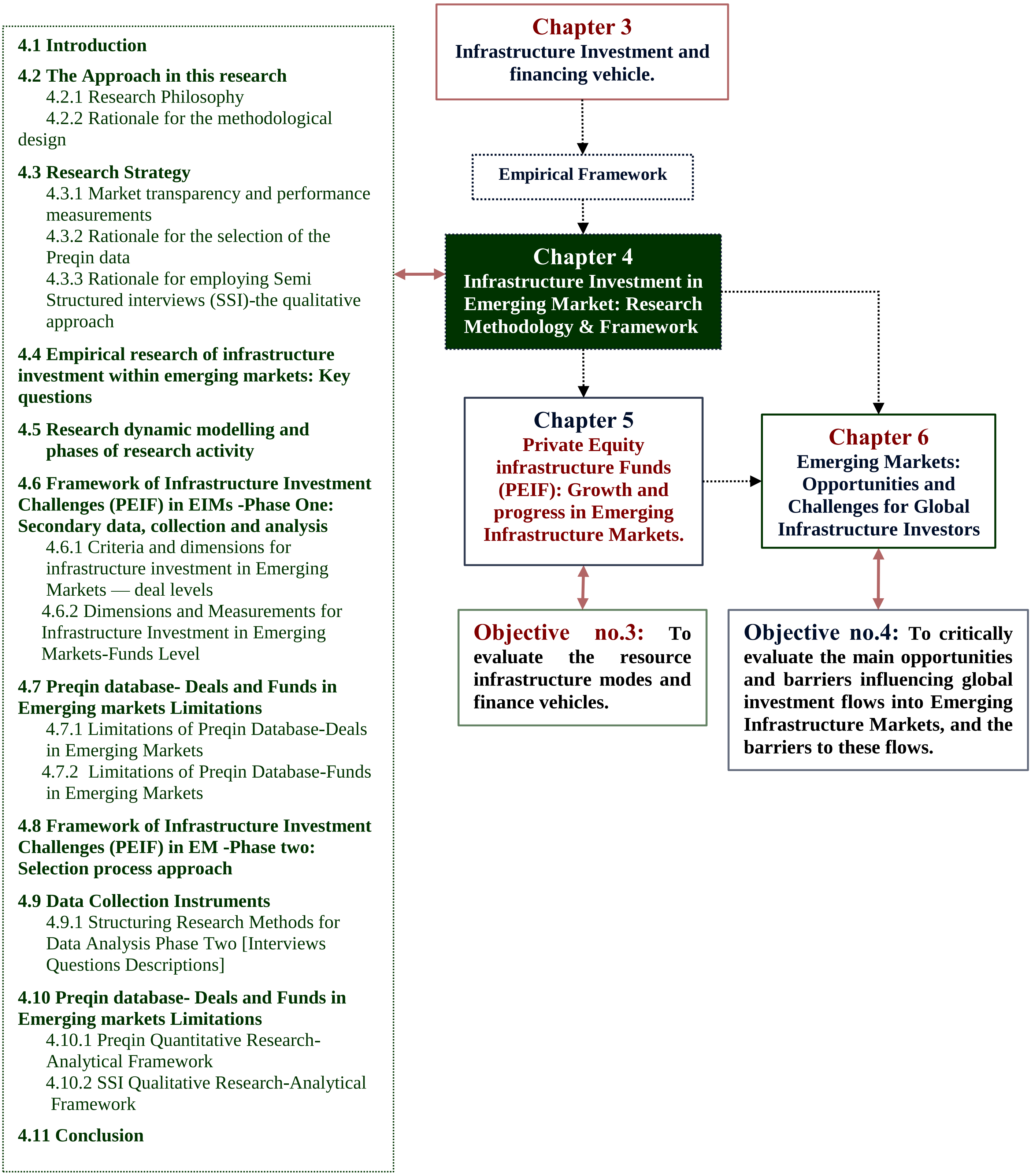
4.1 Introduction

The preceding chapters provided an extensive assessment of the theoretical and contextual perspective of the research concerning the key issues surrounding infrastructure investment from a global perspective. The literature review determined the salient features and challenges that impact global investors' motivation to direct infrastructure investment towards emerging markets. Particularly, the theoretical framework of Chapter Two outlined the scale and magnitude of the infrastructure investment challenges, along with the drivers and factors behind the widening infrastructure funding gap. In addition to the continual growth of global forces (i.e. global warming and climate change, demographic shifts, and socio-economic development), the chapter showed that Emerging Infrastructure Markets face additional complexity in terms of encouraging global investors to invest in intensive public assets. Chapter Three examined the emergence of a wide-range of investment vehicles and financial instruments. In addition, it delivered a comprehensive overview of global trends in the infrastructure investment market, specifically in relation to Emerging Infrastructure Markets. It identified a variety of options available to global investors for investing in capital assets, including a recognition of the fundamentals of evaluating new sources of financing. Furthermore, it examined the fundamental concept and development of private equity infrastructure funds (PEIF) and the drivers behind approaches to private equity investment in Emerging Infrastructure Markets.

Chapter Four takes the first step towards incorporating the theoretical and contextual paradigms identified in previous chapters, and presents the methodological framework used in the study, leading to the attainment of Objective Three and Four of the research. The chapter provides coherent association between the theoretical and empirical phases of the research (Figure 4.1) and describes the research approaches, data sources, and analysis used in the study. The structure follows analytical and coherent progress from inclusive to specific vehicles by providing profiles of Private Equity Infrastructure Funds (PEIF) vehicles in Emerging Infrastructure Markets.

Chapter Four is structured to provide comprehensive details regarding the research methodology and structured framework used for the study. In particular, Section **4.2** provides an overview of the research philosophy and the approach for the methodology design. Section **4.3** investigates the issues of infrastructure market transparency and emphasizes the importance of the availability of data, particularly in the infrastructure investment industry and provides an outline for data source (i.e. secondary data) to fulfilment of Research Objective Three. In addition, presents the rationale behind the selection of the secondary data sources (i.e. Preqin data). Furthermore, It's provides an overview of the research strategy utilised for the analysis of the second phase of the empirical Framework of Infrastructure Investment Challenges (PEIF) in EM, using a qualitative approach. Section **4.4** provides an overview of the research strategy utilized for the analysis of the private equity infrastructure fund vehicles. Section **4.5** it discusses the Framework of Infrastructure Investment Challenges in (EIM), which constitutes the foundation of the empirical research and critical analysis in the subsequent chapters, Chapters Five and Six. Section **4.6** provides initial background information for the study, specifically concerning project profiling in EIM, and the limitations to the level of infrastructure investment deals in emerging markets. In addition, delivers preliminary overview concerning Funds profiling in EIM, and the limitations to the level of infrastructure investment deals in emerging markets. Meanwhile, Section **4.7** outlines the sample selection procedures used to identify particular challenges and difficulties associated with PE infrastructure investment deals within EM. Section **4.8** provides discusses the data collection instruments. A detailed discussion of the second phase of PEIF in the procedures and analysis of EIM is provided. In particular, it assesses the two stages of the empirical framework (i.e. phase two). Section **4.9** delivers discussion and justification for the quantitative techniques and descriptive analysis approach adopted in the research. Finally, the conclusion and summary of the chapter are presented in Section **4.10**.

Figure 4.1- Structural Context of Chapter Four



4.2 The Approach in this Research

4.2.1 Research Philosophy

A research philosophy describes the belief system that governs the research (Saunders at al., 2016). This philosophy should emerge from the aims of the enquiry, and is dictated by the researchers' beliefs concerning how the process should be conducted and their assumptions regarding the phenomenon being investigated (Saunders et al., 2015). The philosophy adopted for the research is likely to fall within one of five established paradigms by which a research philosophy can be defined. These are positivism, critical realism, interpretivism, post modernism or pragmatism. The choice of philosophical approach is generally based on the type of knowledge the researcher is hoping to generate from the study and the purpose for which it will be used (Creswell, 2014; Saunders et al., 2016). Investigating the challenges that face global institutional investors looking to invest in capital intensive assets in EIMs is seen as critical here, to clarify how to encourage global investors to invest in these markets. Furthermore, the output of this research will benefit policy makers, and inform future actions (on the part of EM governments) by exploring the implications of the current global challenges, internal difficulties, and barriers to infrastructure investment in EMs.

As such this study demanded an interpretive approach, using an epistemological assumption, designed to provide new understanding of a phenomenon based on narratives and individual perspectives (Saunders et al., 2016; Disman and Barliana, 2017). It also aimed to provide the opportunity to use worldwide perspectives to scaffold knowledge. The types of enquiry and data generated when using a positivist standpoint, and which usually requires a deductive and highly structured approach, would not have suited the context of this study. Similarly, although a critical realist or a post-modernist approach may have been able to provide some data to answer key elements of the research questions, historical and documentary evidence alone would not have sufficed to determine fully how best to attract global private investors to invest in infrastructure assets in EMs. Moreover, while adopting a pragmatic approach may have been suitable for clarifying certain aspects, the magnitude of the data that this type of approach generates would not have been manageable given the limited time available and the capacity of the researcher. This study required an approach that permitted the collection of documented accounts of occurrences, as well as the perception and experiences of individuals involved; thus, an interpretivist approach and epistemological assumptions were selected (Limpanitgul, 2009; Saunders et al., 2015).

4.2.2 Rationale for the Methodological Design

A research methodology is a critical pillar in empirical analysis in academic research and includes comprehensive and accurate details of the study procedures (Calabrese, 2006; Williams, 2011; Leedy and Ormrod, 2019). Furthermore, the research methodology determines the selection of and justification for the research paradigms and techniques adopted in a study, and explores their significance and weaknesses (Miller, 1983 cited by Miller, 2011). Limpanitgul (2009) stated that the appropriate selection of research model, collection methods, and data forms has a significant influence on research findings. Consequently, selection depends on the nature of the research (Morgan and Smirich, 1980; Disman and Barliana, 2017). According to Mason (2002), Creswell (2014; 2017), and Creswell et al. (2003), there are two fundamental research methodologies — qualitative and quantitative.

Qualitative research focuses on social interaction and uses non-numerical forms (i.e. textual data) rather than numerical forms for data collection and analysis (Gelo et al., 2008). There are a number of types of qualitative research approaches: focus groups, interviews, observation, and conversational analysis (Olds et al., 2005; Borrego et al., 2009). On the other hand, Williams (2011) and Apuke (2017) explained that **quantitative research** deals with quantifying and analysing variables to obtain results. It involves the adoption of tools (e.g. questionnaire surveys and experiments) to collect numerical data, which is then analysed using statistical techniques, leading to new interpretations of current knowledge or new justifications (Creswell, 2014 and Williams, 2011).

However, another form of research methodology, known as the ‘third methodological movement’, is **mixed methods research**, which is very common in academic research and empirical studies (Teddlie and Tashakkori, 2003; Borrego et al., 2009, p.15). According to Creswell et al. (2003, p.212), mixed methods research:

> *…involves the collection or analysis of both quantitative and/or qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of the data at one or more stages in the process of research.*

It is important to note that this method is different to multimethod approaches which include multiple qualitative or quantitative methods in the research but not both (Campbell and Fiske, 1959 cited by Borrego et al., 2009).

Both qualitative and quantitative studies utilize **secondary sources** as a method of data collection. Kumar (2011) identified various data sources that academic researchers can use for secondary analysis, such as public records (i.e. government or semi-government publications), previous academic studies, organizational and personal records, and physical materials. Secondary data is the bedrock of research and, as such, is considered the main tool used to answer the questions being asked about the phenomenon under investigation, to generate new findings, and provide an explanation of what is happening or will happen in the world (Clarke and Braun, 2013). Thus, the type of data needed and how that data is collected and analysed is one of the most critical decisions of the process of designing a research methodology. The data needed is determined by the objectives of the study and the information that will allow the most critical questions to be answered (Robson, 2011).

In order to address the gaps in the literature reviews identified in chapters Two and Three and to identify: 1) the key players-global private investors and fund manager- in infrastructure investment in Emerging Infrastructure Markets and countries/asset allocation, 2) the challenges and difficulties that face global institutional investors looking to invest in capital intensive assets in Emerging Infrastructure Markets, it is essential to examine EIM infrastructure markets and the investment vehicles they apply. Therefore, it is critical to identify the most effective and efficient methodology to implement and to take into consideration the proposed study aims, objectives, and research questions. The nature of the current research permits the use of different methodologies. Consequently, the mixed method approach is adopted in order to achieve the third and fourth research objectives. This approach provides the opportunity to investigate global investors' institutional drivers, explore various investment vehicles and financial tools with data drawn from suitable secondary sources (i.e. infrastructure investment markets) using quantitative methods and supported by SSI formed using the previous quantitative analysis (further details of which are provided in Chapter Six).

4.3 Research Strategy

Data Sources (Quantitative strategy)

The research strategy depicted here is independent of posterior stages of empirical assessment. A principal contribution to the achievement of any academic research is data availability (Aaker et al., 2000; Sileyew, 2019). According to Creswell (2017), it is vital to consider the appropriate data sources and existing datasets available in order to answer research questions. The infrastructure investment industry is constantly evolving and is increasingly able to provide a persistent rate of long-term return for global investors. As such, a range of actors — both direct and intermediary — are emerging in the market, including global institutional investors, pension funds, sovereign wealth funds, insurance companies, and private equity investors. Global investors have intensified the significance of the infrastructure market, particularly in Emerging Infrastructure Markets, and evidence can be seen relating to employing different routes of choices: 1) various investment strategy alternatives; and 2) regions and asset allocation possibly focused on individual-multiple sectors in single-various countries in EIM (Inderst and Stewart, 2014; Inderst, 2016). Furthermore, a number of researchers have emphasized that investing in infrastructure assets in Emerging Infrastructure Markets holds a number of inherent silent implications, such as weak legal and institutional frameworks, inconsistent regulations, no support from governments, economic and political instability, and PPP frameworks (Inderst and Stewart, 2014; Bhattacharya et al., 2015; Qureshi, 2017). Therefore, the current research evaluates infrastructure investment funds in Emerging Infrastructure Markets (i.e. EIM deals profiling), by identifying the key players and the nature and types of assets that investors are investing in (i.e. asset allocation) by acquiring data from relevant data streams.

As stated by Magee et al. (2006), Doolan and Froelicher (2009), and Johnston (2014), secondary data — particularly datasets — have advantages, such as cost effectiveness and the provision of appropriate quality dataset measurements. In spite of the large amount of datasets required, the cost is significantly lower than structuring process that comprises of obtaining, collecting, and analyzing the required data. Furthermore, the use of existing datasets accelerates the pace of the research process and saves time (Doolan and Froelicher, 2009). Researchers often have limited timeframes, and as the current research includes a number of countries that represent Emerging Infrastructure Markets and are distributed across the globe (i.e. Asia, Latin America and the Caribbean, Europe, and the Middle East), the use of a secondary dataset acquired from relevant sources offers the required time-saving.

Robust evidence relevant to prior researchers relates to concerns for acquired secondary data (i.e. data stream) pertaining to the area of infrastructure assets background, particularly, for obtainable historical and time-series data for obtaining detailed information regarding investments and infrastructure assets (Magee et al., 2006; Johnston, 2014). Furthermore, a secondary dataset delivers various opportunities and facilitates the identification of forthcoming business prospects (i.e. widespread pipeline-database) and offers insight regarding the most attractive investment markets in EIM (i.e. opportunity for business) (Doolan and Froelicher, 2009).

Nevertheless, secondary data has a number of limitations and inherent weaknesses. Firstly, existing databases may not have been collected for a specific purpose (e.g. academic research) or customized to answer specific research questions (Boslaugh, 2007; Johnston, 2014). In addition, the data may not available for the study empirical assessment: desired geographic locations; and/or specific timeframe (historical/vintage years), which would have a negative impact on the research scope and findings (Doolan and Froelicher, 2009; Sileyew, 2019).

Semi Structured interviews (SSI) (Qualitative strategy)

The research strategy for this study concentrated on the inclusive approach, so delineating how the empirical analysis approached the fourth research objective. Objective Four was structured in relation to the findings of the literature review in

Chapters Two and Three, which determined the salient measurements and difficulties impacting on the motivation of global investors to undertake direct infrastructure investment in EM. In addition, it outlined the scale and magnitude of the challenges facing infrastructure investment, despite the emergence of a wide range of investment vehicles and financial instruments, along with global trends in the infrastructure investment market and the development of PEIF investments, specifically in relation to EM. This is in addition to the growth and development of financial sectors (i.e. investment banks, multilateral development banks, international and regional commercial banks), aimed at supporting the economic development of countries by providing a range of financial tools to underpin government and/or private investors (Nelson, 2018).

Rubin and Babbie (1989) stated that the purpose of explanatory research is to examine an area that is relatively new and unstudied, in order to acquire a novel perspective of a specific phenomenon. It was thus imperative for this research use a qualitative approach, so as to gain an in-depth insight into global institutional investors and the main players in PEIF investment in EM, i.e. expert interviews.

The key objective of these interviews was firstly, to acquire further insights into the issues and aspects raised in the interviews and to understand the perspectives of both the global investors and main players regarding the challenges preventing them from entering EM. Secondly, to examine the investment criteria and decision making process relating to investment in infrastructure assets in EM. Thirdly, to clarify the major reasons behind the current lack of investment in EM. Although a number of projects were found to be available in these countries, many were yet to be executed or had not been implemented due to various aspects, including a lack of funding. This study therefore aims to develop an understanding of the key hurdles faced by potential investors, along with the potential changes of policies or regulation that would facilitate the overcoming of such challenges.

4.3.1 Market Transparency and Performance Measurements

A number of researchers have highlighted concerns relating to the challenges of identifying comprehensive data related to investable infrastructure (Braun et al., 2017; Andonov et al., 2018; Døskeland, 2018; OECD, 2018B; Blanc-Brude and Tran, 2019). Existing data sources exhibit gaps in terms of projects concerning institutional investors (OECD, 2018B). According to Andonov et al. (2018), obtaining data on the infrastructure industry involves a numbers of challenges for researchers because of the absence of transparency regarding investments. Consequently, the performance and dimensions of infrastructure assets are characterized by disclosure features. In addition, a lack of information regarding the history of investment vehicles prevents researchers from evaluating infrastructure investment performance. Furthermore, Braun et al. (2017) noted that the distribution of investment across the lifecycle of funds is commonly unknown to researchers, and a considerable number of alternatives exist.

Andonov et al. (2018) agreed with research conducted by Deller and Jäckel (2015), which found that private equity investment in the 1990s was characterized as immature, and the number of funds from this time included in each dataset was significantly less than ten. Consequently, these years were characterized by a lack of diversification in the private equity funds offered by investors compared to recent times (Deller and Jäckel, 2015).

In addition to these conceptual aspects, there are a number of issues concerning the availability of data relating to global PE funds, including: (1) a deficiency of input concerning fund returns; (2) a significant portion of data being outdated (i.e. unreliable); (3) a shortage of historical high standard data, resulting in dissimilarity within the global performance benchmark (Stucke, 2011; Braun et al., 2017; Cusumano et al., 2018).

In the context of financial flows databases, Prada (2014) mapped out external financial flows according to a range of institutional players such as private actors (e.g. (1) equity [private sector investment] and portfolio [global capital markets financing the private sector], (2) debt financing [commercial banking], (3) MDBs, and (4) other institutional financial intermediaries) who channel external financial mechanisms (i.e. taxonomy of financial instruments, and PPP) into emerging markets and developing countries (EMDC) database. Furthermore, the author described three trends behind the diffused global growth of fiscal systems associated with fragmented external financial databases (i.e. international capital markets). Firstly, Prada (2014) claimed that the financial database two-dimensional can be broad but informative. Secondly, that fragmented global financial databases are characterized by differences in their data; for example, some data streams generated by global institutions provide comprehensive information regarding financial flows to advanced and developing countries with standard measurements and common frameworks. Furthermore, despite the significant number of financial tools developed over the last decades and the growth of financial system, financial databases only capture part of these developments. Outside of international public fiscal data sources, there is a scarcity of financial information provided by private sectors as project-level data. Finally, in spite of the various fiscal data instruments available, it is significantly difficult and challenging to use them to construct a comprehensive overview of the increase of financial flows to EMDC.

However, over the course of the last decade, capital intensive assets yielded a considerable body of data that enabled researchers to perform substantive analysis and assessment (Andonov et al., 2018). Various researchers have explored the advantages of conducting an empirical analysis using a highly-organized database specifically designed to support the analysis of the infrastructure investments and other investments assets (i.e. PE, hedge funds, and real estate). For instance, Roggi et al. (2019) evaluated the relationship between PE fund characteristics and fund performance in advanced countries (particularly in North America) using the Bison database. Similarly, Mingo et al. (2018) examined the investment strategy of PE firms in EIM and developing markets utilizing Thomson ONE Investment Banking's Private Equity Module database. This rise in the amount of global studies conducted by professional authorities and academic researchers has highlighted the shortage of infrastructure investment, funding and financial deficits, particularly in Emerging Infrastructure Markets (i.e. the widening of funding/finance infrastructure needs gaps). This has been largely facilitated by databases becoming increasingly reliable as a credible source of data, particularly in relation to various types of information (e.g. fund portfolio, deal size, finance details, and investment performance), which has significantly enhanced the quality of infrastructure investment assessment, particularly in specific regions (i.e. Emerging Infrastructure Markets).

4.3.2 Rationale for the selection of the Preqin Data

One of the critical aspects of the research strategy considerations for the secondary data was the potential accessibility of historical and time-horizon information for infrastructure funds. Therefore, the analysis undertaken in this chapter was based principally on data sourced from the Preqin database. The purpose of the inception phase of the research was to analyze the infrastructure investment deals produced by the Preqin database. In addition, exploited as a proxy for private infrastructure investors in the context of emerging markets.

This research makes use of the latest available figures provided by the Preqin database, which is the largest existing dataset on private equity funds and alternative investment, and is referenced extensively in the industry (Inderst, 2010; Degosciu, 2012; Deller and Jäckel, 2015). Preqin first assembled performance data using the Freedom of Information Act legislation in European and North American countries relating to public institutions (e.g. sovereign wealth funds and pension funds). Later, the scope was expanded to include data collated from other public documents (i.e. public filings) and reports generated by general partners (GPs) and limited partners (LPs) (Korteweg and Sorensen, 2017; Jordaan, 2018). Preqin was launched in 2002 with PE funds and expanded in 2006 to include PE-Real Estate. In 2007, the database included hedge-fund investors and infrastructure assets were included in 2008 (Inderst, 2010). Furthermore, the data provided by Preqin regarding fund-level information includes the size/scale of listed and unlisted infrastructure funds, which ranges from below $50 million AUM to over $5 BN. AUM. The database reveals that the allocation of funds is widespread globally and includes various fund type (e.g. buyout and venture capital) (Inderst, 2010).

However, a number of researchers have criticised the Preqin database for its treatment of PE compared to other data streams (Deller and Jäckel, 2015; Døskeland, 2018). In a study conducted by Deller and Jäckel (2015) the private equity index generated using Preqin differed significantly in their samples and demonstrated a cyclical stream at the beginning of the examined period. More recently, Døskeland (2018) argued that assessing UPEIF using the Preqin database has two principal limitations: 1) the Preqin database includes insignificant information regarding funds with the completed cash flow data, which other data sources (i.e. Burgiss and Cambridge Associations databases) do not; and 2) the sample is slightly less representative of the aggregate market than other data sources.

However, other researchers have promoted the use of Preqin data. Despite the criticism around using Preqin data to examine the private equity funds industry, a large body of empirical studies have based their analysis of infrastructure fund on Preqin as either the primary data source or combined with other forms of data (e.g. another dataset, interviews or discussion panels, and case studies) (Inderst, 2010; Blanc-Brude and Hassan, 2015; Deller and Jäckel, 2015; Korteweg and Sorensen, 2017; Andonov et al., 2018; Døskeland, 2018; Jordaan, 2018). In addition, Andonov et al. (2018) utilized the Preqin database to investigate the characteristics of infrastructure as an asset class from the perspective of institutional investors (i.e. limited partners), whereby investors acquire exposure through a mix of direct and private fund vehicles. A large number of academic studies have focused their empirical analysis on employing the Preqin dataset to examine the ongoing performance of private equity (PE) from different perspectives (Degosciu, 2012; Korteweg and Sorensen, 2017).

Therefore, the Preqin database has been selected for this study for two reasons: 1) it includes information regarding a large number of global infrastructure deals (i.e. developed countries, developing countries, and emerging markets) compared to other sources; 2) there is an absence research studies employing the Preqin database for infrastructure deals implementing the Preqin classification of Emerging Markets. According to Pryke and Allen (2018, p. 4) Preqin:

> *…offers a comprehensive, reliable and continually updated source, used by the industry itself, and also a significantly advantageous means to develop a data rich picture of key actors, from general partners to secondary investors.*

Therefore, this presents an opportunity to confirm findings presented by different datasets and boost the external validity of the research findings.

4.3.3 Rationale for employing Semi Structured interviews (SSI)-the qualitative approach

Investors in emerging countries currently face a number of barriers exerting a negative impact on decisions to invest in EM (Gao et al., 2010; Della Croce, 2011; Inderst and Stewart, 2014). In order to address this gap, it is vital to firstly, employ an in-depth assessment to identify the impact of such difficulties on investors' decision making, and secondly, to take into consideration this study's aims, objectives, and research questions. Nix and Chen (2013: p. 7) pointed out that the aim and objectives of research are to 'investigate insights that go beyond the publicly available data'. Furthermore, the infrastructure investment industry is characterised as a niche market, while the participating institutions and organisations are considered as constituting an elite. Consequently, the market has (as highlighted in Chapter Five) experienced strong competition, while mainstream industry has also been criticised for a lack of transparency. It can therefore only perform effectively by directly interacting with the participants of professional institutions, along with global investors and fund managers investing in PEIF investments within EM. This led to a significant method of data collection for this current study consisted of personal interviews with experts and professional participants, with the aim of an in-depth analysis of their experiences and perceptions concerning PEIF investment in EM (Nix and Chen, 2013: p. 57).

This research therefore employed questionnaires **(i.e. closed-ended and open-ended questions) by means of SSI,** to standardise the interpretation of the responses from global investors, financial intermediators and other key players**.** These were followed by in-depth interviews with global investors and main players in infrastructure investment markets, aimed at examining the issues raised during SSI and the participants' perspectives concerning challenges preventing them from entering EM.

The SSI method has a number of benefits: (1) it permits interviewees to describe the situation (i.e. markets or industry) from their own perspective and allows them to continue mirroring and assessing during the interview, so fulfilling the standard required for qualitative interviews (Yin, 2014; Adams, 2015; DeJonckheere and Vaughn, 2019). In addition, Patton (2002, p. 74) highlighted a further advantage of the standardisation of SSI as reducing concerns pertaining to "interview bias (ness), the attempt to impose one's own benefit on the situation and interpretation of the responses".

4.4 Empirical Research of Infrastructure Investment in Emerging Markets: Key Questions

Chapter Four identifies the connection between the gaps in the extant research, and the methodological framework applied in the present study. Furthermore, since the objective of this research was to identify and evaluate the resources of infrastructure investment modes and finance vehicles in EIM, this chapter assesses the data required, and the research questions employed. It was necessary to highlight a number of critical research questions for consideration when assessing private equity infrastructure fund investments in emerging markets. Thus, this section explores the key research questions, the research framework, and the stages of the analysis involved in this study.

According to Bryman (2003), the first requirement of any academic study is to establish the research questions it seeks to address. Therefore, the first stage of this empirical research is to answers four key questions:

1- Who have been the key PE investors within EMs?

The analysis enables the identification of key players (global institutional investors) in emerging markets, which will be selected in the second phase of the analysis (i.e. Chapter Five) to take part in semi structured interviews (SSI). These global institutional investors are selected according to their experience in investing in infrastructure assets within the examined regions (i.e. Preqin analysis findings and results) and exposure to the challenges and limitations of EIM (e.g. economic and political instability, and government regulations and rules).

2- What type of infrastructure deals tend to be targeted by global PE institutional investors in EMs?

Addressing the overarching question of 'Who are the key players investing in emerging markets?' prompts the sub-question: 'What types of EIM infrastructure sectors are most likely to receive investment?' and contributes to the identification of two primary areas from different perspectives: 1) from the EM perspective, emerging countries have developed stronger projects pipelines, the development of financial markets and improved the regulations that attract global investors to invest in their capital assets; 2) from the investor perspective, investing in a specific sector reduces the level of risks (i.e. de-risk project) by guaranteeing the rate of return (i.e. in the context of toll roads, investors secure their funding in the form of toll cash returns).

3- Which regions/countries in EM are the majority of global institutional investors choosing to invest?

The impact of geographic characteristics on locational choice is anything but neutral…' (Audretsch et al., 2005, p.1114)

The geographical influence of the process of institutional investment capital and asset allocation in emerging markets is significantly correlated with the finance/or fund measurements and the growth of financial institutions (i.e. the development of financial market) in the target country, which reflects on infrastructure assets as a service generates investable cash-flows and profits (Pike and Pollard, 2010). However, there are observable differences in the markets of emerging countries in different geographical locations (e.g. relation to regulations and policy, the development of financial markets, and the viability of a project's bankable pipeline), which has let investors to tailor their investment strategy according to the emerging country (see Question 4).

4- Which are the most targeted infrastructure project styles within EMs?

The above question has been formed based on the literature reviews outlined in chapters two and three, in addition to the multifaceted quantitative data regarding the scale of industry markets and infrastructure and in tandem with grey literature and professional reports, prior to the empirical analysis phase of the current research. They have contributed to the design of the empirical data collection process, and identify the global institutional investors behaviours toward Emerging Infrastructure Markets and form the basis of identification of the challenges and limitations. This leading to the attainment of Objective Three and Four of the research, which can be observed in Chapters Five and Six.

These questions seeks to generate a deeper understanding of the significance of how infrastructure deals in EIM are implemented. It includes considerations of the strategies investors design and/or use to customize their investment, and what elements, dimensions, and measurements they take into consideration when investing in a particular capital intensive asset in the country.

4.5 Research Dynamic Modelling and Phases of Research Activity

This study investigated a large volume of quantitative data, particularly that obtained from the Preqin data stream, a source of data regarding alternative investments and financial infrastructure deals (Inderst, 2010; Pryke and Allen, 2018; O’Neil, 2018). The study also employed grey literature sources, such as academic studies and professional reports, and documented infrastructure investment market secondary sources, in order to structure the qualitative data obtained from the semi-structured interviews. It also undertook an in-depth assessment of the sources to determine the key global players in PEIF investment within emerging markets. The analysis is comprised of an inherent comparative application of the form of individual infrastructure investment deals, and the type of global institutional investors and fund managers are evaluated, in order to identify the challenges and difficulties of infrastructure investment in EIM. Consequently, it was imperative to provide an extensive assessment, and to contextualize the steps of PEIF investment deals and global institutional investors across a profiling approach, in order to delineate the primary results. As Ragin (1987, p.1) noted, “virtually all empirical social research involves comparison of some sort”.

Comparative methodology has increasingly been employed in professional infrastructure investment research and academic studies (Ershova and Posokhov, 2016; Bielenberg et al., 2016; O’Neil, 2018). A comparative evaluation of infrastructure investment trends on a regional and sectoral basis was conducted by Bielenberg et al.(2016), and Andonov et al. (2018) employed a comparative assessment of infrastructure investment concerning various types of institutional investors across 33 countries. This approach facilitates the recognition of a range of perspectives of global institutional investors and fund managers, and enables the infrastructure investment approach within emerging markets to be scrutinized.

The approach employed for the present research facilitated a multi-faceted method analysis, including a ‘fine-grain’ assessment of the social procedures in certain circumstances (Cassell and Symon, 1994 cited by Thrower, 2018, p.83). The selection of PEIF investors and fund managers within emerging markets enabled an identification of the international challenges and factors that influence private equity investment flows in infrastructure projects within Emerging Infrastructure Markets. These restricted criteria for the selection of global institutional investors, fund managers, and financial intermediaries to be interviewed were underpinned by the quantitative aspect of the volume of infrastructure investment deals. The material obtained regarding PEIF investment within emerging markets over a range of economic industry, form of projects, and geographical regions, facilitated the obtaining of informative, in-depth insights regarding the scale of global infrastructure investment in EIM.

Thus, the framework of the current research seeks to obtain information by collecting data from relevant databases and empirical interviews (SSI) through Two phases of research activity. The overall process of framework development is presented in Figure 4.2. The driver for using this model (i.e. framework) is to obtain comprehensive information regarding how the key actors observe the market and its various segments, and how they tackle the opportunity set around the way they carry out business. This information is vital to examining the multifaceted and complex industry of infrastructure investment, where the global players are geographically influenced and their behaviour is significantly correlated to geographical location. Furthermore, the model presents the underlying concerns regarding the participation of the private sector in infrastructure investment in EIM. Its identifies the most common financial mechanisms and investment strategies related to infrastructure assets in the emerging markets. The framework includes **Two** principal phases, within which a mandatory distinction between qualitative (SSI) and quantitative (Preqin database) data is made.

Phase One: Secondary data, collection and analysis

An in depth assessment that seeks to evaluate the explanation and analysis of the phenomena — infrastructure investment in Emerging Infrastructure Markets— by obtaining a holistic overview of the infrastructure investment industry, and sectoral infrastructure using the Preqin database. In addition, this phase includes an investigation of institutional drivers of global investors, and explores various investment vehicles and financial tools. A detailed framework breakdown for Phase One (i.e. PEIF in Emerging Infrastructure Markets framework) is provided later in this section.

Phase Two: designing qualitative semi-structured interviews (SSI) and collection primary research data

As the research sought to recognize the key challenges of global infrastructure investment, and the impact these have on the allocation of capital in EIM, it was imperative to assess the factors that influence investment flows into infrastructure projects, and to evaluate the specific barriers and constraints that prevent investment in EIM. This was the essence of the methodological approach employed by this study. As Dowling et al. (2016) noted, interviews are the key method employed by qualitative geographical research. Furthermore, a number of previous researchers emphasized the opportunities presented by conducting interviews, particularly ‘conversation with a purpose’, with geographical differences enabling the collection of in-depth information (Bryman, 2016; Thrower, 2018, p.87; Yeung, 2019; Hassink, 2019; Hitchings and Latham, 2020). The approach to the present study was characterized by constructionist and interpretivist methodologies as the current research gap in the extant literature required a comprehensive view of the subject concerned (Bryman, 2016). Therefore, rather than employing a prototypical structure, the interviews conducted for the present study were structured with the aim of obtaining an informative comprehension of the challenges and barriers of PEIF investment in EIM.

Nevertheless, in order to understand the difficulties and challenges expressed in the institutional investors' interviews conducted for this study, it was necessary to consider the following issues during the second phase of the empirical analysis process: 1) each investor and fund managers had an individual perspective and evaluation system regarding infrastructure investment decision making in EIM; 2) the number of factors, such as the sector, and form of infrastructure asset, the region, and financial instruments varied within EIM, and influenced the investment decisions; 3) the date of the investment decision, namely whether the investors and fund managers made the decision to invest in 2009 or 2010, or in 2018 or 2019, posed an additional factor and related concerns.

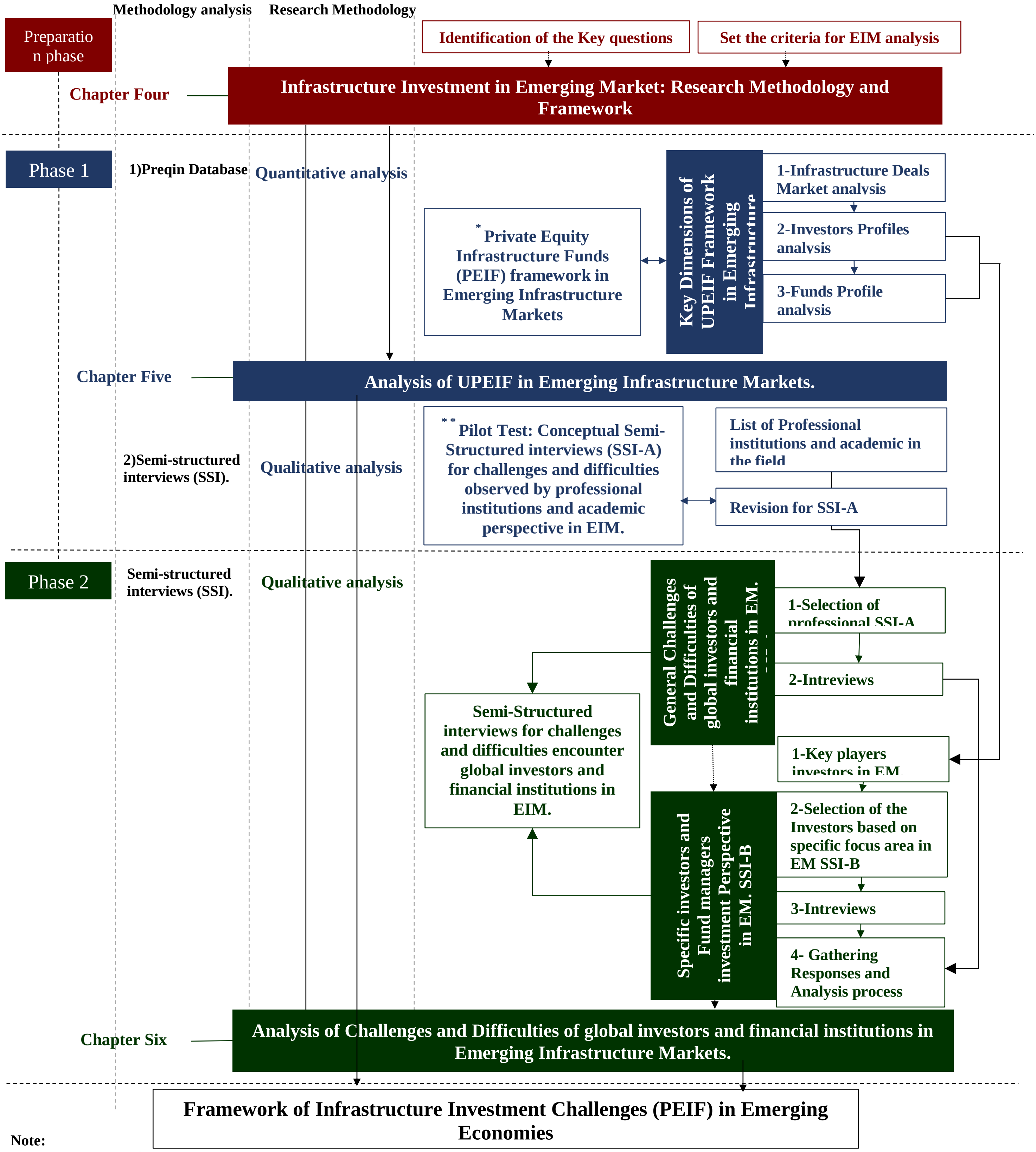
Since controlled conversations involve specific conventions, when using the qualitative interview approach, the interviewer is not permitted to emphasize particular aspects and issues (Thrower, 2018), therefore the semi-structured interview (SSI) technique was employed in this study to verify and confirm, evaluate, describe, and understand the interviewees' views and behaviors (O'Neill, 2018). Consequently, Phase Two of the study involved a structural design for the qualitative data source of the bilateral path of the SSI, comprised of two stages of SSI. The first stage of the SSI (SSI-A) (see Appendix D.1) employed the amended questions resulting from the pilot test, with professional institutions in the infrastructure investment field identified in previous chapters.

In line with the analysis of investment infrastructures in emerging markets, a further evaluation of this study was conducted uses the multi-stages purposive sampling technique, namely refers to the profiles of global investors and fund manager within EM relating to the analysis of the major investors and fund managers targeting investment in EIM, extracted from the Preqin data stream. A number of criteria were identified to support the selection process (i.e. purposive sampling), and to ensure that all of the procedures designated were relevant to the objectives of the study as explored in Section 4.7. The sampling of global institutions investors and fund managers in EM comprises of with these sources of funds, the institutions' investment volume and the predominant market position in Emerging Infrastructure Markets were recognized.

Indeed, the second stage of the interviews (SSI-B) (see Appendix D.2) involved an in-depth assessment, proceeding from inclusive to specific, that explored the views of particular investors, The preqin data stream was investigated to develop an empirically driven shortlist of those institutional investors and fund managers that have the highest infrastructure investment rates among Emerging Infrastructure Markets.

The purpose of the interviews with the specific investors was to facilitate the comprehensive assessment of private equity infrastructure investment funds within emerging markets, and specifically to gain insight into particular investors’ experience and knowledge of infrastructure assets -accessing the ‘black box’- within specific geographic locations that exhibited a significant development in the infrastructure investment industry in EIM.

Figure 4.2 -Structure of the Methodological Framework for Infrastructure Investment Challenges (PEIF) in Emerging Infrastructure Markets



Note:
*** A comprehensive flow chart provided later.**
**** A detailed structure for semi-structure interviews provided later**
SSI-A: Global Investors Interviews in EE.
SSI-B: Selected Investors Interviews based on selective sampling.

Source: Created by Author

4.6 Framework of Infrastructure Investment Challenges (PEIF) in EIMs - Phase One: Secondary data, collection and analysis

4.6.1 Criteria and Dimensions for Infrastructure Investment in Emerging Markets — Deal Levels

To investigate the approaches of infrastructure investment in Emerging Infrastructure Markets and perform an analysis of the infrastructure deals, a number of criteria and dimensions have been structured and applied to the data extracted from the Preqin database, as illustrated in Table 4.1. Although the database provides various details regarding infrastructure deals in various sectors (i.e. diversified, social, and economic industry), the current research is focused on the assessment of **five paramount industries (i.e. economic infrastructure),** transport, conventional power energy, renewable energy, and utilities services (i.e. water and sewage services). In this context, the transport industry included investment in roads, airports, railroads, and seaports; fossil energy included investment in power plants and power distribution; and renewable energy included investment in solar, wind, hydro, and geothermal power services. The reason for examining renewable energy was to investigate emerging markets' preferred approach to energy industries (i.e. a comparison between the renewable energy sector and the traditional power energy sector). The utilities industry included investment in water distribution, water treatments, sewage networks, and sewage treatment plants. The telecommunication sector was excluded from the analysis as the goal of the research was to investigate the five essential infrastructure industries of economic infrastructure.

Secondly, the time period for the empirical analysis is **Q1-2009 to Q4-2019**. This timeframe has been selected based on the size of the private equity funds that the Preqin database provided for this timeframe. Preqin datasets has few funds and minimal data for the 1990s, analogous to other datasets. Therefore, this period is excluded from the analysis. Similarly, the pre-GFC period is also excluded from the assessment due to the availability of funds for infrastructure assets.

As highlighted in Chapter Two, Section 2.6.4 (Developed vs Emerging Countries in Infrastructure Investment), emerging markets (EMs) have been deemed to be the most promising market for conducting business in the future for global competitive corporations (Sunje and Çivi, 2008). Consequently, various classifications for EMs have been provided by global institutions and banks, such as the FTSE Russel Index, the Organization for Economic Cooperation and Development (OECD), and the World Bank (FTSE Russel Index, 2018; OECD, 2005; Aykut and Goldstein, 2006). The list of countries/regions classed as **EIM** in this research was grouped according to the data provided by the Preqin team in line with the industry classification of emerging markets, taken from various sources including IMF, MSC, and FTSE (Preqin, N.D.). Consequently, twenty-three countries distributed over five regions (Asia, Latin America and the Caribbean, Europe, the Middle East, and Africa) were identified for inclusion in the study.

To undertake project profiling and examine the type and nature of projects that investors are investing in Emerging Infrastructure Markets (i.e. EIM. profiling), as highlighted in Chapter Two and Three, infrastructure assets were categorised into three classifications based on project stage (i.e. greenfield stage, brownfield stage, and secondary stage). Then, an assessment of infrastructure deals is conducted using the classification of **greenfield and brownfield stages** and the secondary stage was exclude from the analysis. The rationale behind this exclusion was that the research sought to evaluate the scale of investment in infrastructure assets in Emerging Infrastructure Markets, which is reflected by the greenfield/brownfield stages and not by the secondary stage.

Furthermore, as highlighted in chapters Two and Three, government deficits and delays in delivering the most needed public services by recruiting private professional experience, finance sources, and faster and more efficient project delivery (Boles et al., 2013). Consequently, government participation in EM deals[13] was excluded from the analysis (i.e. various types of government involvement in infrastructure assets such as partnership with private sectors and/or provision of financial support to projects) and primary emphasis was placed on **global private investors**.

[13] The Preqin database includes various type of investors such as private institutional investors (e.g. SWF, insurance companies, corporate investors) and public agency investors (e.g. government agencies and public pension funds).

Furthermore, due to the variance of **global private investors, fund managers and infrastructure construction companies who specialized in executing infrastructure projects-energy Sector** in EIM, and in order to differentiate between investors who specialized in supplying conventional power energy(i.e. electric power generation or utilities networks) and investors who focused on investment in or delivering renewable energy assets (i.e. electric power services), an identification form was used in which investors were placed and presented **according to the word Renewable** (i.e. Infrastructure firm — renewable, investment company — renewable, or power energy company — renewable) and added as a type of investor in the Preqin dataset sheet. In addition, this classification helped distinguish between investors during the interpretations in the later stages and phases of the research (i.e. answering Question No.1).

Table 4.1 -Investment Criteria for Infrastructure Deals in Emerging Markets

<table>
<tr><td>1</td><td>Asset Allocation (Region and Country)</td><td colspan="3"><u>Emerging Markets (23 countries only):</u> Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Saudi Arabia, South Africa, South Korea, Taiwan China, Thailand, Turkey, United Arab Emirates</td></tr>
<tr><td>2</td><td>Timeframe</td><td colspan="3">Q1-2009-Q4-2019 (1st January.2009-31st December.2019)</td></tr>
<tr><td rowspan="18">3</td><td rowspan="18">Industry/Primary Sector</td><td rowspan="8">Transport</td><td>Airports</td><td></td></tr>
<tr><td rowspan="5">Roads</td><td>Toll Roads</td></tr>
<tr><td>Roads</td></tr>
<tr><td>Toll Bridges</td></tr>
<tr><td>Bridges</td></tr>
<tr><td>Tunnels</td></tr>
<tr><td>Railroads</td><td></td></tr>
<tr><td>Sea Ports</td><td></td></tr>
<tr><td rowspan="6">Power</td><td rowspan="4">Renewable Energy</td><td>Wind Power</td></tr>
<tr><td>Solar Power</td></tr>
<tr><td>Hydro Power</td></tr>
<tr><td>geothermal power</td></tr>
<tr><td rowspan="2">Conventional Power</td><td>Power Distribution</td></tr>
<tr><td>Power Plants</td></tr>
<tr><td rowspan="4">Utilities</td><td rowspan="2">Water Utilities</td><td>Water Treatment</td></tr>
<tr><td>Water Distribution</td></tr>
<tr><td rowspan="2">Sewage Utilities</td><td>Sewage Treatment Plants</td></tr>
<tr><td>Sewage Networks</td></tr>
<tr><td>4</td><td>Deal specific: Project stage</td><td colspan="3">Greenfield and Brownfield</td></tr>
<tr><td>5</td><td>Investors Location</td><td colspan="3">Open (Region and countries)</td></tr>
</table>

Source: Created by the author

Note: All figures and tables Chapter Five and Six are Preqin data streams sourced and processed by the author.

Applying the above criteria reveals that the **aggregate** number of infrastructure investment deals in emerging markets comprising **2,519 infrastructure assets**[14],with a cumulative deal cost of USD 632,116.51 million.

4.6.2 Dimensions and Measurements for Infrastructure Investment in Emerging Markets-Funds Level

As mentioned earlier, in Section 4.6.1 (Criteria and Dimensions for Infrastructure Investment in Emerging Markets — Deal Levels), this section will explore the second stage of the assessment infrastructure investment in emerging markets namely the PE infrastructure funds investment vehicle, as depicted in Figure 4.2. In particular, the assessment of infrastructure fund investment structure moves the empirical analysis on to a more in-depth level of examination and involves the collection of detailed information regarding the infrastructure investment vehicle, the routes of investment, and the strategies employed by investors in emerging markets. The fund vehicle allows the analysis of a large volume and size of infrastructure fund levels as a part of the assessment procedures and enables the analysis to be consolidated regarding the research questions presented earlier and the key indicators of infrastructure investment provided by the Preqin database.

Furthermore, evaluating infrastructure fund structure permits facilitates a more in-depth analysis by identifying the purpose of establishing this vehicle of infrastructure funds and **whether infrastructure investment is targeted towards EIMs or is part of a global infrastructure funds investment strategy.** This stage functions as a critical mediator between infrastructure deals level assessment, as identified in the previous step, and global institutional investors, which will be identified in the following step, to invest in capital assets in emerging markets.

[14] The total number of infrastructure assets identified by the Preqin database, after inputting the criteria for infrastructure investment deals in emerging markets was 3,384. However, 865 investment deals were eliminated for a number of reasons: 1) missing deal size or/and information; 2) deal redundancy at different stages of the same deal; and 3) government involvement in the project (i.e. financial contribution to the project or acquisition of stakes) (See Appendix C.1 for details).

As part of approaches to investigating infrastructure investment in Emerging Infrastructure Markets and carrying out an assessment at the infrastructure funds level, a number of dimensions and measurements were designed and implemented with the data extracted from the Preqin database, as exhibited in Table 4.2. Global institutional investors conduct a series of infrastructure investment assessment procedures that they intend to invest in, and the geographic preference for the investment; as such, they must assess which infrastructure investment vehicle to use, the routes of investment, and strategies applied in emerging markets.

There are clear signs demonstrating that long-term and short-term infrastructure funds are changing – both within and outside of infrastructure assets – relative to financial performance shifting. In this context, **the forms of infrastructure funds** available for institutional investors to invest in emerging markets are limited to closed-ended funds and open-ended funds, with no listed funds. The motivation for selecting **closed-ended funds** for the analysis was due to the **majority of global institutional investors** disclosing infrastructure assets across such funds. Meanwhile, **open-ended funds** have been analysed to address whether investors in EIMs are faced with insufficient illiquidity to meet their liabilities in infrastructure investment deals. Since this research investigates unlisted private equity infrastructure investment, the listed funds were excluded from the analysis.

Consistent with the research time period for the empirical analysis at the deals level (i.e., Q1-2009–Q4-2019), assessment of private equity infrastructure funds followed the same timeframe. However, as the investment in infrastructure assets occurred in the early stages of the examined period (i.e., in 2009 and 2010), the timeframe was adjusted to include the three years prior (i.e., 2006, 2007, and 2008).

There exist a range of risk and return elements behind infrastructure funds in the infrastructure investment industry. The attractiveness of infrastructure investments can be grouped into three key categories: **core plus, value added, and opportunistic**. Giving these prevailing conditions, this research concentrates on the investigation of different forms of **infrastructure funds investment strategy**, namely: Core, Core Plus, Opportunistic, Value Added, Debt, Funds of Funds, and Secondary.

The private equity infrastructure funds investment vehicles vary depending on numerous factors. As highlighted by Lara-Galera et al. (2017), the focus of **infrastructure funds investment strategy** is based three key factors: 1) infrastructure industry; 2) the geographical allocation; 3) risk and return evaluations. Therefore, in this research, the empirical analysis focused on the PEIFI strategy in emerging markets regarding assessment of the funds' geographical exposure is not limited (i.e. open geography exposure) and the primary geographical focus was directed toward the 23 examined emerging countries.

Institutional investors and fund manager offices and headquarters are various and distributed all over the world. In order to address the diversity of fund manager location and funds domicile in regard to EMs, an open application for the **funds domicile and fund managers' office** locations was employed when extracting the data from the Preqin database.

Table 4. 2-Dimensions of Infrastructure Funds in Emerging Markets

Funds Type	Closed Ended and Open Ended
Funds Structure	Commingled, Separate Account
Closed End Fund Details	Vintage Inception Year, Fund Size ($), Fund Number (Overall), Fund Number (series), Single Deal Fund, Lifespan(years), Life Span extension.
Funds Status:	Open to investment/Raising, Closed to investment, Liquidated, Announced/Estimated
Infrastructure Strategies	Core, Core Plus, Opportunistic, Value Added, Debt, Funds of Funds , and Secondary
Funds Size	Open
Sector	Transport, renewable energy, conventional power energy, utilities (Water and sewage services) industries
Domicile	Open
Geographic Exposure	Open
Primary Geographic Focus	emerging markets or/and a country or region in emerging markets
Funds Closed Date	Q1-2006-Q4-2019
Reported Fund Size Date	Q1-2006-Q4-2019
Fund Manager Location	Open
Infrastructure	INF: Primary Strategy, INF: strategies, INF: project stage, INF: primary Sector, INF: infrastructure Industry Preferences, INF: PPP/PFI investments

Source: Created by the author

Applying the above criteria reveals that the **aggregate** number of infrastructure investment fund vehicles targeting emerging markets – or a country/region in Emerging Infrastructure Markets– **853 infrastructure investment fund** vehicles managed by 405 fund managers, with a cumulative fund size of United States dollars

(USD) 682,364.83 million, targeting EM, or countries/regions in EIM, over the period Q1-2006 to Q4-2019.

4.7 Preqin database- Deals and Funds in Emerging markets Limitations

4.7.1 Limitations of Preqin Database-Deals in Emerging Markets

Despite the rich information delivered by the Preqin data stream, there was a notable lack of comprehensive data pertaining to deal levels. During the analysis of deals in emerging markets, data was lacking for some of the assets. There are various forms of limitations pertain to issues relating to investor and debt profiles (i.e. some of the investors and debt providers were unidentified, and the amount of debt was unidentified). In addition, the Preqin deal-level data did not contain information regarding the total amount of investment (presented as *secured debt financing for the project*), total deal size ($MN), or equal total transaction debt ($ MN); 3) Issues related to the cost and percentage of stakes (i.e. The distribution of investor stakes for the asset (i.e. percentage stakes) were not determined, and a lack of Deal Size Equity ($ MN) for the parties in the majority of assets that included a number of investors.).

Individual assets go through three financial transaction phases[15] (i.e. from initial investing phase or awarded contract phase to project or stakes acquisition); however, there was no consistency regarding the financial transaction data descriptions given in the Preqin dataset. The majority of assets were in different financial transaction phases; for instance, a significant number of assets in EMs were presented as in the process of securing debt loans for development or upgrade (i.e. second phase) or in the project/stakes acquisition phase (i.e. third/final phase), and missing to provides information regards the awarded contract phase (i.e. first phase).

Finally, the investor profiles did not provide information regarding investor type, so a large number of companies or/and investors were unknown (i.e. it was unclear whether they were fund managers, infrastructure firms, or renewable energy companies).

[15] Further details in Appendix B.1: General description of EM infrastructure deals

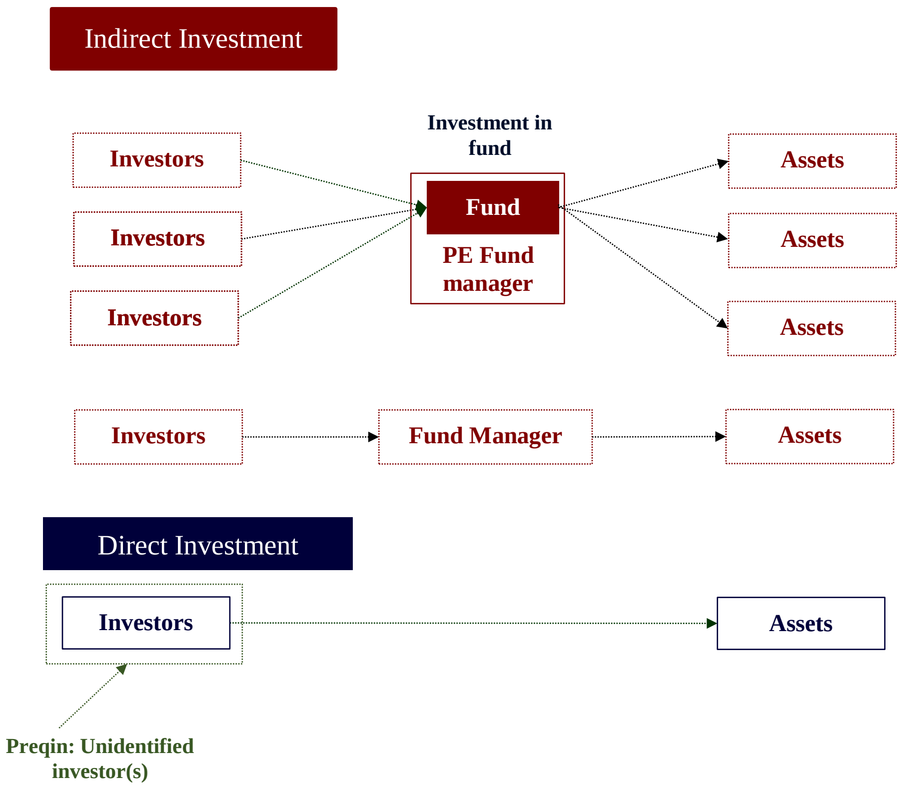
Meanwhile the background, criteria, and dimensions for infrastructure investment in emerging markets at the deals level (project profiling, stage one of phase one) are presented in this chapter, and the descriptive analysis results in Chapter Five. The same procedure is followed for the infrastructure investment in emerging markets at the funds level (funds profiling - stage two of phase one).

The empirical analysis conducted for this work is subject to a number of limitations; however, the most critical limitation in the second stage of the analysis relates to fund vehicle investors analysis. The PE infrastructure funds vehicle encompasses public sector investors, despite the research criteria excluding public sector participation (e.g., public pension funds) with a primary emphasis on global private investors in infrastructure assets.

It's notable that investors and fund manager office locations (i.e. headquarters) are widespread globally and companies often have various branches in other countries/regions. For instance, Actis is a fund manager with various offices located around the world (i.e. in the UK, India, South Africa, China, South Korea, Mexico, and Brazil), which caused some difficulty in this research regarding how to identify who made the investment decisions in the firm. Therefore, a standard was implemented whereby the identified investor or fund manager's country — presented by Preqin — was considered the entity who made decisions regarding investment. In other words, the branch or offices located in the same country as or adjacent region to the EM, regardless of whether their headquarters were located in an advanced country. For instance, Grupo Gransolar — a renewable energy investment and construction specialized in the construction of photovoltaic plants (i.e. solar energy) — is based in Spain but has several branches around the world (e.g. headquarters in Spain, North America (the US), Africa (South Africa), the Middle East (United Arab Emirates), Latin America & the Caribbean (Mexico, Argentina, and Brazil), Asia (India and Australia); however, the branch in the United Arab Emirates made investment decisions for the United Arab Emirates, and the branch in Brazil made invest decisions for Brazil.

From a deals-level standpoint, several EM deals were characterized as unidentified investors, because the Preqin data stream identified and considered investors as limited partners (LP) if they invested in a fund portfolio,[16] NOT directly in the project, as illustrated in Figure 4.3 (Structure of investment in infrastructure). Therefore, a large number of assets were characterized by concession type; for instance: 1) build, operate and maintain; 2) build, own, and operate; or 3) build and operate, compared to design, build, finance, operate and transfer.

Figure 4.3 -Structure of investment in infrastructure



Source: Adopted and augmented from Herasym and Segura (2006)

In terms of issues related to missing investor information, although the Preqin database provided information regarding the title of private investors, construction companies, or engineering services companies who participated in infrastructure deals in Emerging Infrastructure Markets, information regarding investor type was missing. Consequently, to fill this gap, it was necessary to seek and verify the investor type. However, some details were inconsistent due to the double role held by some of

[16] A comprehensive details will be provided later for Fund(s) in Funds portfolio analysis section

the firms. For instance, LIMAK Holding is a Turkish firm specialized in investment and construction of infrastructure assets around the world. Similar to the LIMAK Holding corporation, Alten Energías Renovables is a Spanish-based firm (with a branch in UK) that has multi-functions, including design and development, investment and funding, construction management, and operations and maintenance (Alten Energías Renovables website).

Therefore, in this research an estimation was made for firms or companies that participated in infrastructure deals and could be considered a potential investor.

4.7.2 Limitations of Preqin Database-Funds in Emerging Markets

Despite the quality of data sourced from Preqin database, there was notable absence of comprehensive data pertaining to the funds level. In addition, while the Preqin dataset identifies a large number of infrastructure fund portfolios, the considerable immaturity of infrastructure funds reflects that a small number of funds have been liquidated.

In the context of funds' **primary geographic focus,** the Preqin database limits the data to allocation of private capital within primary region classifications and diversifications (i.e. multi regional). There was a notable lack of comprehensive data pertaining to fund-level geographical arrangements based on emerging markets, economic regions, and frontier markets.

4.8 Framework of Infrastructure Investment Challenges (PEIF) in EM -Phase Two: Selection Process Approach

The current increase in the number of global institutional investors and fund managers reflects the improvements made to procedures, with global investors targeting new markets (i.e. EIM) and allocating a range of infrastructure assets (Cheteni, 2013). However, as highlighted in Chapter Two, EIM presents a number of inherent difficulties and challenges comprised of: (1) the absence of transparency in the infrastructure market, as well as disclosure of information concerning the finance market; (2) inherent long-term risk; (3) a lack of investment security and protection; and (4) ambiguity of regulation (Taylor, 2014; Ruiz et al., 2017). Nevertheless, the progress of PEIF investment from global institutional investors and fund managers within EIM has attracted additional infrastructure investors to further target their investment into EM. It is therefore imperative to acquire further in-depth assessment in order to firstly, implement the research objectives and answer the key research questions pertaining to the identity of the key players in EM and secondly, recognise the major trends in infrastructure investment within EIM. In addition, it is important to gain recognition of IP and acquired knowledge in terms of: (1) the methods used by these investors to make their investment decision; (2) the various challenges encountered during their infrastructure investment process within EM; and (3) managing deployed capital to invest in infrastructure within EM regions. This presents the structural analysis procedures of PEIF investment dimensions.

The implications of the growth in PEIF investment has been in response to considerable opportunities to examine the infrastructure of investment markets in EIM. As highlighted in Chapter Five, the aggregate number of infrastructure investment deals in EM was found to comprise of 2,519 economic infrastructure assets, invested by firstly, various forms of institutional investors (i.e. infrastructure firms; financial institutions; investment banks; and construction and engineering firms) and secondly, fund managers from different countries (i.e. advanced, local emerging, and developing).

Furthermore, a further in-depth assessment investigating the action and behaviours of global institutional investors undertaking infrastructure investment within EM. In addition, the first step in stage two of phase two of the infrastructure Investment Challenges (PEIF) in EM Framework recorded the key players undertaking infrastructure investment within EM. Moreover, the Preqin data source was examined to empirically identify the group of key players and actors demonstrating the highest rates of infrastructure investment among EM, as demonstrated in Figure 4.4, which also outlines the structural design of the process assessment of the most active PEIF players in EM. The investigation of global institutional investors and fund managers was based on Saunders et al.’s (2009) multi-stage purposive sampling technique, which follows a logical dynamic development from general global investors and fund managers active in PE infrastructure investment within EM, to specific selective investors and fund managers concentrating their investments on the addressed specific plot in EM (see Section 6.3 for further details)

Sedgwick (2015) and Taherdoost (2016) stated that this approach recognises that the selected subset of the population or sampling frame was geographically dispersed, as well as being focused on a specific number of areas to achieve the relevant research objective during the analysis. Furthermore, the authors highlighted that this techniques focuses on an ability to generalise conclusions concerning a specific population. Palinkas et al. (2015) identified two forms of purposive sampling strategies: (1) emphasising the similarities utilised to narrow the scale of differences and concentrating on resemblance (e.g. typical case studies, snowball sampling, and homogeneous sampling); and 2) emphasising the variations used to recognise differences and dissimilarities (i.e. analogous to quantitative analysis to identify the difference and variabilities of value for a specific variable), including maximum variation, purposeful random sampling and extreme case sampling.

This current research uses the multi-stages purposive sampling technique focussing on the similarities utilised to narrow the scale of differences, i.e. the various global PE institutional investors and fund managers investing in infrastructure assets within EM. Therefore, the structure assessment in the current study draws on the insights from three primary multi-stage purposive sampling analyses, with **the first stage sampling assessment** representing an in-depth analysis of investors' profiles (i.e. the overall perspective) with regard to infrastructure investment within EM (i.e. global investors and fund managers active in EM). However, it should be noted that identifying those global investors and fund managers most active in the markets requires various forms and structures. Hence, two forms are recognised in the current empirical work of this research: (1) investors based in a specific country, who are heavily involved in EM (i.e. sixty-six investors and fund managers based in the USA concentrating their investment in Latin America and the Caribbean region); (2) global investors and fund managers investing heavily in EM (i.e. a specific investor based on Spain investing into thirty-nine of out the forty-four renewable energy assets in Latin America and the

Caribbean region). Therefore, a further evaluation encompasses **Two platforms assessments**:

- Platform One. This firstly, refers to the profiles of global investors and fund manager within EM platform relating to the analysis of the major investors and fund managers targeting investment in EIM within the examined time frame (2009-2019), and secondly, further exploration of the most attractive industry and region/country for infrastructure investment within EM.

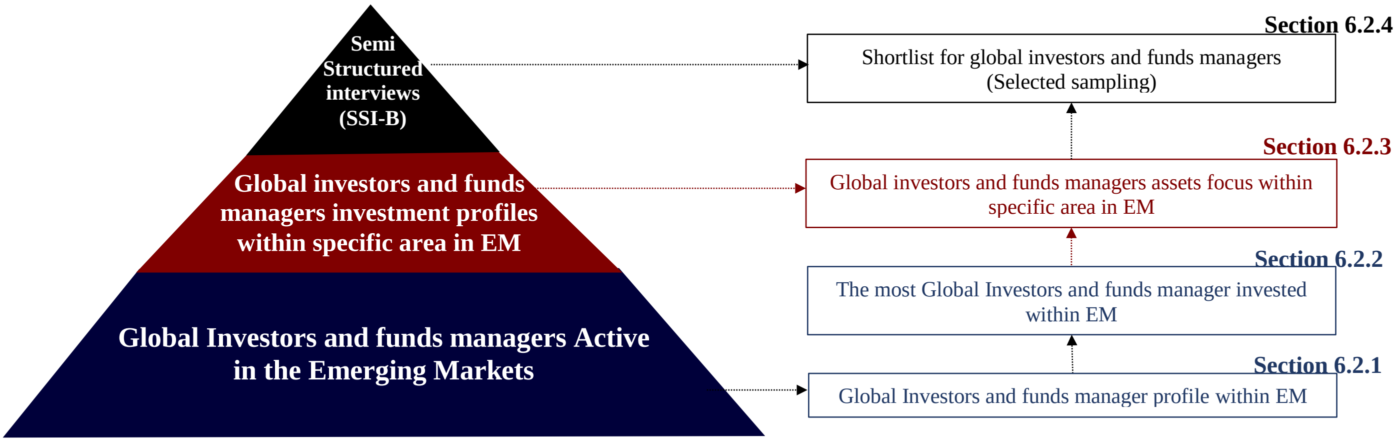
- Platform Two. This includes further insights from the second platform call for the global investors and fund managers investing primarily within EM, i.e. a structural list of institutional investors and fund managers with the highest EM infrastructure investment rates.

The second stage of purposive sampling techniques concerned the subsequent assessment gaining a further insight into the commitment of global investors and fund managers, along with understanding the concentration of investment into a specific geographical area within EM, as shown in Figure 4.4. Although it is important to recognise the significance of PEIF investment within the five regions of EM, this study experienced a number of issues, particularly due to the time restrictions of the research and the global spread of institutional investors and fund managers, along with the geographical distribution of infrastructure assets within EM (i.e. five of the regions are comprised of twenty-three countries). Therefore, the concentration of selected investors and fund managers as sampling was related to their PEIF investment, and in particular their infrastructure investment in Latin American, Caribbean, Asian and African regions (See Section 6.2.3).

The third stage purposive sampling assessment represents the preparation process of the selected investors and fund managers. This stage examined the detailed outcomes of the analysis of PEIF investors and fund managers in EM, in order to empirically draw up a shortlist of the top twenty investors and fund managers at the selected geographical areas within EM. This was structured in the form of selective sampling of SSI-B interviewees.

Furthermore, the multi-stage assessment (i.e. criterion) was characterised by means of the historical data considered to be appropriate instrumental measurements for analysing the individual perspectives of infrastructure investors, which in turn reflected the questions employed in SSI-B. The selection reflected the criteria used for the selection of suitable candidates when interviewing global institutional investors and EIM fund managers.

Figure 4.4 -Schematic Outline of Selected Global Investors and Fund Managers Investing in Infrastructure Assets within EM



Source: Created by the researcher

The analysis allows for the improvement and purification of the concentration on the key players in the EM, as highlighted earlier. Participants for the SSI-B interviews were chosen from large scale and prolific global investors, i.e. the most active investors in infrastructure assets investment in EM who were located at a distance from their geographical investment preference. Furthermore, this measurement secured the ability to undertake high levels of comparison, while at the same time allowing assessment of the ways PEIF investment in EM vehicles has developed and evolved across the examined period, as well as identifying the challenges and difficulties encountered in EIM. Further, the assessment procedures were utilised to explore the perspectives of specific investors and fund managers and assist in the in-depth investigation into PEIF investment within EM. This also focused on acquiring an understanding of specific investors' experience and knowledge of infrastructure assets within specific geographic locations, which exhibited a significant development in infrastructure investment in industry in EIM.

However, selective interviews with investors concerning their infrastructure investments **have a number of caveats and limitations**, particularly in relation to the empirical work undertaken in the current research. Firstly, as highlighted in earlier, the unlisted PE infrastructure investment market is considered to lack the transparency compared to the listed market. Secondly, global firms, investors, fund managers and financial intermediaries are characterised as being elite institutions possessing a high degree of undisclosed information concerning: (1) ownership (i.e. type and form of infrastructure assets); (2) performance reporting in the market from the PE manager (i.e. performance monitoring); and (3) investment criteria and decision making processes, i.e. IP (Çelik and Isaksson, 2014; Blanc-Brude, 2015). Çelik and Isaksson (ibid) argued that, in the context of several investors involved in an individual asset, the engagement of a variety of ownership (including considerable differences in percentage stakes), tends to result in greater restrictions in the giving out of information concerning any challenges relating to infrastructure assets and/or the investment decision process (i.e. IP). Consequently, one of the main the difficulties potentially influencing the research findings of the current study relates to the ability to gain an insight in the infrastructure investment market and the experiences of investors.

4.9 Data Collection Instruments

The second phase of the empirical research focuses on interviews with global institutional investors, fund managers and professional institutions. The in-depth insight gained by the assessment is supported by analysis of different levels of specific experience of infrastructure investment in EM, as expressed by fund managers and investors.

The structural design for SSI in this research follows a logical dynamic development, as follows: (1) general overviews of global professional institutions active in the field of infrastructure investment; who obtained an observation of the infrastructure investment market in EIM; and (2) interviews with specific global investors and fund managers, based on selective EM sampling. Consequently, SSI were divided into two strands: The first consists of SSI-A interviews with global professional institutions, and authors in infrastructure investment field aimed at establishing an overall perspective of the difficulties faced by infrastructure investment in EM (See Appendix D.1). The second focuses on SSI with selective global investors and fund managers (SSI-B) and represents the second route of interviews signified by SSI-B, i.e. selective sampling (See Appendix D.2).

Interviews have been selected as a research instrument to provide a range of different perspectives from different levels of infrastructure universe and investment industry (i.e. SSI-A and SSI-B) to provide a distinctive insight into the challenges and barriers that global private investors and fund managers face when investing in the infrastructure of EMs. Particularly, in the context of SSI-A, the selection process ensured that the participants had in-depth experience in finance, economic development, and universal infrastructure. Meanwhile, the SSI-B interviews are intended to serve at managerial level (i.e. decision-making level). Therefore, their perspective towards infrastructure investment and market development in emerging countries has a significant value and contributes to the development of the PEIF conceptual framework (see chapter seven).

As well as open-ended questions, a number of closed-ended questions, were included in SSI, structured to form part of the quantitative data. The responses to the closed-end questions were formed utilising a categorical list or Likert scale, from which the participants were asked to make a selection from a list of answers (Adams, 2015; DeJonckheere and Vaughn, 2019). Hesse-Biber and Leavy (2011, p. 102) highlighted that closed-ended questions can “reflect our own categorisations – what we think some of the key issues may be” which may differ “from how the respondents themselves would have discussed them.” Consequently, all SSIs employed in this research included a number of open-ended questions that assisted in quantifying the responses and in finding themes capable of being employed by the statistical system for the subsequent analysis.

However, the SSI procedural requirements presented a number of difficulties and challenges when seeking to engage participants in contributing to the research. Firstly, initial contact with the participants commenced during the global coronavirus crisis in 2020, and ran from August to October 2020. The method employed to approach investors, institutional professional, advisory consultants and key authors was through email because they were working remotely and consequently could not be contacted at their offices. Secondly, the intensive workloads of investors and fund managers impeded the research, because the emails requesting interviews were met with no response. In terms of authors and experts in infrastructure investment in EM, there are a limited, and even fewer with expertise specializing in EMs. The initial emails were followed by up with reminder emails 2 weeks later, and this procedure was then repeated 3 times. This was done to maximize participation, although the current research aimed for quality and not quantity. Eventually, the total number of participants was 17, comprising 11 SSI-A interviewees and 6 SS-B interviewees.

As noted above, the foundation for this research concerned the challenges and difficulties of global private institutional investors and key players in the field of infrastructure investment, particularly within EM, with PEIF investment markets considered to demonstrate complexity, diversity and internal risk factors. Furthermore, the structure of investment vehicles tends to be complex and diverse regarding EIM markets, including various forms of funds and financial instruments, along with sector and asset geographical allocation and investment capital flows. This led to a need to contextualise such differences and a variety of perspectives, which were mirrored in the questions themes explored in the interviewees. Furthermore, the scale and differing perspectives of the primary materials (i.e. academic and professional literature reviews and empirical data) delivered a ‘wider context’ and improved the overall outcomes (Silverman, 2017, p.210).

4.9.1 Structuring Research Methods for Data Analysis Phase Two [Interviews Questions Descriptions]

The current section attempts to answer the research questions and identify the challenges and difficulties of global private institutional investors of investing in infrastructure assets within emerging markets as part of the research foundation framework (Infrastructure Investment Challenges (PEIF) in Emerging Infrastructure Markets framework- Phase Two). The SSI was designed to depict key issues concerns global investors to invest in infrastructure assets in EM, as presented in Table 4.3.

The questions included in the SSI were developed on the bases of the findings of the literature review[17] (see Chapters Two and Three) and the outcomes of the empirical work of this research- (Infrastructure Investment Challenges (PEIF) in Emerging Infrastructure Markets Framework- Phase One). Furthermore, the themes were developed in a such a way that captures the perspective of two stakeholders (i.e. the professional institutions' philosophical perspective [SSI-A strand] and the global investors' and fund managers' experience [SSI-B strand] perspective) regarding the challenges and barriers that prevent global institutional investors and fund managers from investing in infrastructure assets within EM (i.e. using common questions). These themes were divided into five sections, namely: 1) The infrastructure projects in the pipeline in EIM; 2) the institutions' general strategy regarding EIM; 3) the challenges, risks and key consideration that global investors and fund managers encounter, specifically including investors' funds and financial challenges and internal Emerging Infrastructure Markets; 4) infrastructure investment sector/ regions preference; and 5) opportunities in EIM.

Furthermore, Table 4.3 presents a specific additional theme that includes questions pertaining to SSI-B designed to target experience and knowledge of the most active investors and fund managers who invested in infrastructure assets in emerging markets and indicated by the Institution's Specific investment strategy in EM.

The questions posed within each of the themes were structured to avoid non-response, and specialism was not relevant in this regard. The selected themes encompass the key aspects influencing PEIF investment decision making and provide an in-depth insight into the difficulties and challenges associated with EMs that impact global institution investors' and fund managers' investments in infrastructure assets within EMs. A chief limitation of this research is that the empirical framework fails to

[17]Further details of these primary themes provided in Chapter Two and Chapter Three

investigate the relationships between each of these challenges, barriers and difficulties.

Table 4.3 -Structure SSI-A, B Framework of Infrastructure Investment Challenges (PEIF) in EIMs [Phase Two]

Thematic questions	Questions content	SSI-A perspective (Professional institutional and key authors)	SSI-B perspective (Global institutional investors)
Professional institutions' observation process	Sources and analysis process to evaluate the infrastructure investment industry in EMs	■	
Institutions' strategy towards EM	Motivation to enter EMs	■	■
	Criteria allocation for country allocation for infrastructure investment	■	■
	Chief elements of infrastructure investment strategy	■	■
Institutions' specific strategy in EM	Reasons to concentrate on infrastructure investment in a specific area of an EM	■	■
	Criteria for evaluating multi-national markets		■
	Criteria for selecting infrastructure asset investment in EMs		■
Infrastructure projects pipeline in EIM, strategies and policy	Policies to boost infrastructure pipelines in EMs	■	■
	*Reasons for widening gap in infrastructure needs in EMs	■	■
Infrastructure investment in EM challenges	**Factors influencing institutional investors to invest in EMs (challenges and barriers)	■	■
	**Critical risks that institutional investors and fund managers facing in EM	■	■
	**Key considerations in infrastructure investment in EMs to consider	■	■
EM internal challenges	Importance of regulatory frameworks	■	■
infrastructure investment preference/target in EMs	Most targeted sector in EMs for investment	■	■
	Most targeted region in EMs for investment	■	■
Opportunity in EM	Reasons for targeting EMs for future infrastructure investment	■	■

Note:
***** these questions were raised during the interview process and have a strong correlation within the research context.
****** the content of these questions included internal inherent challenges in EM.

Sources: Author's own analysis

The list of SSI questions was verified and reviewed following each interview, in line with the 'dialogue approach' (Bakhtin, 1981 cited by Thrower, 2018, p.92; Campbell et al., 2013). This approach is employed to re-evaluate developing themes and assess and analyse the efficiency and quality of interview questions and interviewing mechanism to guarantee significant outcomes. Moreover, this techniques permits the researcher to delve deep into the context of a research study and fine tune questions to focus on essential concepts and key aspects of the data (Bowen, 2009; Campbell et al., 2013). In the context of this research, whenever SSIs were conducted, the interview questions were revised to ensure the focus was on PEIF investment in EIMs. Thus, additional questions evolved, as highlighted in Table 4.1, which identifies the reasons behind the growing infrastructure gap in EMs despite various parties and entities existing and/or assisting infrastructure investment in EM, such as MDBs and other financial institutional mediators. A further question that emerged during the interview process relates to the drivers behind infrastructure investment's concentration in the renewable energy sector compared to the traditional energy sectors in EM.

4.10 Data analysis

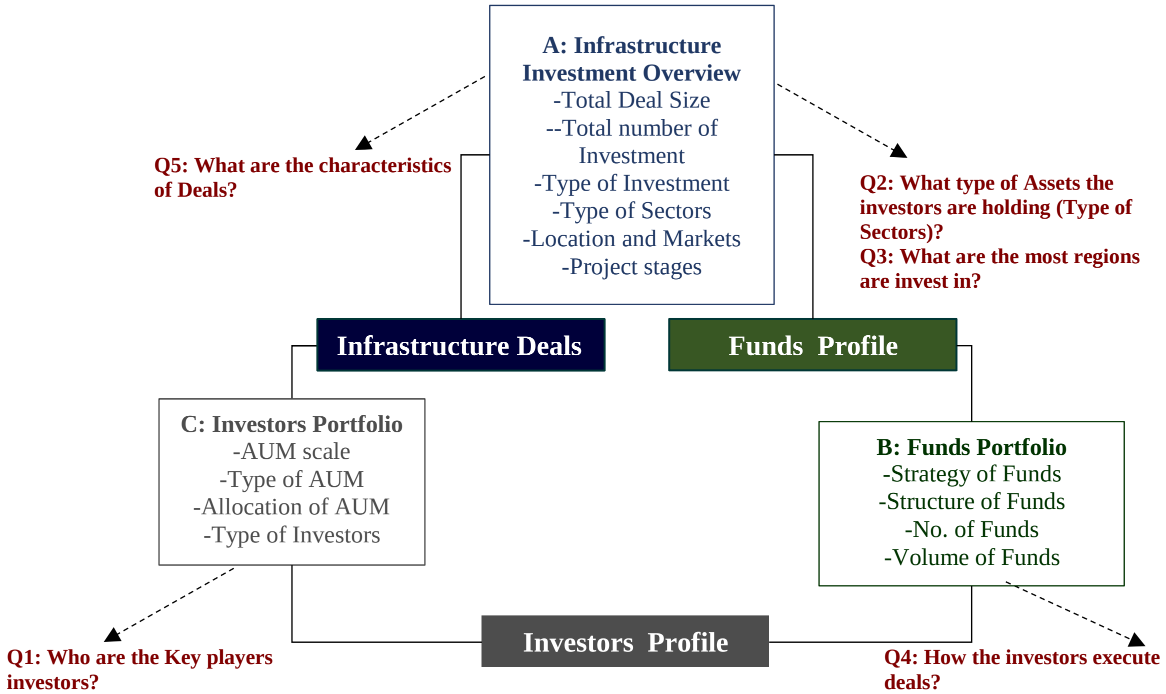
4.10.1 Preqin Quantitative Research-Analytical Framework

Successful assessment of the vehicle structure for unlisted infrastructure investment within EEs, at deal level and fund level, depends on the accessibility of financial deals (i.e. deal size, equity size, and debt amount) and the investors-stakeholders participation percentage across each sector and EIM. Furthermore, at fund level it is also dependant on the availability of the financial fund's vehicle (i.e. vehicle size, participation percentages for each sector/country) in EMs. Accordingly, it is vital to recognize the infrastructure fund deals in EMs sourced from the Preqin database and exploited as a proxy for the private infrastructure investment universe over the addressed period. Therefore, the analysis was constructed following an intensive and detailed process of mining and linking of data from the Preqin database, which generated all the figures and tables in Chapter Five and Six.

4.10.1.1 The analysis of Preqin Database-Deals in Emerging Markets

To facilitate the analysis and **integrate the data regarding the questions presented above and the key indicators of infrastructure investment provided** by the Preqin database (investor profiles; fund profiles; and infrastructure deals (see Figure 4.5)), an assessment of infrastructure investment in emerging markets **is carried out in three stages**. Infrastructure deals levels are considered the foundation of the empirical analysis (i.e. an infrastructure-projects based approach), as the primary objective of the analysis is to examine asset allocation in emerging markets, to examine the type and nature of projects receiving investment in Emerging Infrastructure Markets (i.e. EIM project profiling). **The next step of the process** is highly critical to the empirical analysis, and is to assess the investor portfolio based on the assessment of infrastructure deals identified in the previous step (i.e. institutional investors invest in Emerging Infrastructure Markets) as exhibited in Figure 4.5. The final step involves the assessment of fund portfolios and linked infrastructure deals with investor portfolios in order to obtain in-depth information regarding the magnitude and scale of infrastructure fund-levels and the routes of investment taken by investors in emerging markets.

Figure 4.5 -Breakdown of the Research Questions Related to Private Equity Infrastructure Funds (PEIF) in EIM.

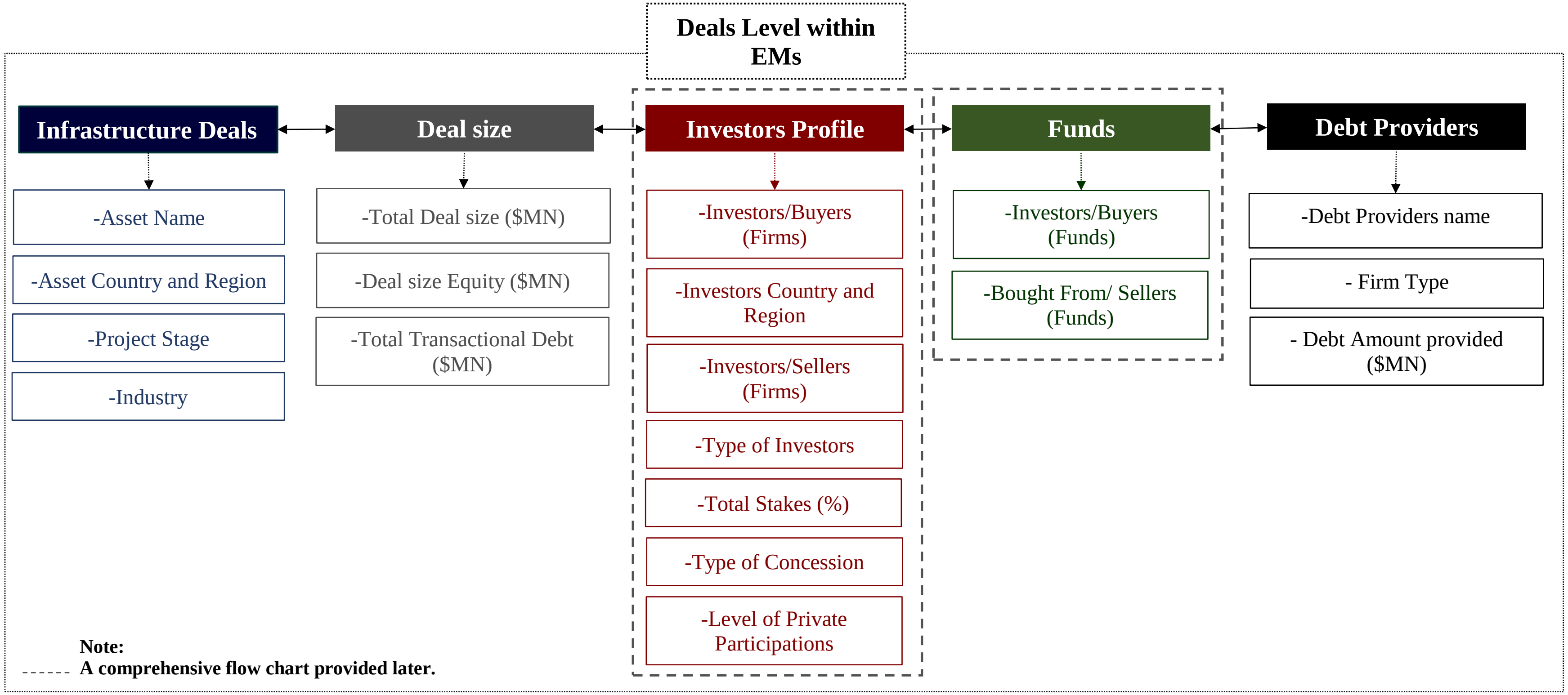


Source: created by the author

In order to successfully evaluate infrastructure investment in emerging markets, the assessment is structured to enable an in-depth analysis in order to answer the main research questions and assess the three indicators of infrastructure investment in emerging markets (See Figure 4.5). Figure 4.6 depicts a breakdown of **first stage of** infrastructure deals in EMs. Specifically, the following candidate explanatory variables for private equity infrastructure in emerging markets were used and each key variable was divided into further sub-variables, as exhibited in Figure 4.6[18]. Firstly, infrastructure deals were divided according to asset country and region, project stage (i.e. greenfield, brownfield), and industry sector type. Secondly, deal size ($MN) was divided according to aggregate deal value ($MN), deal size equity ($MN), and total transaction debt ($MN). Investor profiles included the following organizational details: investor/buyer (firms) and investor/seller (firms), investor country and region, investor type (i.e. corporate or fund manager), and participation measurement (i.e. level of participation, percentage of stakes acquired, and type of concession). Funds were divided according to investor/buyer (funds) and bought from/seller (funds). Finally, debt providers were divided according to name and type (i.e. bank, investment bank, government agency, and placement agent).

[18] A brief general description of the EM infrastructure deals, which were assessed in terms of 1) asset phases and 2) investor profiles (i.e. investor countries and regions, investor type, and source of funds) (See Appendix B.1).

Figure 4.6 -Prototypical Conceptual Model for the Infrastructure Investment in EIM-Deals Level (Stage One).



Source: Created by the author

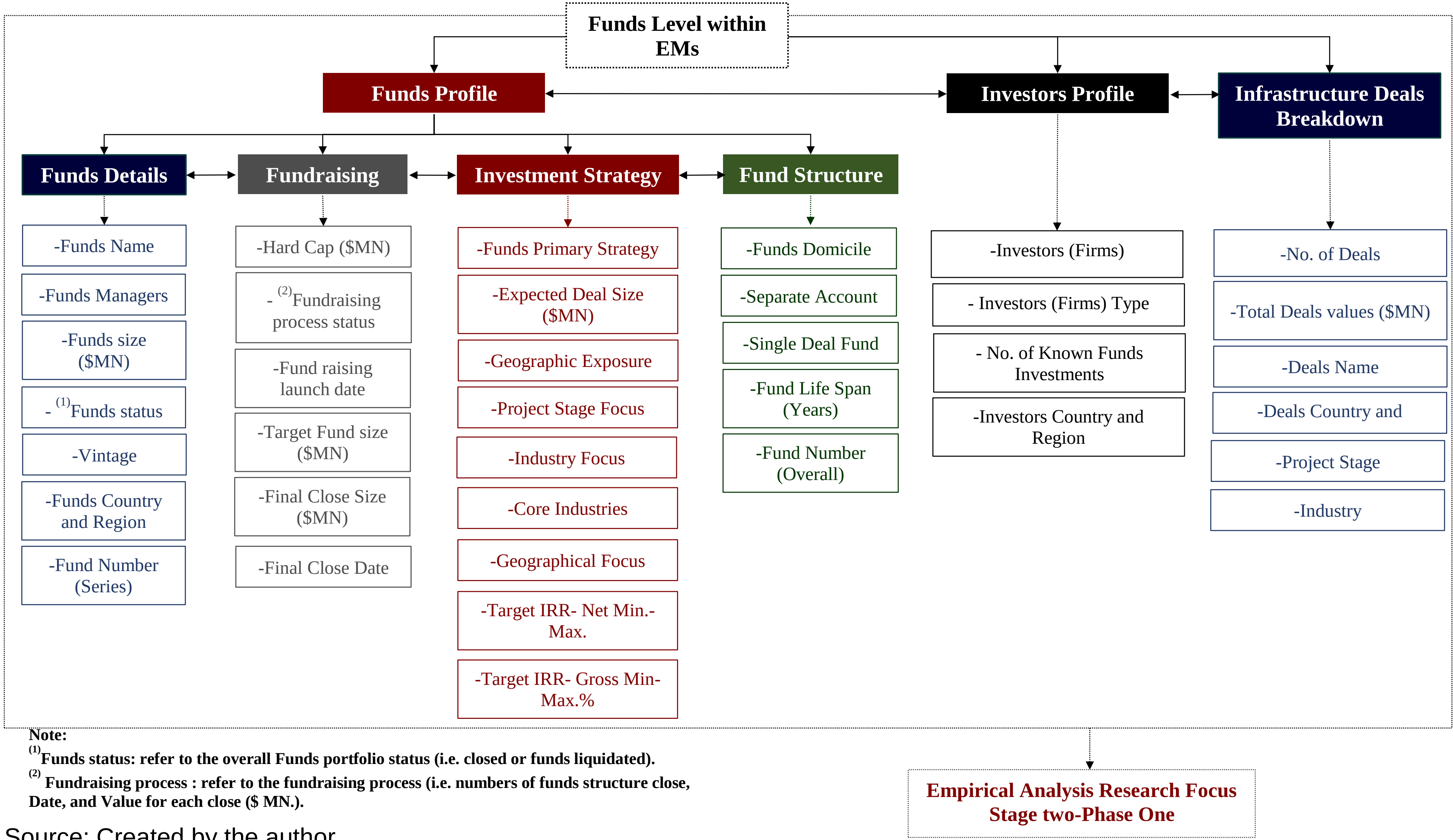
4.10.1.2 The analysis of Preqin Database-Funds in Emerging Markets

Similar to the breakdown and analysis of stage one – private equity infrastructure funds investment – at the deals level (in EMs, stage two concerned with private equity infrastructure funds investment (PEIFI)), the is exhibited in Figure 4.5[19]. The funds level breakdown identifies the descriptive variables for PEIFI-funds level in EMs that were employed, where each critical variables comprises other sub-variables. The breakdown of the second stage is with the research questions breakdown, as illustrated in Figure 4.7, which were divided based on three key categories: 1) fund profile; 2) investor profile; and 3) deal profile. First, the fund profile comprised of four key pillars: **1) funds details** includes fund name, funds manager, fund manager's country and region, fund size ($MN), fund status (open/closed), year of fund (i.e. vintage), and number of funds (series) managed by fund manager's institution. **2) fundraising** measurements consisted of fund's hard cap ($MN), fundraising process status (including numbers of funds structure close, date, and value for each close ($MN)), fundraising launch date, target amount ($MN), and final close date. **3) fund's investment strategy** encompasses fund's primary strategy, expected deal size ($MN), geographic exposure, project stage, sector focus, geographical focus, core funds industries, target IRR (net min. and max.), and target IRR (gross min. and max. %). Fund structure comprised fund's domicile, fund's lifespan (years), whether fund is a separate account or single deal fund, and overall fund numbers.

Investor profile included the following organisational details: investors (firms), investor (firms) type, number of known fund investments, and investor's country and region. **Infrastructure deals** were divided based on aggregate number of deals, total deals value ($MN), deal names, deals' country and region, project stages, and industry.

[19] A brief description of the infrastructure investment fund vehicle. The overview is based on three pillars: infrastructure assets (i.e., industry, geographic area, and project stage), investment fund mechanism (i.e., infrastructure funds investment criterion, strategy, approaches, and forms), and fund managers' and investors' involvement and participation (See Appendix B.2).

Figure 4.7-Prototype Conceptual Model for Infrastructure Investment in EIM-Deals Level (Stage One).



Note:
(1) Funds status: refer to the overall Funds portfolio status (i.e. closed or funds liquidated).
(2) Fundraising process : refer to the fundraising process (i.e. numbers of funds structure close, Date, and Value for each close ($ MN.).

Source: Created by the author

4.10.2 SSI Qualitative Research-Analytical Framework

The empirical analysis concerning PEIF and the EM Framework in the current research focussed on the actions of global institutional investors in relation to the following: (1) infrastructure investment within EM; (2) challenges encountered in EE; and (3) the Investment Policies (IP) of specific investors undertaking infrastructure investment within EM. As highlighted earlier, the SSI interviews were with global institutional investors and main players in PEIF investment in EE. The outcomes of the empirical SSI interviews (i.e. qualitative data) were structured based on deductive method across the questions, with responses recorded by means of a transcript.

In order to achieve the aims and objectives of the analysis, and so answer the research questions, the investigative frameworks developed across the three dominant steps comprised of: (1) examining the transcript of the SSI interviews; (2) recognising and inspecting emergent issues; (3) contextualising and the empirical outcomes utilising secondary data; and (4) considering the emergent themes.

Step One: Interrogating transcripts from the SSI interviews

Firstly, the SSI interviews were inspected qualitatively in order to enable the thematic analysis (i.e. segmental ordering) of the material content of the interviews, i.e. examining, coding, organising, and grouping into concepts strands. This process was adopted from Campbell et al.'s (2013) SSI analysis procedures, in particular: (1) recognising themes; (2) analysing interviews to organise them into themes, to facilitate coding and the development of textual concepts; and (3) creating a scheme, followed by testing by means of empirical materials (see Section 6.4.2). The qualitative method was deemed crucial for establishing the perspectives and views of global professional organisations, institutional investors and fund managers in PEIF in EM. This was particularly important for those investors and fund managers for whom English was not their native language (i.e. investors based in Italy, Spain and France), along with the existence of differing terms for investment and industry within the diverse geographical locations of EM.

In order to achieve the results highlighted above, a detailed process was required for the analysis of the transcript of the SSI questions. Since both closed-ended and open-ended questions were included in the SSI-A and B distributed to investors and other participants, as well as the in-depth interviews, the sample size was relatively small. The collected data was evaluated on both a nominal (categorical) and ordinal (ranked) scale. As this research focused on an in-depth understanding of the participants, rather than the wider population, it employed descriptive, textual, and content analysis, along with non-parametric statistics (See Appendix D.1 and D.2 for the two strands of SSI questions).

Descriptive and inferential analysis

Descriptive analysis was undertaken on the responses to the closed-ended questions in the SSI distributed to investors and fund managers. The assessment of the descriptive statistics provided an overview of the data collected concerning the key variables recognised in the research framework. The analysis was undertaken by employing mathematical formulae comprised of: (1) weighted scores and medians; (2) non-parametric tests; and (3) descriptive charts and graphs. In addition, SPSS (i.e. a software computer programme utilised to assist statistical analysis) was employed for the statistical analysis of the responses of the investors and fund managers to the SSI items. The feedback was subsequently coded and inputted into the SPSS program, with the statistical outcomes transferred to Microsoft Excel, which structured, and then calculated, the applicable formats of the SSI statistical outcomes.

Textual and Content Analysis

This research employed textual analysis in conjunction with descriptive analysis to analyse the responses to the open-ended questions. The transcript (i.e. data/information) gathered in each interview was transferred from a Word document into Nvivo software, which assisted in breaking down the transcript into tranches of text, coded by joining meaning and significance. These codes were subsequently combined and categorised into group of themes, based on the specific research question and related topic. Several code cohorts were formed, followed by pooling the groups to remove any imbrication in the codes across these groups. The outcomes then put into an organised arrangement utilising the Excel programme.

Step Two: Recognizing and inspection emergent issues

The SSI-A and SSI-B compositions were grouped and combined following step one, and structured in the form of specific themes, which were then analysed in relation to various global concepts, including: (1) the perspective of professional institutions toward EM: (2) the approaches and investment decision-making strategies of global institutional investors; (3) global difficulties and challenges; and (4) specific aspects relating to EE. The rationale behind this step permitted a more in-depth analysis and application of the research questions. In particular, it obtained two perspectives for a number of barriers preventing global institutional investors and fund managers from investing in infrastructure assets within EM. In addition, it resulted in the fulfilment of Objective Five of this research, i.e. to devise a conceptual framework for global infrastructure investment within EE, as outlined in Chapter Seven.

Step Three: Contextualising and setting up the empirical outcomes with secondary data

As highlighted in Chapter Four, this research utilised a mixed methods approach, as this permits the structuring of a strong conceptual path to contextualise and increase the value of essential qualitative data (Creswell et al., 2003; Teddlie and Tashakkori, 2003; Borrego et al., 2009). Consequently, it offers opportunities to firstly, correlate the behaviors of global infrastructure investors and secondly, identify the challenges and difficulties experienced in EM. This was achieved by employing material from the empirical SSI and quantitative data stream (i.e. the Preqin data) of the actual development of PEIF investment within EE, as well as capital flows (i.e. target investment strategy and sectoral and geographical allocations). The aim was to verify the data from the SSI interviews through a comparison with the recorded data and the literature review.

4.11 Conclusion

This research examined the global challenges and difficulties regarding the amount and scale of PEIF investment in EIM. The current chapter considered the foundation of the empirical work of the study, including the structure of the research methodology, and a discussion of the Framework of Infrastructure Investment Challenges in (EIM). The study embraced a secondary analysis methodology by acquiring data from the Preqin data stream. The empirical study comprised two phases, each of which involved the assessment of the data obtained from the Preqin database. **Phase One** evaluated the infrastructure investment in EIM by obtaining a general overview of the infrastructure investment industry, the geographical allocations, the sectoral targets, and the funds vehicle structure within the period Q1-2009 to Q4-2019, by employing the Preqin database. Further analysis examined the general distribution of PEIF investments seeking opportunities in EIM (i.e. fund vehicle profiles) in the period addressed, i.e. Q1-2006 to Q-4-2019.

In order to investigate the level of PEIF investment deals in EIM in Phase One of the study, a number of aspects and measurements were designed and applied to the data extracted from the Preqin data stream. Alongside these criteria, a holistic overview of the observations and limitations of the data interrogated was presented in detail. Therefore, Phase One of this study was critical for the empirical work, and constituted the foundation of the subsequent phase, which was comprised of qualitative data sources, in the form of SSI, which sought to obtain a comprehension of the challenges and difficulties regarding the amount and scale of PEIF investment in EIM.

Phase Two was divided into two main parts. The first part involved the identification of general overviews of global professional institutions active in the field of infrastructure investment; who obtained an observation of the infrastructure investment market and evaluating PEIF investment in EMs (SSI-A), and the attainment of an holistic overview of the challenges and difficulties encountered in infrastructure investment in emerging markets, via SSI. The second part constructed based on the interrogation of the Preqin data analysis regarding PEIF in emerging markets, and understand the perspectives of global professional institutions' and key PE investors within specific geographic locations in EE. It's offering insights into the challenges pertaining to the degree and scale of PEIF investment in EIM. In addition, provide feedback on their experience assessing EIMs, exhibiting a significant development in the infrastructure investment industry in EIM (SSI-B) during the relevant timeframe (Q1-2009-Q4-2019).

Chapter Five addresses the assessment and interpretation of the outcomes of this study, which explored the evaluation of the level of PEIF investment deals in EIM in the period Q1-2009 to Q4-2019. In addition it analyses the private equity infrastructure fund (PEIF) investment vehicle, targeting EM, or countries/regions in EIM, over the period Q1-2006 to Q4-2019. Meanwhile, Chapter Six presents the challenges and difficulties regarding the amount and scale of PEIF investment in EIM.

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Chapter Five: Private Equity infrastructure Funds Investments (PEIF): Growth and progress in Emerging Infrastructure Markets

5.0 Private Equity infrastructure Funds Investments (PEIF): Growth and progress in Emerging Infrastructure Markets

5.1 Introduction

This chapter addresses the foundation of this research, and relates to the subsequent chapter, Chapter Six, which evaluates the challenges and difficulties of global institutional investors and fund managers, regarding the amount and scale of PEIF investment in EIM. The empirical analysis included in this chapter employs the review of the extant literature in the field, and the theoretical comprehension of the subject at hand, which were addressed in Chapter Two and Chapter Three, respectively, and the assessment of the secondary data sources discussed in Chapter Four.

The literature review in Chapter Two of this study highlighted the need for a continued growth in infrastructure investment in EIM, and recognized the salient merits and challenges that impact global investors' decision to target their infrastructure investment towards emerging markets. Chapter Three identified the fact that a variety of options of funding/financing are available to global investors for investing in capital assets in EIM. It discussed the essential concept of private equity infrastructure funds (PEIF), and the key drivers behind approaches to PE investment in EIM. Chapter Four presented the methodological framework of the infrastructure investment challenges in EIM employed by this study, in order to address objectives three and four of the study.

Chapter Five delivers an assessment of infrastructure fund deals in emerging markets sourced from the Preqin database and exploited as a proxy for the private infrastructure investment universe (Figure 5.1). In addition, it analyses the pattern growth of private equity infrastructure investment funds (PEIF) within emerging markets. Particularly, its concentrates on addressing research Key Q.2 (What types of infrastructure deals tend to be targeted by global PE institutional investors in EIMs?), Key Q.3 (Which regions/countries in EIM are the majority of global institutional investors choosing to invest?), Key Q.4 (Which are the most targeted infrastructure project styles within EIMs?) and attainment Objective Three:

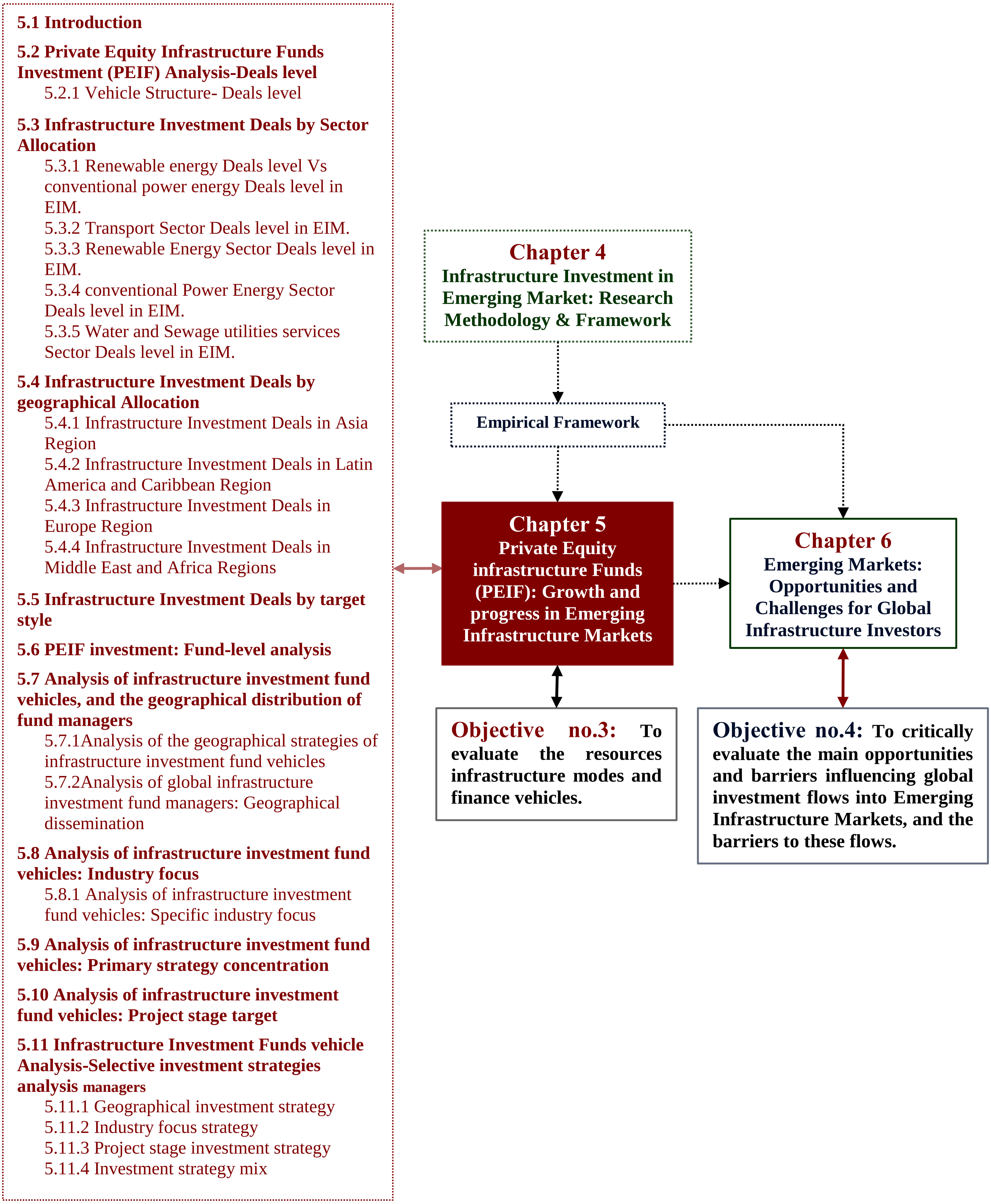
> *To evaluate the resources of unlisted Private Equity infrastructure Funds modes and finance vehicles.*

Currently, EIM are under considerable pressure to meet infrastructure investment demands, and to overcome the deficit in delivering infrastructure assets (Della Croce and Gatti, 2014; Xhala et al., 2017; Moller and Wacker, 2017). Therefore, EIM tend to focus on the development of infrastructure investment, and seek to create an attractive market environment, in order to attract international investors and fund managers (Jordaan, 2010). Meanwhile, global institutional investors, fund managers, and financial intermediates are currently increasing their participation, in the form of foreign investors, with the aim of benefitting from the stable financial climate, and improving local markets in several EE, and have thus become essential for EIM's (Yeadon, 2014; Hendriks, 2017). Indeed, emerging markets have recently increased the volume of the private capital investment market, and attracted global PE institutional investors, with the most recognizable investment vehicle structure, or PE funds investment, capable of accessing core economic infrastructures (Della Croce and Sharma, 2014; Pries and Berla, 2015). As a result, the exposure of global institutional investors to emerging markets has led them to shift their perception, and to consider investing in EIM as a strategic action, taking into consideration the fact that PEIF investment is characterized by its transformational nature, and that fact that it is accompanied by value added features (Conway, 2011). Nevertheless, the PEIF investment process in emerging markets has encountered a number of challenges, and there are a number of recognized critical aspects that influence the investment decisions of global investors in emerging countries (Mingo et al., 2018). These are addressed in detail in Chapter Six.

Chapter Five is structured into two main parts. The first part investigates the level of PEIF investment deals, namely EIM deals profiling, by identifying the key players, and the nature and types of assets that investors are currently investing in, namely their asset allocation, in EIM. The analysis employs data obtained from the Preqin database, which identified **2,519 infrastructure assets** in emerging markets over the period Q1-2009 to Q4-2019. Section **5.2** outlines the scale of private equity investment in infrastructure deals in emerging markets across the period concerned. Section **5.3** and Section **5.4** examine the detailed results of the analysis of the growth of the level of PEIF deals in EIM, by sector and geographical allocation. Section **5.5** presents an in-depth assessment of the infrastructure investment deals by target style.

The second part of Chapter Five addresses the need to examine infrastructure investment vehicles in depth, in order to obtain a full understanding. It analyses the second stage of phase one of assessment infrastructure investment in emerging markets (EM), namely the private equity infrastructure fund (PEIF) investment vehicle, and explores whether these fund structures target infrastructure investment in Emerging Infrastructure Markets (EIM), or whether this is part of the global infrastructure fund investment in their strategy. The analysis employs data obtained from the Preqin database, which identified **853 infrastructure investment fund** vehicles managed by 405 fund managers, with a cumulative fund size of United States dollars (USD) 682,364.83 million, targeting EM, or countries/regions in EIM, over the period Q1-2006 to Q4-2019. Section **5.6** discusses the scale of private equity (PE) investment in infrastructure fund structures across the period concerned, Sections **5.7** and **5.8** examine the primary focus of the sector, and the geographical target analysis of the PEIF vehicle in EIM, together with their fund managers' locations. Section **5.9** and **5.10** present an in-depth assessment of the infrastructure primary target strategy, and the infrastructure investment project stage of the PEIF vehicle in EIM. Section **5.11** provides an in-depth view of the recent trends in the investment strategies of infrastructure investment fund vehicles in EIM. Section **5.12** presents the conclusion and summary of the chapter. The gaps in the understanding of the challenges and difficulties regarding the amount and scale of PEIF investment in EIM are incorporated in the formation of the subsequent primary research strategy, as is discussed in Chapter Six.

Figure 5.1-Structural Context of Chapter Five



5.2 Private Equity Infrastructure Funds Investment (PEIF) Analysis-Deals level

This section presents an in-depth analysis of the vehicle structure of unlisted infrastructure investment within emerging markets — at deal level, and gives further details regarding the sectorial, geographical, and project stage analysis.

5.2.1 Vehicle Structures-Deals Level

First level analysis of aggregate deals within Emerging Infrastructure Markets reveals the diverse performance mechanisms effecting investments in infrastructure deals in emerging markets. The Emerging Markets infrastructure shows total unlisted infrastructure investment deals in Emerging Markets at 2,519 infrastructure assets, with cumulative deal costs of USD 632,116.51 MN. between Q1-2009 and Q4-2019. Unlisted investment in infrastructure growth was reflected at detailed Deal-level within emerging Markets[20], over the timeframe 2009-2019, as illustrated in Figure 5.2.

Overall, the various infrastructure assets were comparatively large transactions and investors jointly executed asset deals. However, the strong negative effect of GFC appeared directly in 2009, at the beginning of the period examined. The investment rate was low in terms of cost, with the amount of infrastructure deals totalling 154 with a value of USD 29, 630.33 million (i.e. 4.6% of total investment deals were in emerging markets). However, other significant deal events occurred in 2009 involving the development of considerable infrastructure assets (i.e. brownfield stage)[21]; a consortium awarded a concession contract to design, build, finance, and operate A1

[20] It should be noted that the illustrated figures (i.e. deal size) in the research analysis present assets for which Preqin provided deal size (i.e. known asset value) and DO NOT present the actual aggregate values for the projects executed in Emerging Infrastructure Markets in the examined period. In other words, the majority of actual asset deal sizes were excluded because of the absence of information regarding deal size (i.e. the financial terms of the transaction were not disclosed or the financial terms were undetermined). For further details see Appendix C.1, which presents the aggregate number of deals in Emerging Infrastructure Markets identified and broken down into further details (i.e. total number of known and unknown deal values, aggregate renewable energy assets, and conventional assets[20]). Furthermore, it should be noted that the values of the infrastructure deals presented do not represent the total initial investment of deals only, but include the cost of the first financial transaction that occurred in the examined year.

[21] A list of the pioneering asset deals in the context of scale, sector, and annual basis are provided in Appendix C.2, Table C.2.1: Summary of the largest deals in the transport sector; Table C.2.2: Summary of the largest deals in the renewable energy sector; Table C.2.3: Summary of the largest deals in the conventional power energy sector; and Table C.2.4: Summary of the largest deals in the utilities services sector.

Stryków I - Pyrzowice Toll Road project in Poland valued at USD 2,005.13 million. The development of the project was led by two Spanish companies (Ferrovial SA (an infrastructure and investment firm) and Cintra Infrastructures SE (an infrastructure company)).

This negative impact of GFC continued in 2010, evidenced by the low investment rate demonstrated by 195 deals totalling USD 61,627 million (9.7% of the total investment deals in emerging markets). Thanks to effort by investors and fund managers to invest in combined deals and project acquisitions, a relatively quick recovery in infrastructure investment emerged as exhibited by the award of a concession contract to design, build, finance, operate and transfer (DBFOT) of Narketapally-Addanki-Medarametla Road Upgradation Project (i.e. brownfield stage) in India with a total financial value of USD 24, 535.64 million.

Overall, 2011 was characterized by a low rate of infrastructure investment quantified by USD 40,742.09 million compared to USD 61,627 million in 2010 (i.e. 9.7% of the total investment deals in emerging markets in 2010 compared to 6.4% in 2011). However, there was a notable different in the number of deals, with a slow increase in 2011 to 208. Although the low rate of investment remained, a prominent asset emerged valued between USD 2,104 million to USD 2,717 million (i.e. Ituango Hydroelectric Project in Colombia and Qurayyah Power Station in Sadia Arabia respectively). The falling rate continued somewhat in 2012, both with the number of deals falling to 199 and total deal size falling to USD 37293.53 million — representing approximately 6% of the total investment). However, a number of various significant asset investments were made by local sourced investors. For example, a concession contract to expand, operate, maintain, and explore the Guarulhos International Airport in Brazil (i.e. a brownfield project) with a value of USD 3,949.12 million was invested in by four local Brazilian investors: 1) two of Brazilian private pension funds (Previ and PETROS), 2) a construction engineering company (Construtora OAS Ltda), and 3) a public pension fund (FUNCEF), and an airport management company based in South Africa (Airports Company South Africa (ACSA)).

The annual investment level in emerging markets increased significantly from 2012. Figure 5.2 presents the exponential increase in infrastructure investment in asset markets during the middle of the investigated timeframe. The greatest change in the growth of unlisted infrastructure investment in emerging market occurred between 2013-2015, when the total amount of investment increased significantly and peaked in 2015 with 362 deals worth USD 110,580.2 million.

In 2014, the infrastructure investment rate rose considerably compared to 2013 (i.e. total deals 319 deals assets worth USD 60,505 Mn. in 2014 (Circa 9.5%) compared to 2013 quantified 297 deals reached to financial closed USD 48,981.67 Mn. (circa 7.7.%) in EIM). Its notably in emerging markets between period 2013-2014, investment in infrastructure assets branded with combined deals. In 2013, fourteen combined deals included thirty six assets worth a total of USD 10,383 million. The predominant asset deals were occurred in the Saudi Arabian transport sector, with a consortium of global investors and fund managers (from France, the UK, Spain, the Netherlands, and South Korea) invested in the construction of three assets — Riyadh Metro Orange Line, Riyadh Metro Yellow Line, and Riyadh Metro Purple Line — in a combined deal with a total cost of USD 7,820 million.

Similarly, in 2014, thirteen significant combined deals totalled thirty-three assets costing a total of USD 1,122 million, seven of which secured debt financing from fund managers and multilateral development banks (MDBs) (i.e. the Brazilian Development Bank (BNDES), the European Bank for Reconstruction and Development (EBRD)) in Indonesia, Poland, Colombia, Brazil, China, and Turkey. Five build, operate, and transfer (BOT) combined deals were completed in India, China, South Africa, and Brazil. Finally, a combined deal was carried out for stakes acquisition of two greenfield wind powers assets in Poland.

As mentioned previously, significant deal-level investment was made in 2015, with total EIM deals valuing USD 110,580.2 million and numbering 362 (circa 17.49% of the total number of deals) over the examined period. It is notable that in 2015, a significant amount of asset deals focused on special purpose vehicles (SPVs) promoted by Indian investors, and form of deals splits between BOT and DBFOT concession contracts.

Overall, the second half of the examined period experienced a drop in infrastructure investment rate, particularly in the final three years (i.e. 2016, 2017, and 2018). In 2016, a considerable drop in investment level in EIM in terms of number of deals (205) and their value (USD 73, 848.48 million) accounted for 11,68% of the total deal size in the questioned period. Furthermore, the lowest rate of investment occurred in 2016, in which the most significant asset deals was one of the Manila Light Rail Transit System Line 6 projects (across the Philippines), which was executed in one combined deal by a local corporate investor (Ayala Corporation). The projects comprised of: (1) the Governor's Drive Station Light Rail Line 6 Railway Project; (2) Daang Hari Station Light Rail Line 6 Railway Project; (3) Tirona Station Light Rail Line 6 Railway Project; (4) Congressional Avenue Station Light Rail Line 6 Railway Project; (5) Niog Station Light Rail Line 6 Railway Project; (6) Imus Station Light Rail Line 6 Railway Project; and (7) Salitran Station Light Rail Line 6 Railway Project. The overall project cost USD 1,287.07 million jointly between the brownfield and greenfield stages.

Mean infrastructure investment rates continuously declined in Emerging Infrastructure Markets in 2017 to USD 56,673.14 million for 196 deals (representing 8.9% of the total deal size in EIM). Thus, 2017 was characterized by the investment approaches of stake and project acquisition and secured debt for development projects rather than awarding concession contracts for infrastructure assets. This is exhibited by the predominance of investment deals focused on project acquisition and grouped assets in an individual deal — with nineteen combined deals for seventy-one assets costing USD 3,837.50 million. Eleven of these combined deals focused on securing debt financing for a project, four focused on project acquisitions, and the remaining five focused on award approval.

Several reasons for the low rate of investment in the period 2016 to 2018 were cited by Preqin: 1) the growth of debt financing accessibility; 2) the needs of infrastructure assets in EIM; 3) increasing numbers of investors and fund managers seeking direct investment, leading to increased competition for investment in infrastructure assets and difficulties identifying attractive investment opportunities (Preqin, 2016A, 2017, 2019). This impacted negatively on asset deals and resulted in the decline in investment rate.

There may have been other reasons for the low rate of investment in infrastructure assets in the years 2017, 2018, and 2019 compared to the previous examined years: firstly, the final three years included secondary stage financial transactions for assets that had been initiated or invested in during the previous years (from 2009 to 2015);[22] secondly, the majority of the actions were characterized as second and third financial transaction phases (i.e. secured debts for project development and the two acquisition types).

Similar to 2016 and 2017, the decline in infrastructure investment rate in emerging markets pursued in 2018 and reach to 164 assets valued USD 50,935.7 MN. However, a number of major financial deals occurred in 2018, led by a greenfield project in Egypt related to the Tahrir Petrochemicals Complex, valued at USD 10,900 million, with total transactional debt of USD 4,650 million (representing 42.6% of the total investment) from five various debt providers: 1) Africa Finance Corporation (an investment bank); 2) the US Export-Import Bank and the Export-Import Bank of Korea; 3) a Korean Insurance Corporation; and 4) the Italian Export Credit Agency, which acted as custodian.

Although the Emerging Infrastructure Markets witnessed a decrease in investment during the second half of the examined timeframe (i.e. from 2016 to 2018), the end of the period saw a moderately quick recovery in terms of value, with 120 assets worth USD 61,299.37 million in 2019 compared to 164 assets worth USD 50,935.7 million in 2018. Moreover, a conflict phenomenon occurred between the number of infrastructure deals and scale of investments in 2019. In other words, the scale of

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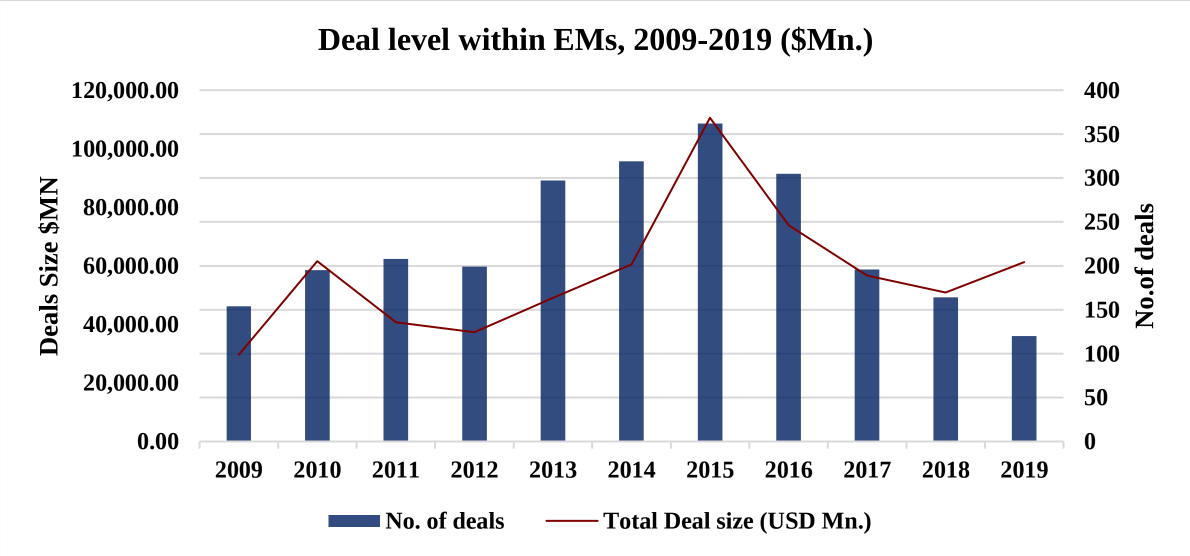
[22] This research is predominantly focused on greenfield and brownfield stage investment; however, in the final three years of the examined period (2017-2019), a significant amount of asset deals were made in Emerging Infrastructure Markets that could be characterized as secondary stage. For instance, in 2019, the Canadian Public Pension (CPP) Investment Board (23.7%) and Ontario Teachers' Pension Plan (16.3%) acquired a 40% stake in (1) the PTAR Atotonilco (invested in 2009); (2)Pacífico Norte Toll Road (invested in 2009); (3)Terminal El Rosario (invested in 2009); (4) Terminal Cuatro Caminos (invested in 2013); (5) Pacifico Sur Toll Road (invested in 2011); (6)Tuxpan-Tampico Highway (invested in 2014); and (7) Mitla-Tehuantepec Toll Road (invested in 2010), through the acquisition of a 40% stake in its holding company Impulsora del Desarrollo y el Empleo en América Latina (IDEAL). The deal was part of a larger transaction concerning a portfolio of 13 toll roads, three logistics terminals, and two wastewater treatment plants in Mexico.). Similarly, in 2019, IndInfravit Trust acquired (1) the Rajsamand - Bhilwara Road (in 2012) from Sadbhav Infrastructure Project. The deal was part of a larger transaction concerning a portfolio of 9 roads in India for a total consideration of INR 66.1 billion. (USD 919.49 Mn.), which are: (2)Shreenathji - Udaipur Tollway (invested in 2012); (3) Bijapur - Hungund Road (acquired a 77% stake and invested in 2010); (4) Hyderabad - Yadgiri Road (acquired a 60% stake and invested in 2010).

investment increased and the amount of asset deals decreased. This indicates that investors and fund managers invested a similar amount in 2019 (USD 61,299.37 million) as in 2010 (USD 61,627 million) for fewer deals (120 in 2019 compared to 195 in 2010). Furthermore, in 2019, infrastructure fund managers encountered difficulties when identifying attractive asset deals in emerging markets due to the high demand for infrastructure assets. Nevertheless, the largest infrastructure deal was the development (i.e. brownfield) of a consortium to construct, maintain, and operate the Thailand High-Speed Rail Linked 3 Airport Project, which closed at USD 7,402.31 million invested by local and Chinse investors.

Figure 5.2-Infrastructure Investment Deals in Emerging Markets



Source: Author’s own analysis (Preqin data)

The results of a further in-depth analysis pertaining to the largest financial investment deals are presented in Table 5.1. The assessment reveals that these infrastructures assets are the largest scale interms of Private Equity Infrastructure Funds Investment (PEIF) Analysis-Deals level (i.e. Section 5.2.1 Vehicle Structures-Deals Level; Section 5.3 Infrastructure Investment Deals by Sector Allocation; Section 5.4 Infrastructure Investment Deals by geographical Allocation; and Section 5.5 Infrastructure Investment Deals by target style, respectively) classifications. Consequently, the interpretations of the aforementioned sections and reference to the largest financial transactions (i.e. pioneering deal values in EIM) will contain some repeated data.

Table 5.1-Largest Financial Deal Values in Emerging Markets

Trans-action year	Asset Country	Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Project Stage	Investors/ Buyers (Firms)	Investor Country	Sections 4.6.1 Vehicle structures - Deals leve	Section 4.6.2 Investment by sector allocation	Section 4.6.3 Investment by geographical allocation	Section 4.6.4 Investment by target sector
2009	Poland	*A1 Stryków I - Pyrzowice Toll Road	Toll Roads	2,005.13	-	Brownfield	Ferrovial SA Cintra Infrastructures SE Budimex Group	Spain Spain Poland	■	■	■	
2009	Saudi Arabia	*Haramain High Speed Rail (Phase 1) PPP	Railroads	1,810.67		Brownfield	Arup Bouygues Group Unidentified Investor/s China Railway Construction Corporation (CRCC) Arup	UK France ? China UK	■		■	
2009	Indonesia	Tanjung Jati B Coal Fired Power Plant Expansion Project	Power Plants	1,800		Brownfield	Sumitomo Corporation	Japan	■	■	■	
2010	India	*Narketapally-Addanki-Medarametla Road Upgradation Project	Roads	24,535.64		Brownfield	N.A.M Expressway Limited	India	■	■	■	■
2010	Turkey	Gebze-Orhangazi-Izmir motorway PPP	Roads	6,500	3,250	Brownfield	Nurol Holding, Astaldi SpA Özaltın Holding Yüksel holding company Makyol Construction Industry Tourism and Trading Co. Inc. Göçay [Gocay Co. Inc.]	Turkey Italy Turkey Turkey Turkey Turkey		■	■	
2010	South Africa	*Medupi Power Plant	Power Plants	3,050	3,050	Greenfield	Eskom Holdings SOC Ltd	South Africa	■	■		

Source: Author's own analysis (Preqin data) (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Continue-Table 5.1-Largest Financial Deal Values in Emerging Markets

Trans-action year	Asset Country	Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Project Stage	Investors/ Buyers (Firms)	Investor Country	Sections 4.6.1 Vehicle structures - Deals leve	Section 4.6.2 Investment by sector allocation	Section 4.6.3 Investment by geographical allocation	Section 4.6.4 Investment by target sector
2010	Saudi Arabia	Riyadh Gas-fired Power Plant	Power Plants	2,100	1,500	Greenfield	Saudi Electricity Company Sojitz Corporation Engie Aljomaih Holding Co	Saudi Arabia Japan France Saudi Arabia		■	■	
2011	Indonesia	Central Java Coal Fired Power Plant	Power Plants	4,000	3,000	Greenfield	J-Power ITOCHU Corporation	Japan Japan		■	■	
2011	Saudi Arabia	*Qurayyah Power Station	Power Plants	2,717		Greenfield	Saudi Electricity Company Samsung C&T Corporation ACWA Power International MENA Infrastructure	Saudi Arabia South Korea Saudi Arabia United Arab Emirates	■		■	
2011	Russia	*Western High Speed Diameter PPP Project	Roads	2,450.71	960	Brownfield	Astaldi SpA IC Holding	Italy Turkey	■	■	■	
2011	Saudi Arabia	*King Abdulaziz International Airport	Airports	2,300	2,300	Brownfield	Saudi Binladin Group Ltd	Saudi Arabia	■	■	■	
2012	Brazil	*Guarulhos International Airport	Airports	3,949.12		Brownfield	PETROS Construtora OAS Ltda FUNCEF	Brazil Brazil Brazil	■	■	■	
2012	Turkey	*Third Bosphorus Bridg	Bridges	2,500		Brownfield	Astaldi SpA IC Holding	Italy Turkey	■	■	■	
2012	India	Bengaluru Metro Phase II	Railroads	1,308.89	1,308.89	Greenfield	Unidentified Investor/s	?		■	■	

Source: Author's own analysis (Preqin data)

Continue-Table 5.1-Largest Financial Deal Values in Emerging Markets

Trans-action year	Asset Country	Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Project Stage	Investors/ Buyers (Firms)	Investor Country	Sections 4.6.1 Vehicle structures - Deals leve	Section 4.6.2 Investment by sector allocation	Section 4.6.3 Investment by geographical allocation	Section 4.6.4 Investment by target sector
2013	Saudi Arabia	*Riyadh Metro Orange Line *Riyadh Metro Yellow Line *Riyadh Metro Purple Line	Railroads Railroads Railroads	7,820		Brownfield	Alstom Transport Samsung C&T Corporation Strukton Groep n.v. FCC Construcción Setec Consultants Freyssinet Ltd. Técnica y Proyectos S.A. (TYPSA)	France South Korea Netherlands Spain France UK Spain	■	■	■	
2013	Brazil	BR-040 Highway PPP	Roads	2,000		Brownfield	Invepar	Brazil	■	■	■	
2013	Brazil	Jirau Hydroelectric Power Plant	Hydro Power	1,822.49	820.12	Greenfield	Engie (Energia Sustentavel do Brasil) ELETROSUL Centrais Elétricas CHESF Camargo Correa Infraestrutura SA	France Brazil Brazil Brazil		■	■	
2013	Chile	Chile Metro - Line 3	Railroads	1,720		Greenfield	Bouygues Group VINCI Concessions SAS	France France		■		
2014	Peru	Lima Metro Line 2	Railroads	6,500	1,155	Greenfield	Salini Impregilo Peruvian construction firm Cosapi FCC Construcción [Fomento de Construcciones y Contratas] Ansaldo Hitachi ACS Group	Italy Peru Spain Japan Spain	■	■	■	

Source: Author’s own analysis (Preqin data)

Continue-Table 5.1-Largest Financial Deal Values in Emerging Markets

Trans-action year	Asset Country	Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Project Stage	Investors/ Buyers (Firms)	Investor Country	Sections 4.6.1 Vehicle structures - Deals leve	Section 4.6.2 Investment by sector allocation	Section 4.6.3 Investment by geographical allocation	Section 4.6.4 Investment by target sector
2014	Malaysia	Project 3B	Power Plants	2,730.83		Greenfield	1Malaysia Development Berhad	Malaysia		■	■	
							Mitsui & Co - Corporate Development Business	Malaysia				
2014	Indonesia	Cirebon Coal-Fired Power Plant 2	Power Plants	2,471	2,471	Brownfield	Indika Energy	Indonesia		■	■	
							Samchully Asset Management	South Korea				
							Korea Electric Power Corporation	South Korea				
							JERA Co., Inc.	Japan				
							Marubeni Corporation	Japan				
2015	India	*Fagne-Maharashtra/Gujarat Border Road Upgradation Package III Project	Roads	26,211.77		Brownfield	IL&FS Investment Managers	India	■	■	■	
2015	India	*Guna-Biaora Road Upgradation Project	Roads	14,114.02		Brownfield	Dilip Buildcon Ltd.	India	■	■	■	
2015	Egypt	Beni Suef Power Plant	Power Plats	8,947.6		Greenfield	Orascom Construction Industries	Egypt	■	■	■	
		New Capital Power Plant	Power Plats				Siemens Financial Services Ltd	Germany	■	■	■	
							Elsewedy Electric	Germany	■	■	■	
2015	Indonesia	Jakarta-Bandung High-Speed Railway	Railroads	5,500	4,125	Greenfield	China Railway International	China	■	■	■	
							PT Jasa Marga	Indonesia				
							PT Wijaya Karya	Indonesia				
							PT Kereta Api	Indonesia				
							PT Perkebunan Nusantara XIII	Indonesia				

Source: Author’s own analysis (Preqin data)

Continue-Table 5.1-Largest Financial Deal Values in Emerging Markets

Trans-action year	Asset Country	Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Project Stage	Investors/ Buyers (Firms)	Investor Country	Sections 4.6.1 Vehicle structures - Deals leve	Section 4.6.2 Investment by sector allocation	Section 4.6.3 Investment by geographical allocation	Section 4.6.4 Investment by target sector
2015	Turkey	Istanbul Grand Airport	Airports	5,045.98		Greenfield	Mapa Insaat Ve Ticaret Anonim Sirketi Limak Holding AS Cengiz Insaat Sanayi ve Ticaret	Turkey Turkey Turkey	■	■	■	
2016	Philippines	Manila Bay International Airport	Airports	10,000		Greenfield	San Miguel Corporation Mettro Pacific Investments Corporation	Philippines Philippines	■	■	■	
2016	China	*Zhejiang High Speed Railway	Railroads	6,592.09		Greenfield	Fosun International	China	■	■	■	
2016	Russia	*Khabarovsk Bypass	Toll Roads	6,293.65		Greenfield	VIS Group	Russia	■	■	■	
2017	China	Hangzhou-Shaoxing-Taizhou Railway	Railroads	6,388.82	3,998.35	Greenfield	Ping An Insurance Group Zhejiang United Mechanical & Electric Wangfeng Auto Holding Group Co Ltd Fosun International Hongrun Construction Group Co. Ltd	China China China China China	■	■	■	
2017	China	Taiwan Strait Wind Assets	Wind Power	5,970		Greenfield	Copenhagen Infrastructure Partners	Denmark		■	■	
2017	India	Solapur-Bijapur Tollway Project	Toll Roads	3,327.67		Greenfield	IJM Group	Malaysia		■	■	

Source: Author's own analysis (Preqin data) (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Continue-Table 5.1- Largest Financial Deal Values in Emerging Markets

Trans-action year	Asset Country	Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Project Stage	Investors/ Buyers (Firms)	Investor Country	Sections 4.6.1 Vehicle structures - Deals leve	Section 4.6.2 Investment by sector allocation	Section 4.6.3 Investment by geographical allocation	Section 4.6.4 Investment by target sector
2017	United Arab Emirates	Al Maktoum International Airport Expansion	Airports	3,000	3,000	Greenfield	Unidentified Investor/s	?		■	■	
2018	Egypt	*Tahrir Petrochemicals Complex	Power Plants	10,900	4,650	Greenfield	Carbon Holdings	Egypt	■	■	■	
2018	Egypt	Red Sea Port of Hamrawein Power Plant	Power Plants	6,190			Mitsubishi Heavy Industries	Japan	■	■	■	
							Toyota Tsusho Corporation	Japan				
							Orascom Construction Industries	Egypt				
							Elsewedy Electric	Egypt				
2018	India	*Sattanathapuram-Nagapattinam Road Project	Roads	2,786.91	1,337.68	Greenfield	Welspun Enterprises Ltd	India		■	■	
2019	Thailand	*Thailand High-Speed Rail Linked 3 Airport Project	Railroads	7,402.31		Brownfield	CH. Karnchang Public Company Limited	Thailand	■	■	■	
							Charoen Pokphand Group Co. Ltd	Thailand				
							Bangkok Expressway and Metro (BEM)	Thailand				
							China Railway Construction Corporation (CRCC)	China				
							Italian-Thai Development	Thailand				
2019	China	*Naqing Expressway Project	Roads	5,060		Greenfield	Naqing Project Company	China	■	■	■	

Source: Author’s own analysis (Preqin data) (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Continue-Table 5.1- Largest Financial Deal Values in Emerging Markets

Trans-action year	Asset Country	Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Project Stage	Investors/ Buyers (Firms)	Investor Country	Sections 4.6.1 Vehicle structures - Deals leve	Section 4.6.2 Investment by sector allocation	Section 4.6.3 Investment by geographical allocation	Section 4.6.4 Investment by target sector
2019	Egypt	*Cairo Monorail Project	Rolling Stock	4,500		Greenfield	Bombardier	Canada	■	■	■	
							Orascom Construction Industries	Egypt				
							The Arab Contractors	Egypt				
2019	China	Liu'an Expressway Project	Roads	3,459.12		Greenfield	Liu'an Project Company	China		■	■	

Source: Author's own analysis (Preqin data) (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

5.3 Infrastructure Investment Deals by Sector Allocation

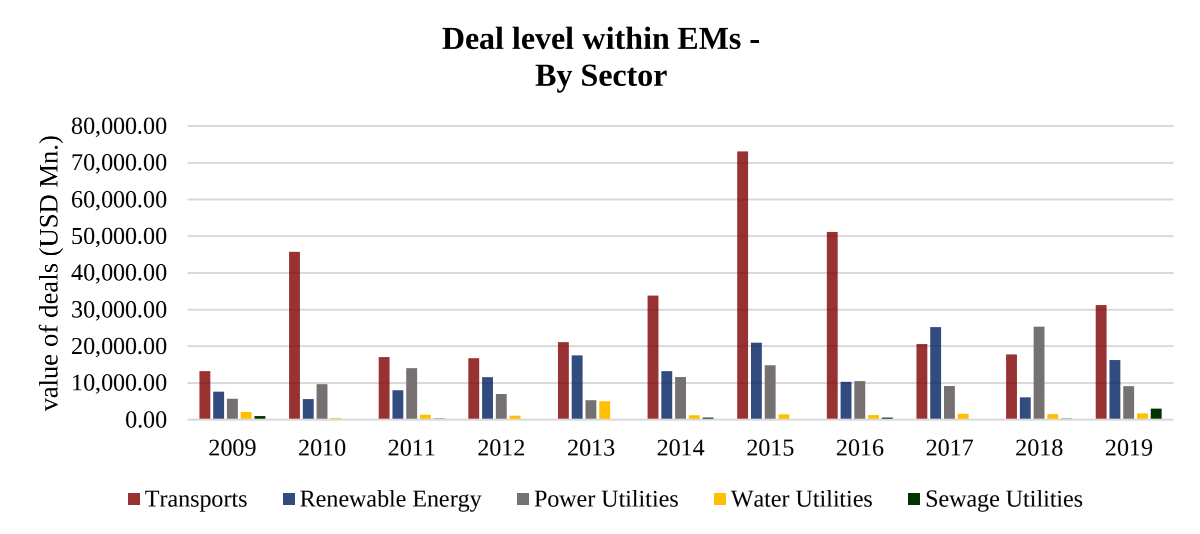
Much of the discussion and assessment of growth in infrastructure to date has focused on the level of infrastructure deals, and direct productivity enhancement (Whittle, 2009). A detailed depiction of the volume of asset deals by industry in emerging markets over the course of the last eleven years, specifically 2009-2019 is provided in Figure 5.3. Over all, there is a huge variance in terms of investment rates and investment industry across the examined period. A total of 2,519 deals differentiated their investment across a range of five critical infrastructure industries. The leading industry was the transport sector, with USD 341,469.11 million of investment for 913 deals (i.e. representing 54% of the total number of deals). Indeed, the transport industry experienced progressive development in the examined period, and it became evident that transport sector is the most vital industry over other economic infrastructure ventures in Emerging Infrastructure Markets.

The second most significant sector in terms of investment was renewable energy industry, with 1,000 deals costing USD 142,358.65 million — representing 22.5% of the total amount of investment in EIM. During the period investigated, Emerging Infrastructure Markets focused their investment in energy industry towards renewable energy assets rather than traditional power energy.

Despite the significant amount of investment in renewable energy assets, investment in conventional power energy in EIM was considerable, with USD 122,213 million invested in 289 deals (approximately 19.5% of the total amount of investment in emerging markets) during the period in question.

Investment in utilities services (i.e. water services and sewage services) achieved the lowest rate across the examined period. The total investment rate was below USD 30 million for a total of 317 deals (i.e. approximately 4% of the total investment deals in EIM). However, at the end of the period (2019), investment in sewage utilities increased significantly and reached USD 3,009.75 million.

Figure 5.3-Infrastructure Investment in Emerging Markets by Sectors



Source: Author calculation (Preqin data)

Before conducting a comprehensive analysis of deal investment level in the context of individual sectors in Emerging Infrastructure Markets, it is critical to provide an overview of a comparison of investment in two major power energy industries — renewable energy and traditional power energy.

5.3.1 Renewable Energy Deals level Vs Conventional Power Energy Deals Level in EIM.

As discussed in the previous section, investment in renewable energy and conventional power energy industries acquired significant weight in EIM over the other infrastructure industries during the investigated period. Figure 5.4 captures the annual differences between investment in these two industries across the identified timeframe. However, further analysis revealed that in the context of scale of deal value, the majority of the investment rate belonged to renewable energy assets (with a total deal value of USD 142,358.65 million, representing 22.5% of the total investment amount) compared to investment into conventional power energy assets (which reached a total of USD 122,213 million for 289 deals, representing 19.5% of the total investment amount). Similarly, the number of renewable energy assets was over three times greater than the number of conventional power energy assets (i.e.

1000 deals for renewable energy compared to 289 deals for conventional power energy) in EIM.

With regard to quantity of deals, at the beginning of the second third of the examined period, both industries experienced development and growth (i.e. Sixteen deals in the conventional power energy industry and forty-three deals in the renewable energy industry in 2009 compared to fifty-two deals in the conventional power energy sector and 124 deals in the renewable energy sector in 2014).

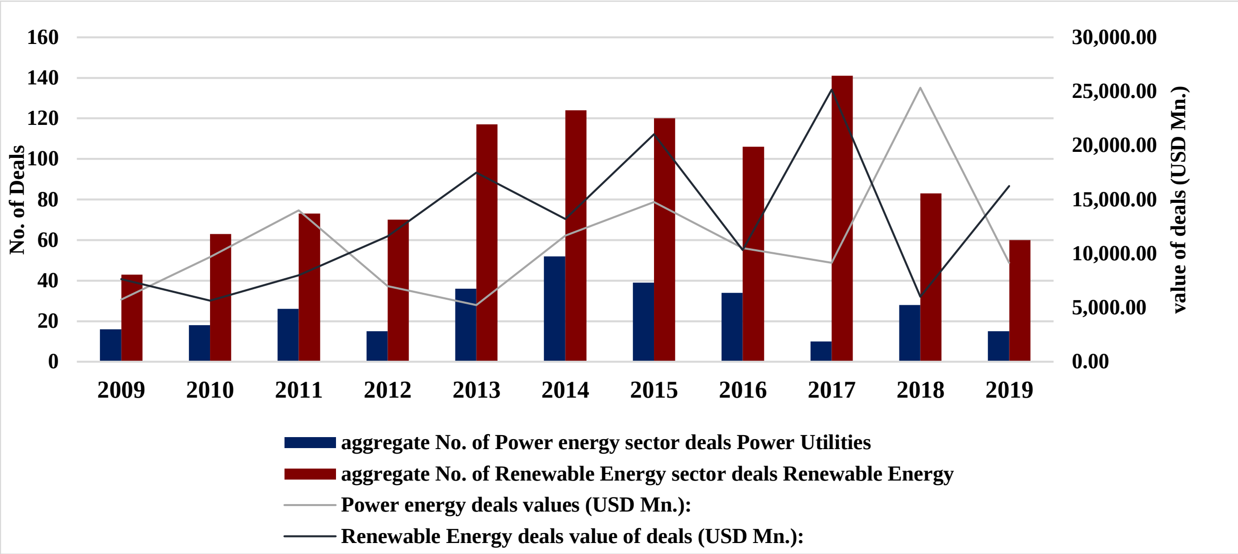
However, in the context of deals size, a fluctuation pattern was observed between these two industries in Emerging Infrastructure Markets. When the number of conventional power energy deals increased, renewable energy deals decreased in the same period and vice versa. For instance, the amount of renewable energy investment continuously increased for the first four years of the timeframe (from USD 7,639.8 million in 2009 to 17,482 million in 2013), whereas traditional power energy costs fluctuated negatively and the size of deals remained below USD 6,000 million between 2009 and 2013.

In the middle of the investigated period, renewable energy and conventional power energy jointly demonstrated a unified pattern in terms of investment scale. In particular, the two forms of energy increased and decreased annually at the same time for years 2014, 2015, and 2016 (i.e. the total value of renewable energy deals was USD 13,208.74 million, 21,029.55 million, and USD 10,325.25 million, respectively, and the total value of conventional power energy deals was USD 11,661 million, USD 14, 772 million, and 10, 515.79 million, respectively).

However, in 2017 and 2018, the opposite occurred. Renewable energy investment boomed and peaked at a total of USD 25,157.28 million for a total of eighty-three deals in 2017, whereas conventional power energy deal size dropped sharply to the lowest rate over the investigated period and reached USD 9,161.79 million for just ten conventional power energy deals. In 2018, there was a quick and significant recovery for conventional power energy deals occurred, which peaked at a total of USD 25,334.34 million, whereas renewable energy deals collapsed reached to USD 6,024.39 million.

In 2019, investors and fund managers funded much larger renewable energy asset deals in Emerging Infrastructure Markets than in 2010 (USD 16,251.84 million compared to USD 5,648 million), whereas the amount of deals remained similar (sixty deals in 2019 compared to sixty-three deals in 2010).

Figure 5.4-Comparison between Renewable Energy Investment and Traditional Power Energy Investment Sectors



Source: Author calculation (Preqin data)

5.3.2 Transport Sector Deals Level in EIM.

As demonstrated in Section 5.3 Infrastructure Investment Deals by Sector Allocation, the leading industry investment in EIM over the time period investigated was the transport sector. A further, in-depth assessment of transport sectors is presented in Figure 5.5, which shows the size of the deals in the transport sectors made in emerging markets over the period 2009-2019. The transport sector experienced substantial fluctuations throughout the entire period, with deals worth USD 341,469.11 million. It had the greatest performing assets relative to the other sectors, reflecting the preferences of a number of global institutional investors and fund managers who favoured investment in transport projects. At the same time, it mirrored the significant demand for transport assets in emerging markets.

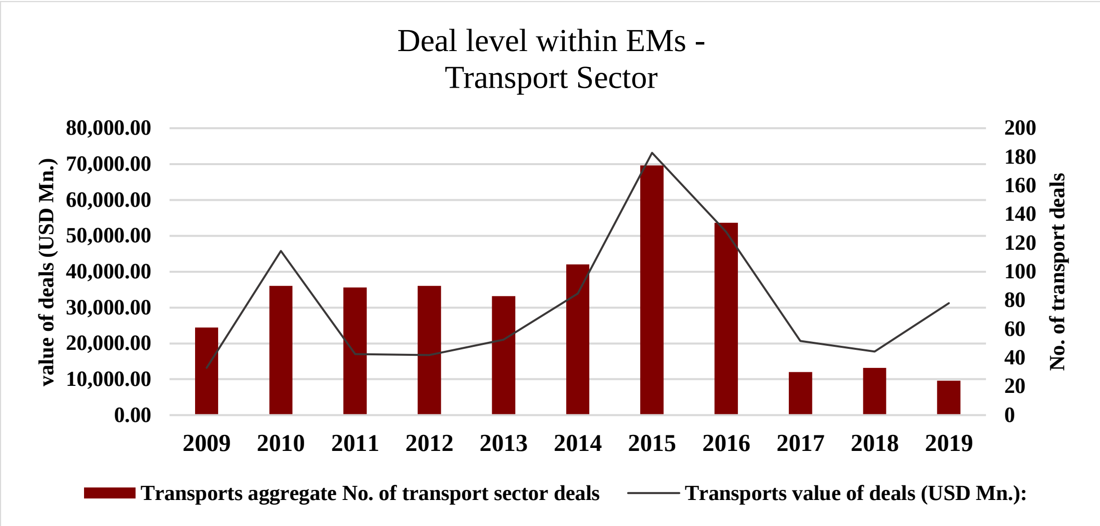
Despite the GFC impact that occurred in 2009, 2010 experienced significant recovery and triple the amount of transport investment deals (from USD 13,183.89 million to USD 45,797 million), demonstrated by the pioneering 2010 deal discussed in Section, 5.2.1 Vehicle Structures-Deals Level (the Narketapally-Addanki-Medarametla Road Upgradation Project in India). The second largest deal in 2010 was the consortium-awarded concession contract to develop (i.e. brownfield) Gebze-Orhangazi-Izmir motorway PPP roads in Turkey, with a total deal value of USD 6,500 million, which was financed through 50% equity and 50% debt (i.e. USD 3,250 million was funded through equity and the remaining USD 3,250 million was secured through debt finance).

Despite the moderate increase in the number of investments in the transport sector for the period 2011–2013 (from eighty-three to ninety), there was a sharp drop in the value of investment deals to USD 17, 026.12 million in 2011, which continued at a similar level in 2013 (i.e. USD 21,054.31 million).

However, the amount of investment in transport assets rose significantly in 2014 (USD 33,858 million for 105 deals) and peaked in 2015 at USD 73,142.96 million for 174 deals. The leading deal in 2014 was the railroad project for Lima Metro Line 2 in Peru, which had a value of USD 6,500 million, with USD 1,155 million of secured debt obtained from multinational investments and local banks and investment from five investors from Japan, Spain, Italy, and Peru. The leading deals within the transport sector in 2015 were the USD 26,211 million Fagne-Maharashtra/Gujarat Border Road Upgrade Package III Project in India (as stated in the previous section, 5.2.1 Vehicle Structures-Deals Level).

Generally, 2015 and 2016 were characterized by mid-size deals that focused on road sub-sectors with major BOT and DBFOT concession contracts. In addition, a significant amount of asset deals concentrated on special purpose vehicles promoted (SPV) by local investors. Furthermore, transport assets were awarded concession contracts to develop and upgrade infrastructure assets (i.e. brownfield assets), such as Grupo Sanjose (an Indian Construction engineering company) and MEP Infrastructure Developers Ltd. (a Spanish infrastructure firm), However, these rates fell sharply to USD 20, 630.9 million for thirty deals in 2017, and then dropped again in 2018 to 17,720.02 million for thirty-three deals. Of the low number of deals in 2017, the largest was for the Hangzhou-Shaoxing-Taizhou Railway in China, with a total cost USD 6,388.82 million, for which the Chinese investors secured financial debt of USD 3,998.35 million from the China Construction Bank and other unidentified debt provider/s. However, a moderate recovery in deal flows occurred in 2019, reaching 31,194.81 million for a total of twenty-four transport deals.

Figure 5.5-Infrastructure Investment in EIM-Transport Sector Deals Level



Source: Author calculation (Preqin data)

5.3.3 Renewable Energy Sector Deals Level in EIM.

The assessment of deal sectors conducted for this research emphasized the wider infrastructure investment trends in emerging markets, particularly the increased level of investment in renewable energy deals in Emerging Infrastructure Markets. The in-depth analysis demonstrated the pronounced development and growth in renewable energy deals from USD 7,639.8 million in 2009 to 16,251.84 million in 2019. Figure 5.6 illustrates the pattern of renewable energy investment deals in emerging markets within the timeframe of 2009-2019.

Despite the increase in the number of renewable energy deals in EIM. (from forty-three in 2009 to sixty in 2010), the size of deals decreased. In 2010, the investment dropped sharply to USD 5648 million — the lowest rate across the examined period. Among the lowest sized deals in 2010, the largest renewable energy deal was the Rayalaseema Thermal Power Stage IV Project in India, in which a local infrastructure developer company invested a total of USD 418.68 million.

Overall, 2011 and 2012 were characterized by low numbers of infrastructure investment deals (seventy-three in 2011 compared to seventy in 2012). However, investment value demonstrated a different trend. In 2011, there was a slow increase in deal values (reaching USD 11,588.8 million in 2012 compared to USD 8,003 million in 2011). Although the low rate of investment remained, there was a significant in the hydro power sub-sector in the Latin America and Caribbean region. In 2012 a significant number of deals focused on funding a number of sustainable energy assets, particularly solar and wind farms. For instance, in South Africa, a solar power asset contract for Witkop Solar Park, for a total cost of USD 153 million, with USD 32 million equity and debt financing of USD 84.6 million.

Conversely, the quantity of renewable energy deals rose significantly in 2013 (to 117 deals) and forecast the growth pattern for the following years (124 deals in 2014 and 120 deals in 2015). However, for the same period (from 2013 to 2015), the size of renewable energy deals fluctuated. Whereas total renewable energy deal value decreased in 2014 (from USD 17,482 million in 2013 to USD 13,208.74 million), it increased significantly in 2015 to USD 21,029.55 million. The largest deal in 2013 was for the development of Jirau Hydroelectric Power Plant in Brazil for total cost of USD 1,822.49 million, in which of four investors and electric power generation company-Renewable secured a total of USD 820.12 million debt to finance the project from the Brazilian Development Bank (BNDES) and other unidentified debt provider/s.

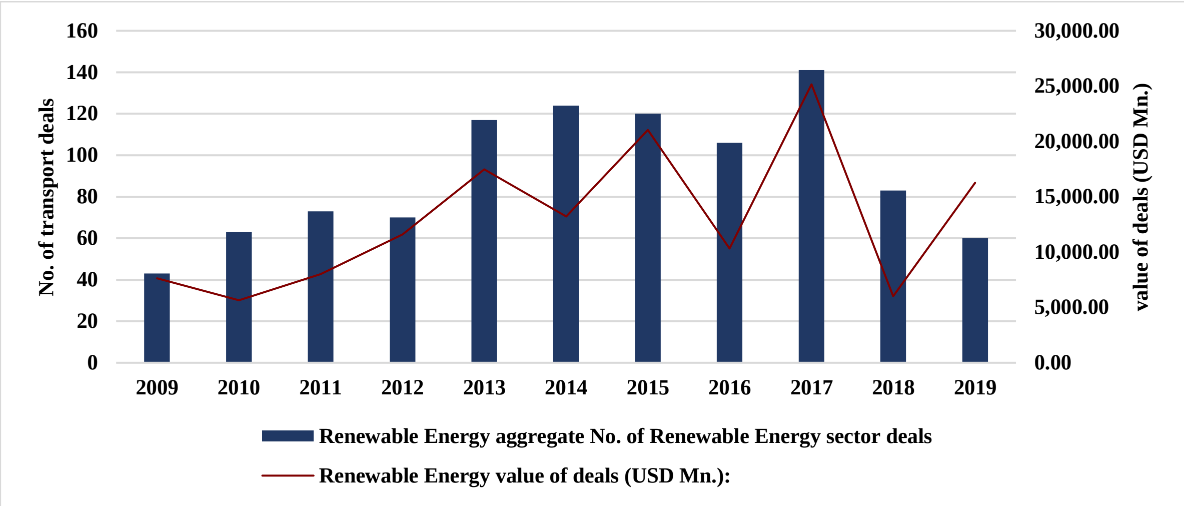
Similar to other infrastructure industries in the examined period, a sharp decreased occurred in renewable energy deals in 2016 and reached USD 10,325.25 million for 106 deals. However, investment in renewable assets was characterized by a focus on the creation of larger transactions concerning a portfolio of solar plants and/or wind farms by investors, fund managers, and renewable energy companies. For instance, Villanueva I Solar Farm, Don José Solar Farm, and Villanueva III Solar Farm executed a large deal concerning a portfolio of 1.8GW renewable energy assets in Mexico. The portfolio was acquired for a total of USD 1,400 million, including USD 200 million for the majority interest and USD 1,200 million for related-party loans granted to the eight special purpose vehicles (SPVs) that held the assets in the portfolio (Preqin, n.d.).

Over the period 2009-2019, renewable energy investment boomed and peaked at a total of USD 25,157.28 million for 141 deals in 2017. Furthermore, as highlighted in Section 5.2.1, markets in 2017 concentrated on the acquisition of a number of assets in a single deal. Its notable that a large amount of combined deals related to the renewable energy sector. For instance, Eragro Enerji Tarim and Girayhan Tarim Enerji, a mid-size Turkish investor, secured debt financing from the European Bank for Reconstruction and Development (EBRD), as part of a portfolio project for eight solar PV plants in Turkey: (1) Girayhan 1 Solar PV Plant; (2) Girayhan 2 Solar PV Plant; (3) Eragro 5 Solar PV Plant; (4) Eragro 6 Solar PV Plant; (5) Eragro 7 Solar PV Plant; (6) Girayhan 3 Solar PV Plant; (7) Eragro 8 Solar PV Plant; and (8) Eragro 9 Solar PV Plant. The total project cost for the 8 SPV portfolio amounted to USD 15.75 million, of which USD 6.5 million and USD 9.25 million were allocated to equity and debt, respectively.

Generally, the predominance of investment in renewable energy assets in 2017 concentrated on combined assets in an individual deal, accounting 15 grouped deals for total 66 deals for total cost of USD 3,830.51 million. This was demonstrated by Turkish investors (see previous examples), who acquired the greatest number of renewable assets in combined deals and achieved the highest rate of investment in renewable assets across the examined period.

Renewable energy deal size then dropped sharply to the lowest rate and reached USD 6,024.39 million for eighty-three deals in 2018. The most significant deal in 2018 was the USD 1321.55 million acquisition of six wind power assets: 1) Nxuba Wind Power Project; 2) Oyster Bay Wind Power Project; 3) Garob Wind Power Project; 4) Karusa Wind Power Project; and 5) Soetwater Wind Power Project. The renewable energy investor (Enel Group) contributed approximately USD 253.29 in equity. The total financing secured was 1,046.14 million, representing 80% of the total project cost. In 2019, quick significant recovery for renewable energy deals occurred and total deal value peaked at USD 16, 251.84 million. In contrast, the total amount of renewable deals collapsed to sixty.

Figure 5.6-Infrastructure Investment in EIM-Renewable Energy Sector Deals Level



Source: Author calculation (Preqin data)

5.3.4 Conventional Power Energy Sector Deals Level in EIM.

The assessment of unlisted infrastructure investment industries helped to highlight the increasing critical need for infrastructure projects and the notable role of private investors and fund managers within emerging markets. Further analysis of the fossil energy industry highlighted the prominent magnitude of investment value in EIM as demonstrated in Figure 5.7. Indeed, the conventional power energy industry was the prominent sector in terms of total invested in emerging markets and attracted a total of 289 deals with a total investment value of USD122,214 million over the period in question. Meanwhile, despite the size of the energy infrastructure project deals, the utilities sub-sector of traditional energy — namely power plants — accounted for a considerable amount of infrastructure investment, with 158 projects divided between power plants and across distributed deals flows.

Despite the negative GFC influence observed in 2009, investment in the sector increased from USD 5,732.56 million for sixteen deals to USD 9,668.11 million for eighteen deals in 2010. The largest deal executed in 2010 was the new building of the

Medupi Power Plant in South Africa for a total investment value of USD 3,050 million (as explained in in the previous section, 5.2.1). A local electric utility company (Eskom Holdings SOC Ltd.) secured debt financing for 100% of the total investment amount from the International Bank for Reconstruction and Development (IBRD) — IBRD Retirement Plans.

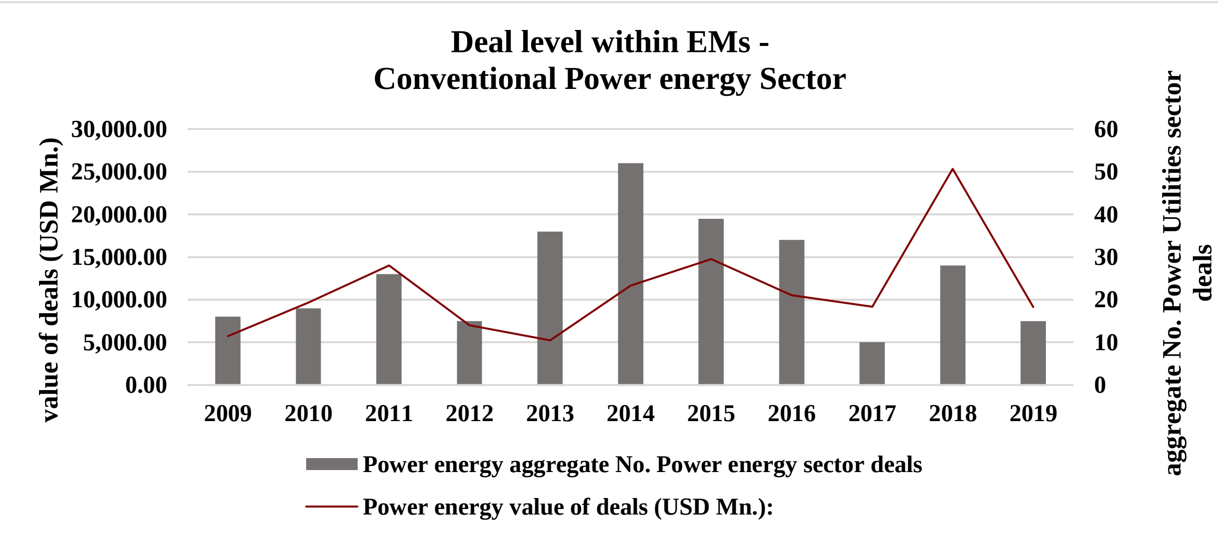
The growth and development in conventional power energy industry in terms of deal numbers and value persistently increased in 2011, and the total deal value reached USD 14, 005 million for twenty-six fossil energy deals. However, 2012 witnessed a sharp drop in the value of investment deals to USD 6,992.22 million, which remained at a similar value level in 2013 (i.e. USD 5,236.76 million). The most significant level of investment in 2012 targeted the new development of power plants in Malaysia, such as the Tanjung Bin Power Plant for a total cost of USD 2,140 million. The Malaysian conventional power energy company secured 100% debt financing for the project from various international banks (e.g. Sumitomo Mitsui Banking Corporation, HSBC Bank, and the Bank of Tokyo-Mitsubishi UFJ). Furthermore, demonstrating the decreased rate in 2013, the largest invested value was the project acquisition of Kineta Power Plant in India for USD 1,407.1 million, compared to the largest investment value deal in 2012, which was USD 2,140 million.

Conversely, the quantity and size of conventional power energy deals rose significantly in 2014 (to fifty-two deals worth USD 11,661 million). Total deal value increased again in 2015 to USD 14,772 million, but the quantity of deals remained the same, with fifty-two power plant and power distributions deals. The investment pattern rate in 2014 and 2015 was mirrored in the highest value traditional power energy deals. In 2015, the highest value deal was a USD 8,947.6 million deal executed in Egypt for two power plant projects (Beni Suef Power Plant and New Capital Power Plant) by joint venture corporate investor and engineering services companies from Germany (Siemens Financial Services Ltd. and Elsewedy Electric) and Orascom Construction Industries from Egypt.

Both 2016 and 2017 followed the decreasing pattern for total deal value (i.e. USD 10,515.79 million in compared to USD 9,161.79 million in 2017). This rate of decrease was also reflected in the highest value deals in 2016 and 2017. However, with regard to deal quantity in 2016 and 2017, a sizeable drop occurred and reached the lowest rate over the examined period of ten conventional power energy deals in 2017 compared to thirty-four deals in 2016.

Despite this period of reduced deal flow (i.e. from 2015 to 2017), the rate of traditional power energy investment deals experienced significant recovery in 2018, and reached the highest volume of the entire investigated period by more than 150% (i.e. USD 25,334.34 million for twenty-eight conventional power energy deals). In contrast to other industries (i.e. transport and renewable energy sectors), the fossil energy investment sector experienced a significant collapse in deal values and numbers in 2019, with just USD 9,134 million invested in fifteen deals. Furthermore, the highest deal value achieved was in the United Arab Emirates — a USD 1,684 million joint venture (JV) between GE Energy Financial Services (EFS) (a corporate investor from the USA), Sumitomo Corporation (a corporate investor from Japan), Shikoku Electric Power Company (from Japan), and Sharjah Asset Management (from the United Arab Emirates) which obtained a concession contract to build, own, and operate (BOO) Hamriyah Power Plant. In addition, the JV secured debt financing of USD 1,684 million from seven Asian investment banks (e.g. the Japan Bank for International Cooperation (JBIC), Sumitomo Mitsui Banking Corporation, and KfW IPEX-Bank).

Figure 5.7-Infrastructure Investment in EIM-Conventional Power Energy Sector Deals Level



Source: Author’s calculations (Preqin data)

5.3.5 Water and Sewage Utilities Services Sector Deals Level in EIM.

The final in-depth analysis of the infrastructure industry relates to investment in water and sewage utilities facilities in emerging markets (Figure 5.8). The investment in Sewage and water utilities was the lowest over the examined period (i.e. 2009-2019); as the aggregate of investment accounted USD 25,164.12 Mn. represented by 3% for Water utilities and lower than 1% for sewage utilities, encompassing 317 deals (246 deals for water utilities and 71 deals for sewage utilities). Meanwhile, despite the magnitude of the water project deals, the sub-sector of the traditional water sector, namely water treatment, constituted a considerable volume of infrastructure investment, at approximately 70% of the aggregate utilities sector, over 174 projects (of total 246 deals).

Overall, the number of deals decreased in the years 2009, 2010, and 2011 for both utilities services (i.e. from twenty-seven deals in 2009 to nineteen in 2011 for water services and from seven deals in 2009 to zero in 2011 for sewage services). However, for the same period, a significant fluctuation pattern was observed for deal size in these two sectors in Emerging Infrastructure Markets. Whereas utilities services investment deals sharply decreased in 2010 (USD 481.41 million in water services deals and USD 32.88 million in sewage services deals), the investment rate significantly increased in the following year (USD 1,373.99 million in water services deals and USD 334.19 million in sewage services deals). This pattern was echoed by the deal values.

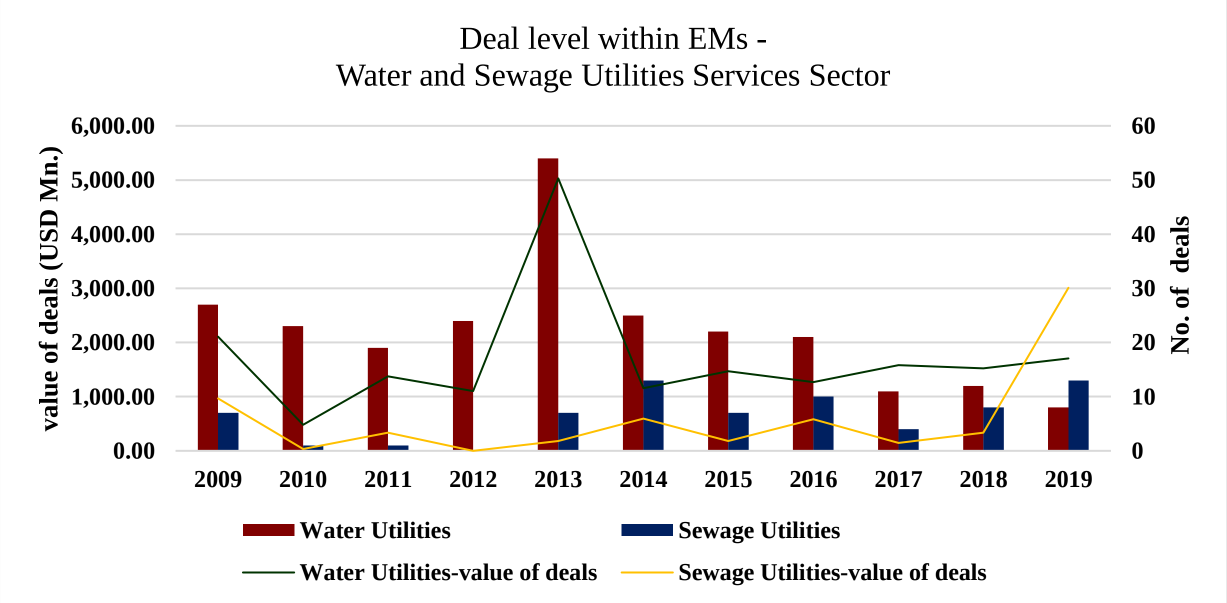
In 2013, the water utilities constituted a massive amount in the Emerging Infrastructure Markets investment deals (USD 5,029 MN.). The largest single deal was the São Lourenço Water PPP in Brazil, worth USD 1,470 MN. at the close of 2013. Two local infrastructure firms invested in the deal.

In the following three years (2014, 2015 and 2016), the value of water investment deals decreased significantly compared to 2013 (from USD 5,029 million in 2013 to USD 1,271.26 million 2016). Furthermore, the value of investment deals in the water services sector remained on the same level with rates between USD 1,271.26 million in 2016 and USD 1,521.12 million in 2018. During these years, the largest deal was a

USD 700.05 million deal for a water treatment project in Saudi Arabia in 2018. Two local firms (ACWA Power International (70% stake) and Saudi Brothers Commercial Company (SBCC) (30% stake)) were awarded a contract to design, build, operate, and maintain the Rabigh 3 Independent Water Plant. The companies secured senior debt financing of USD 700.05 million for the development of the Rabigh 3 Independent Water Plant from Natixis, SAMBA, MUFG, and Riyad Bank.

Generally in the period investigated, investment in sewage services utilities remained low compared to investment in water services. However, a considerable increase in the values and quantity of deals was observed in the second half of the time period. A total of forty-two projects worth USD 1,834.77 million reached financial closure in the period from 2014 to 2018. However, in 2019, rates of investment in sewage utilities services rose significantly and reached USD 3,009.75 million for a total of thirteen deals.

Figure 5.8-Infrastructure Investment in EIM-Water and Sewage Utilities Services Sector Deal Levels



Source: Author calculation (Preqin data)

Table 5.2-Sectoral Deal Levels Breakdown within Emerging Infrastructure Markets

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
aggregate No. of transport sector deals	**Transports**	61	90	89	90	83	105	174	134	30	33	24	**913 deals**
value of deals (USD Mn.):		13,183.89	45,797	17,026.12	16,706.26	21,054.31	33,858	73,142.96	51,154.84	20,630.9	17,720.02	31,194.81	**341,469.11**
aggregate No. of **Renewable Energy** sector deals	**Renewable Energy**	43	63	73	70	117	124	120	106	141	83	60	**1000 deals**
value of deals (USD Mn.):		7,639.80	5,648	8,003	11,588.8	17,482	13,208.74	21,029.55	10,325.25	25,157.28	6,024.39	16,251.84	**142,358.65**
aggregate No. of **Power** sector deals	**Conventional Power Energy**	16	18	26	15	36	52	39	34	10	28	15	**289 deals**
value of deals (USD Mn.):		5,732.56	9,668.11	14,005	6,992.22	5,236.76	11,661	14,772	10,515.79	9,161.79	25,334.34	9,134	**115,245.35**
aggregate No. of **Water** sector deals	**Water Utilities**	27	23	19	24	54	25	22	21	11	12	8	**240 deals**
value of deals (USD Mn.):		2,108.21	481.41	1,373.99	1,106.25	5,029.12	1,156.08	1,471.12	1,271.26	1,579.61	1,521.12	1,708.51	**18,806.68**
aggregate No. of **Sewage** sector deals	**Sewage Utilities**	7	1	1	0	7	13	7	10	4	8	13	**71 deals**
value of deals (USD Mn.):		965.87	32.88	334.19	0	179.98	594.22	180.02	581.14	143.56	335.832	3,009.75	**6,357.44**

Source: Author calculation (Preqin data) (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

5.4 Infrastructure Investment Deals by Geographical Allocation

Global institutional investors are currently under considerable pressure to execute infrastructure investment deals. There are a number of drivers behind the increase in the lag of infrastructure investment deals, such as severe competition and increasing asset prices, and the reduction in the aggregate of infrastructure deals on a global level (MacArthur, 2019). Similarly, Emerging Infrastructure Markets encounter obstacles and constraints as they are expected to reduce the rate of demand for infrastructure assets such as political and economic instability, financial difficulties and weak regulation framework. Indeed, the overall economic infrastructure deals in the questioned period, exhibited a steady progressive investment in the market, as depicted in Figure 5.9. The current section presents an in-depth assessment of the investment actions and geographical focus of various investors and fund managers in EIM (i.e. regional analysis).

Overall, despite moderate investment scales at the outset of the examined period, the magnitude of infrastructure deals in the Asia and Latin America and Caribbean regions over the period examined were outperformed by the aggregate scale of infrastructure deals, as shown in Table 5.3. The growth rate increased substantially by approximately three-fold compared with the infrastructure deals in the other regions, with USD 21,482.39 million values of deals in Asia and Latin America regions and USD 8,140.66 million of deals for Europe, Middle East and Africa in 2009, compared with deals values quantifying USD 52,070.27 million for Asia and Latin America regions and USD 9,229.19 million for Europe, Middle East and Africa in 2019. However, the trend reflects aggressive competition between these two regions at the midpoint of the timeframe concerned, with an average of aggregate shares accounting for 3/4 of the EIM. infrastructure in transactions and deals.

For a comprehensive overview of Emerging Infrastructure Markets unlisted infrastructure investment deals across the examined period, a further in-depth evaluation broken into regions is delivered in the following subsections.

5.4.1 Infrastructure Investment Deals in Asia Region

As highlighted previously, the Asia region acquired significant weight over the other regions in terms of investment into emerging markets. A further in-depth assessment of deal levels in regions is presented in Figure 5.10 and Figure 5.11. The in-depth analysis illustrates the pronounced development and growth in the Asia region with a total deal value of USD 327,615.79 million for 1688 deals over the examined period.

Generally, despite the negative impact of GFC at the beginning of the period, in 2010 Asia recorded a substantial investment rate of USD 45,271.02 million for 153 deals compared to USD 14,123.10 million for 109 deals in 2009. As well as the largest deal in India (the USD 24,535.64 million Narketapally-Addanki-Medarametla Road upgradation project), the Navabharat Power Plant project in India was the second largest deal achieved between 2009 and 2010, in which the Essar group (corporate investors from India) and others were invested 100% of the project value (USD 2,000 million).

Furthermore, the development and growth rate in the Asia region persistently increased for the following years and significantly peaked in 2015 at USD 70, 592.95 million for 286 completed deals. India acquired the largest financial deal for the Fagne-Maharashtra/Gujarat Border Road Upgradation Package III Project for USD 26,211.77 million.

However, these rates fell sharply to USD 46,396.13 million for 238 deals in 2016, and then dropped persistently in 2017 and in 2018 to reach a low of USD 24,813.28 million for sixty-six deals in 2017 and USD 20,414.96 million for sixty-one deals in 2018. Of this low number, the largest infrastructure deal in the Asia region in 2017 was executed China for asset in the transport sector and renewable energy sector; the Hangzhou-Shaoxing-Taizhou Railway, Railroads project costing USD 6,388.82 million.

This indicates that the development and growth in the Asia region was led by India and China. Due to their acquisitions of highest value and greatest number of deals in the examined period, a brief examination of these countries is provided later in this Chapter to deliver a general overview of the context of investment deal levels.

A similar pattern was observed between Indonesia and the Philippines. These two countries highlighted the prominent investment deal values and numbers, as demonstrated in Table 5.3 and Table 5.4. Meanwhile Indonesia increased their investment deals values and numbers from USD 2,700 MN. in 2009 to USD 4,112 MN. in 2011. The Philippines decreased investment from 109.35 million 2009 to USD 64.72 million 2011, with the highest value deal belonging to Indonesia with a USD 4,000 million deal for the Central Java Coal Fired Power Plant (as described in Section 5.3.4).

Furthermore, both countries increased their investment in the following years (from 2013 to 2015). Specifically, the Philippines increased the total investment value from USD 1,358.84 million for ten deals in 2013 to USD 4,075.5 million for seventeen deals in 2015, and Indonesia increased investment from USD 1,170 million for one deal in 2013 to USD 6,084 million for three deals in 2015. The largest investment deal made in this period (i.e. in 2017) was for the Atimonan Coal Fired Power Plant in Philippines, with a total investment value of USD 1,907.6 million. Manila Electric Co. secured 100% debt financing for the project from local investment banks (the Bank of the Philippine Islands (BPI) and the Philippine National Bank (PNB)) and from five other lenders.

However, investment by both countries fell sharply in 2019 compared to 2017 and reached to lowest rate in 2019 (MN. 3,557.9 million in 2017 falling to USD 309.84 million in 2019 for Indonesia, and USD 2,007.37 million in 2017 falling to USD 299.55 million in 2019 for the Philippines).

In the region of Asia, Thailand, Malaysia, and South Korea possessed very low rates of investment deals, in terms of their value and number, across the timeframe addressed by this study. There were number of causes for this low rate, the most notable being the low level of investment market transparency in these countries, which caused a lack of disclosure of infrastructure deals invested in by global institutional investors.

India:

The most notable infrastructure deal rate was in India, investments there numbered 1,265 deals (USD 177,377.65 MN.). The analysis revealed that the involvement of the private sector in infrastructure investment was targeted by local investors and infrastructure developing firms. Overall, India's infrastructure investment rate was significantly high (for both deal values and numbers) across the timeframe. However, the investment level increased significantly in 2012, 2013 and 2014 (with a total size of USD 24,360.99 million for 451 deals) and peaked in 2015 with a total investment value of USD 55,178.25 million for 234 completed infrastructure deals. In 2013, the majority of assets contracts frameworks structured as concession contracts in utilities services and conventional power energy sectors, particularly in the power plants and power distribution sub-sectors. 2014 was characterized by a considerable amount of assets, particularly special purpose vehicles (SPV) promoted by Indian investors (i.e. ten assets were invested in by SPVs in that year).

The analysis revealed several reasons for the high investment rates in India, but notably the most critical driver was the Indian strategy that awarded concession contracts associated with the participation of different level private investors (i.e. large, mid, small size investors) and the absence of secured debt financing from local banks or investment companies. Furthermore, a significant account of deals In India related to BOT and DBFOT concession contracts, either for new projects (i.e. greenfield stage) or the development of existing assets (i.e. brownfield stage), in the transport and power sectors, particularly in the roads conventional power energy supply sub-sectors. The driver behind this strategy is to involve maximum amount of local and global foreign investors to accelerate the infrastructure investment rate.

However, rates fell sharply in the context of deals numbers for 23 deals in 2017 and then dropped persistently in 2019, to reach the lowest quantity over the addressed period for 9 deals, although deal values remained at a similar level (i.e. USD 5,038.6 million in 2017 and USD 5,815.25 million in 2019). Indeed, Solapur-Bijapur Tollway Project in India executed one of the most significant deals of 2017. A Malaysian construction company (i.e. IJM Group) was awarded a concession contract to design, build, finance, operate, and transfer the project for 100% investment of the USD 3,327.67 million project cost.

China:

While India experienced the majority of the infrastructure deals completed during the years studied, the second most significant infrastructure investments deals occurred in China, with 229 deals executed at a total of USD 58,298.19 million. Overall, China witnessed a moderate increase in investment deals vales in the first three years of the examined timeline (USD 790.25 million in 2009, USD 907.2 million in 2010, and USD 776.32 million in 2011). Within this period, the highest value deal was a greenfield renewable energy project conducted by a local electricity generation company (China Huaneng Group Co Ltd.), which invested USD 300.86 million to build Huaneng Biedieli Hydro Station in 2009.

Investment value level increased significantly by approximately four times (from USD 776.32 million in 2012 to USD 3,630.73 million in 2013), and then increased persistently (USD 4,000.2 million in 2015) to reach the significant rate in 2016 (USD13,627.37 million). The value of investment in China rose strongly and peaked at the end of the questioned period (USD 16,430.98 million for twenty-four deals). The most significant deal completed in 2019 was in the wind power sector. A Japanese consortium comprised of Sojitz Corporation, Chugoku Electric Power, Chudenko Corporation, Shikoku Electric Power, and JXTG Nippon Oil & Energy Corporation acquired a 27% stake in Yunlin Wind Project from WPD (a renewable energy company from Taiwan, China) for USD 3,129.68 million. In addition, the consortium secured debt financing (USD 284.67 million — approximately 9% of the total investment) from nineteen regional investment banks and corporate investors (e.g. OCBC Bank, Sumitomo Mitsui Banking Corporation, and Société Générale Corporate & Investment Banking) for the development of the project.

5.4.2 Infrastructure Investment Deals in Latin America and Caribbean Region.

Despite the huge variance in investment rates (for both deal values and numbers) between the Asia region and the Latin America and Caribbean region, the Latin America and Caribbean region ranked the second most significant region across the five EIM regions, with 441 deals completed at a total value of USD 150,699.79 million, as illustrated in Figure 5.10 and Figure 5.11.

Meanwhile, growth in terms of investment deals in the Asia region was led by India and China. The leading country in the Latin America and Caribbean region was Brazil, which attracted up to USD 43,137 million of investment for a total of 143 deals. This was followed by Chile with a total investment value of USD 35,757.15 million for 116 deals over the examined period.

Overall, the Latin America and Caribbean region experienced significant investment rates during the investigated period, with total investment value in 2009 reaching USD 7,359.29 million for twenty-one deals. The growth was demonstrated in Brazil, which experienced a strong start to 2009 with a total investment of USD 1,406.11 million for four deals. The highest value deal of 2009 was the USD 802.05 million concession contract awarded to construct the Salvador de Bahía-Rio de Janeiro toll road in Brazil, which received 25% investment from infrastructure construction companies from Brazil and 75% investment from a construction engineering company from Spain.

In contrast to the Asia region, total investment in the Latin America region decreased slightly in 2010 to USD 6,027.27 million for twenty-two deals. Mexico and Chile demonstrated approximately similar investment rates (USD 35,575.15 million for 116 deals in Chile and USD 34,652.85 million for total ninety-six deals in Mexico). The two countries therefore experienced similar pattern at the beginning of examined period. Mexico achieved a significant investment rate (USD 2,580.12 million for ten deals in 2009, increasing by approximately 25% in 2010 to USD 3,400.06 million for eight deals). Similarly, Chile had a low investment rate in 2009 (USD 619.5 million for two deals) which was approximately doubled in the following year (to USD 1,106 million for four deals).

However, investment decreased significantly by approximately one-third in Brazil in 2010 and reached the lowest rate of USD 491.01 million. The highest value deal in 2010 across the Latin America and Caribbean region was in Mexico. OHL Mexico, a subsidiary of OHL Concessions, acquired a 100% stake in the Autopista Urbana Norte for a total investment of USD 792.03 million. In the same year, Banco Bilbao Vizcaya Argentaria provided USD 45.97 million of loans for the project.

Furthermore, significant investment values were recorded in the Latin America and Caribbean region over the following five years of the examined period (i.e. from 2011 to 2014), from USD 6,593 million for seventeen deals in 2011 to USD 29,063.10 million for fifty-seven deals. This growth was illustrated by significant infrastructure investment increases for Mexico and Chile (in Mexico, investment increased from USD 655 million for two deals in 2011 to USD 6,100.2 million for ten deals in 2015, and in Chile investment increased from USD 1509.98 million for five deals in 2011 to USD 4,216 million for twelve deals in 2015). The highest value deal value in the Latin America and Caribbean region in 2015 was USD 4,200 million invested in Mexico City New International Airport (NAICM) in Mexico by a consortium of eight investors (six construction companies from Mexico and two infrastructure firms from Spain), which secured debt financing for approximately 71% of the total investment amount (i.e. USD 3,000 million) from thirteen international and investment banks (e.g. J.P. Morgan, HSBC Bank, Citigroup, and Crédit Agricole Corporate and Investment Bank).

In Brazil, a significant investment vales were recorded for the same period, rising from USD 1,224.5 million for four deals in 2011 to USD 8,615 million for twenty deals in 2014. Two significant financial deals were recorded in the country during this time. First, in 2013, Invepar was awarded a thirty-year concession contract to construct and operate the BR-040 Highway PPP project for a total of USD 2,000 million; second, in 2014, Galvão Engenharia (a construction engineering company from Brazil) was awarded a USD 1,920 million concession contract by Brazil's National Ground Transport Agency, ANTT to construct, maintain, and operate the BR-153 Highway Project.

The growth and development continued in the following year (2017). Brazil recorded a significant level of investment (USD 5,400.49 million for twenty-two deals), Mexico approximately tripled their investment and recorded a total investment of USD 11,996.6 million for seventeen deals compared to USD 3,251 million in 2016. In addition, Chile increased their investment to USD 2,500.3 million for eleven deals compared to USD 1922.4 million for nine deals in 2016. Similarly, Mexico achieved the highest investment value across the Latin America and Caribbean region in 2017 by acquiring a renewable energy project — the Sagamore Wind Farm. Xcel Energy (a renewable energy company from the USA) acquired the project from Invenergy for a total of USD 900 million.

However, overall these rates fell sharply in 2018 with total deal value in the Latin America and Caribbean region being 4,921.26 for twenty-six deals). At a country level, Brazil invested USD 1,884.72 million in twenty-two deals, Chile invested USD 970 million in twenty-one deals, and Mexico invested USD 1,813.84 million in sixteen deals. However, although investment by Mexico persistently decreased in 2019 to USD 1,317.44 million, Chile recorded an investment rate that was approximately four times larger (i.e. Brazil USD 10,445.79 million and USD 3,991.21 million in Chile). The most significant investment value in the Latin America and Caribbean region was observed in Brazil, with a total value of USD 10,445.79 million for nineteen deals. Indeed, a quick recovery of investment rates was noted, and total deal values in Latin America and the Caribbean reached USD 18,905.12 million for forty-nine deals.

Investment in Colombia and Peru was the lowest over the examined period (2009-2019), with a total investment of USD 19,978.23 million for thirty-nine deals in Colombia and USD 17,175.26 million for forty-seven deals in Peru. Overall, the investment rates in both countries are low for the majority of the timeframe investigated. However, significant investment values were recorded in both countries in 2014 (with a total value of USD 7,392 million for seven deals in Peru and a total value of USD 5,742.61 million for nine deals in Colombia)[23].

5.4.3 Infrastructure Investment Deals in Europe Region

Despite the huge differences in investment rates (i.e. deal values and numbers) between the Asia region and the Latin America and Caribbean region and remaining

[23] From broad perspective, in comparison with the investment level, it's worth noting that the scale of country area, GDP and population for instance in Brazil and Colombia are dissimilar. Meanwhile the size country Brazil accounted 8.516 km2 compared to 1.143 Km2 in Colombia (quantified 13% of Brazil). Followed by the size of population in Brazil 211 (million) compared to 50 million in Colombia (circa 24% of total population of Brazil). While GDP in Brazil quantifies 1840 USD billion in comparison with 323.6 USD billion for GDP in Colombia (quantified 18% of total GDP in Brazil).

regions (Europe, Middle East, and Africa regions), the Europe region achieved considerable investment rates of USD 59,600.89 million for 262 deals, as illustrated in Figure 5.10 and Figure 5.11. The leading country in the development and growth of investment deals in the Europe region was Turkey, with a total investment value of USD 29,441.64 million for 147 deals over the examined period, followed by Russia with a total investment value of USD 17,709.68 million for twenty deals.

Generally, investment rates in the Europe region experienced a significant fluctuation over the investigated period. Investment started in 2009 at 5,807.66 million for twenty-one deals. Poland acquired the most investment during this year, with USD 4,709.47 million for thirteen deals. The most significant investment deal was for toll road asset in Poland; the A1 Stryków I - Pyrzowice toll road received an investment of USD 2,005.13 million (as described in Section 5.3.2).

Similar to the Asia region, the Europe region recorded a considerable increase in investment to USD 7,816.26 million for twenty-two deals in 2010. The majority of this investment belonged to Turkey, which acquired USD 7,173 million for twelve deals. The investment rate in the Europe region dropped in the middle of examined period (rom USD 6,259.38 million for twenty deals in 2011 to USD 6,180,47 million for total eighteen deals in 2012). At a country level, Russia experienced decreased investment (from USD 2,784.9 million in 2011 to USD 187.14 million in 2012), but Turkey experienced increased investment (from USD 3,050 million in 2011 to USD 5,822.89 million in 2012). The largest investment deals in the Europe region in 2011 and 2012 are presented in Section 5.2.1 and 5.3.2 (the USD 2,450.71 million Western High Speed Diameter PPP project in Russia in 2011).

Furthermore, investment in the Europe region dropped sharply in 2013 and reached the lowest rate over the examined period of USD 1,860.29 million for twenty-five projects. The greatest amount of investment was Turkey, with USD 1,293.18 million (approximately 70%), and the highest value deal in 2013, at USD 638.39 million, was also in Turkey. In 2013, Enerjisa — a 50/50 joint venture between E.ON and Sabanci Holding — acquired the Alpaslan II Dam and Hydroelectric power plant. The USD 638.39 million project was financed with USD 222.87 million (USD 111.43 million for each investor) in owners' equity. The remaining USD 415.52 million was funded in debt provided by the European Bank for Reconstruction and Development (EBRD) and other debt providers.

The following years in the addressed period (i.e. from 2014 to 2016) experienced a fluctuation in investment within the Europe region. In 2014, the investment increased significantly to USD 7,687.37 million for twenty-seven deals. In 2015 it decreased slightly, by 25% (to USD 5,743.37 million for twenty-one deals), and it then increased significantly in 2016 and reached USD 9,844.69 million for twenty-six deals. Whereas Russia and Poland followed the same pattern (USD 4,219.2 million for three deals in 2014, USD 70.19 million for one deal in 2015 and USD 8,067.76 million for three deals in 2016 in Russia, and USD 2,068.06 million for twelve deals in 2014, USD 490.4 million for six deals in 2015 and USD 890.2 million for total five deals in 2016 in Poland), Turkey experienced the opposite, with USD 1,343 million for eleven deals in 2014, USD 5,028.2 million for eleven deals in 2015 and USD 591.11 million for sixteen deals in 2016). Across the variations in investment deal values, the largest deal was the USD 6,293.65 million Khabarovsk Bypass toll road construction project in Russia in 2016 (as presented in Section, 5.2.1).

This fluctuation continued in 2017, when investment dropped suddenly by one-fifth to USD 2,189.31 million for forty-six deals. The largest total investment in the Europe region was in Poland, with USD 817.36 million for three deals. The majority of this investment related to the Gdansk-Katowic railway, for which a local investor (Polskie Koleje Linowe) secured debt financing of USD 724.07 million from the European Investment Bank. In the following year (i2018) investment doubled to USD 4,144.06 million. However, deal numbers dropped significantly to twenty-six (by approximately 50%). Turkey acquired approximately 90% of the investment (USD 3,426.3 million for eighteen deals).

In contrast to the Asia and Latin America and Caribbean regions, investment deals in the Europe declined by up to 50% in 2019 compared to 2018 (2,067.46 million compared to USD 4,144.06 million. The highest value deal took place in Turkey for the development of renewable energy assets — the Efeler Geothermal Expansion Project costing USD 350 million. Gürmat Elektrik, a subsidiary of Güris Holding, secured USD 350 million of debt financing from the Asian Infrastructure Investment Bank (USD 100 million), the European Bank for Reconstruction and Development (USD 60 million), the Black Sea Trade and Development Bank (USD 20 million), Isbank (USD 90 million), the Industrial Development Bank of Turkey (USD 50 million), and ICBC Turkey (USD 30 million) for the development of the Efeler Geothermal Expansion Project (Preqin, n.d.).

5.4.4 Infrastructure Investment Deals in Middle East and Africa Regions

The last in depth assessment of infrastructure investment deal levels across geographical allocation within EIM related to investment in emerging markets in the Africa and Middle East regions. Overall, it shows a huge variance in terms of investment rates (deal values and numbers) between the Africa region and the Middle East region. The analysis reveals that the majority of investment belonged to the Africa region (USD 60,023.95 million for ninety-two deals) compared to the Middle East region (USD 34,171.12 million for thirty-six deals —approximately 50% of the investment figures for the Africa region). Figure 5.10 and Figure 5.11 capture the differences between the investment rates of these two regions across the investigated timeframe.

A detailed exploration of the key countries driving the growth and development of infrastructure investment deals in the Africa and Middle East regions during the period investigated revealed that Egypt acquired the highest investment deal values and numbers in the Africa region (USD 40,594.13 million for ninety-two assets). Meanwhile, Saudi Arabia led investment in the Middle East with a total investment value of USD 20,466.22 million for fourteen deals.

Despite the negative influence of GFC, the Middle East region recorded strong growth at the beginning of the first third of the period (from USD 1,861 million for one deal in 2009 to USD 6,417 million for three deals in 2011) compared to the Africa region (from USD 472 million for one deal in 2009 to USD 789.61 million for five deals in 2011). Saudi Arabia led the investment in this period in terms of numbers of assets invested in. For Example, Qurayyah Power Station at USD 2,717 million. The project was acquired by a consortium awarded a concession contract to build, own, and operate the project with various type of investors from different countries (i.e. Saudi Electricity Company (an electric power distribution company), Samsung C&T Corporation (a South Korean construction company), ACWA Power International (a Saudi corporate investor), and MENA Infrastructure (a United Arab Emirates infrastructure firm).

In 2012, and in contrast to the absence of investment deals in the Middle East region, Africa recorded a considerable investment rate of USD 3,270.10 million for eleven deals, 61% of which was acquired by South Africa (USD 1,982.98 million for nine deals). The largest deal executed in this year occurred in South Africa — a USD 331.73 million investment in Lesedi and Letsatsi Solar Farms. A number of investors and fund managers (IDEAS Managed Fund, Kensani Capital, GCL-Poly Energy Holdings, SolarReserve, Intikon Energy, and Oakleaf Investment Holdings) secured an undisclosed debt financing sum from Rand Merchant Bank and the Development Bank of Southern Africa for the construction of the project.

Although South Africa maintained a similar investment rate in 2013 (USD 3,111.26 million for fourteen deals), the Middle East recorded a significant investment rate of USD 8,080 million for six deals. The high rates in 2013 were reflected by the highest value deal, which was the USD 7,820 million investment to construct three railroad assets (Riyadh Metro Orange Line, Riyadh Metro Yellow Line, and Riyadh Metro Purple Line in a combined deal) in Saudi Arabia (as described in Section 5.2.1).

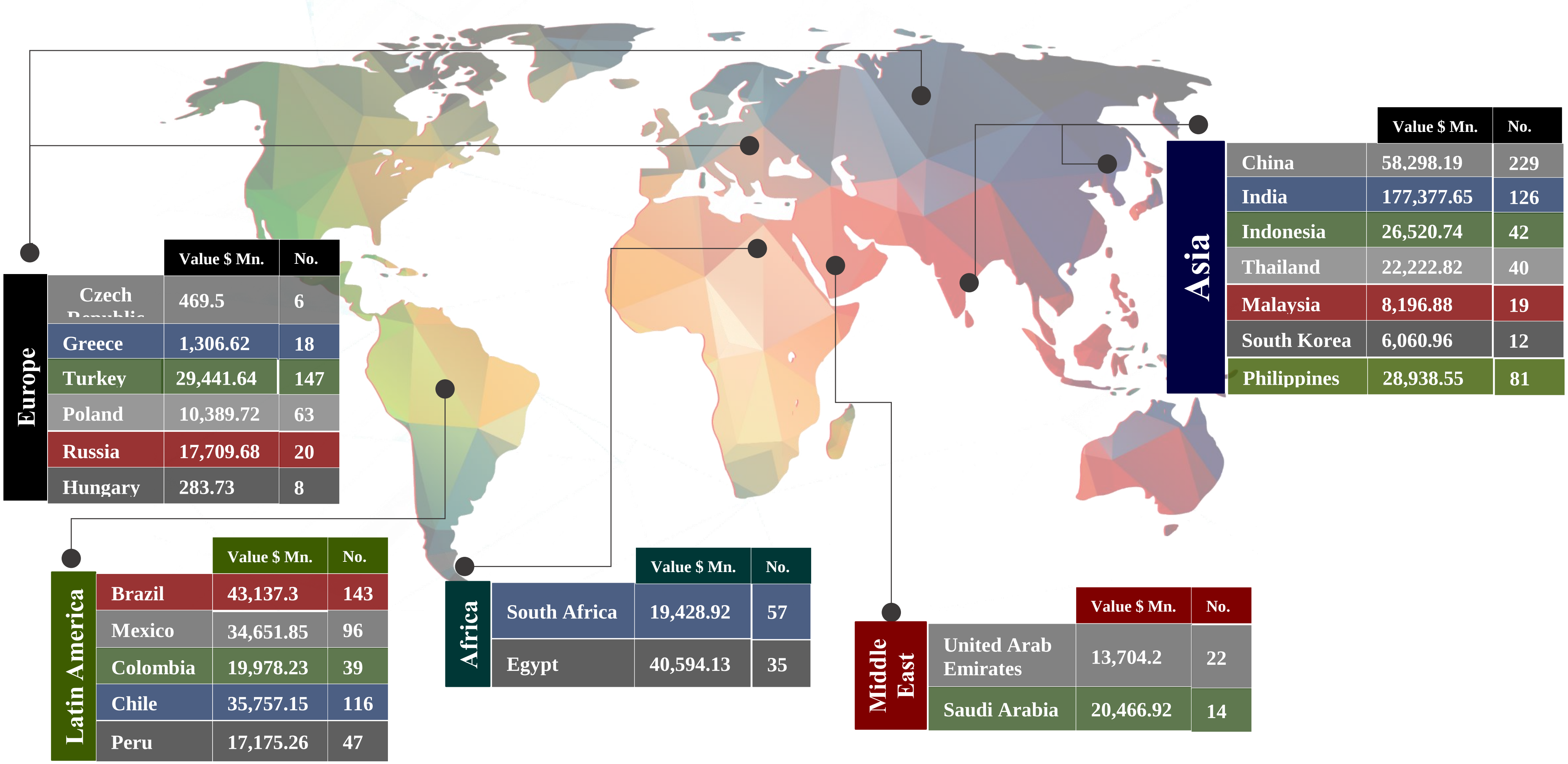
In, 2014, deal values decreased significantly in the Africa and Middle East regions to reach low rates of USD 1,500 million and USD 1,430.13 million, respectively. However, in 2015, a significant variance in investment in the two regions occurred. Whereas the Middle East region experienced a persistent decrease in investment (USD 230.21 million for two deals), Africa recorded a significant rise in investment deal values (19,100.46 million for nine deals, the majority of which (approximately 59%) was in South Africa (USD 11,000.21 million for seven deals).

2016 and 2017 witnessed significant competition between the Middle East and Africa regions. Both regions attempted to elevate and maintain their total investment rates within USD 3,000 million – 4,000 million levels (i.e. total deals value in the Middle East increased from USD 3,411.08 million in 2016 to USD 4,600.20 million in 2017, and total deals value in the Africa region decreased from USD 4,150 million in 2016 to USD 3,059.72 million in 2017).

Similar to the 2015 pattern, in 2018 there was significant variance between the investment rates achieved by the two regions. Whereas deal value in the Middle East region persistently decreased (i.e. USD 2,408.05 million for four deals compared to USD 4,600.20 million for six deals in 2017), Africa recorded a significant rise in investment deal values, of 19,047.41 million for eleven deals compared to USD 3,059.72 million for twenty-one deals in 2017. Similar to the Europe region, the Middle East and Africa regions experienced a decrease in investment rates in 2019 and (to USD 1,590.50 million for three deals in the Middle East region and USD 5,571.23 million for six deals in the Africa region).

The analysis presented in this section discusses the distribution of deal flows and levels in emerging markets in three strands: total deal sizes, sectoral classifications, and regional assessments, over the period in question, namely Q1-2009 to Q4-2019. A key issue identified that cut across the sectoral and regional assessment was the significant volume of institutional investors and fund managers who increasingly directed their PEIF infrastructure deal levels to the early stages of infrastructure projects within EIM. This significantly promoted a particular aspect involved in determining the PEIF investment targeting style within emerging markets. Consequently, the final strand of the deal levels analysis provided in the following section evaluates the deal levels in the context of project stages, namely greenfield and brownfield.

Figure 5.9-Infrastructure Investment Deals within EMs Broken Down by Regions



Europe

	Value $ Mn.	No.
Czech Republic	469.5	6
Greece	1,306.62	18
Turkey	29,441.64	147
Poland	10,389.72	63
Russia	17,709.68	20
Hungary	283.73	8

Asia

	Value $ Mn.	No.
China	58,298.19	229
India	177,377.65	126
Indonesia	26,520.74	42
Thailand	22,222.82	40
Malaysia	8,196.88	19
South Korea	6,060.96	12
Philippines	28,938.55	81

Latin America

	Value $ Mn.	No.
Brazil	43,137.3	143
Mexico	34,651.85	96
Colombia	19,978.23	39
Chile	35,757.15	116
Peru	17,175.26	47

Africa

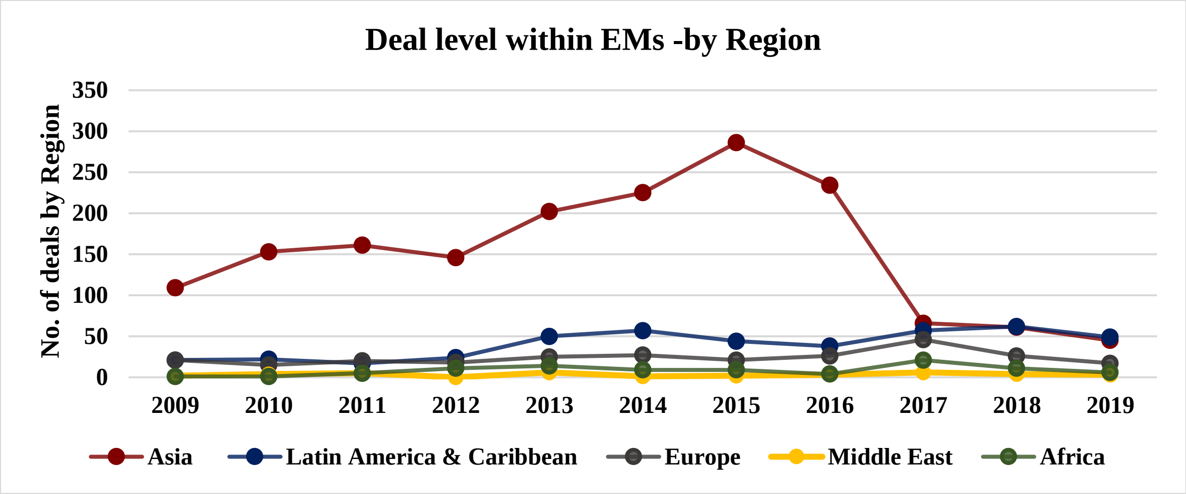
	Value $ Mn.	No.
South Africa	19,428.92	57
Egypt	40,594.13	35

Middle East

	Value $ Mn.	No.
United Arab Emirates	13,704.2	22
Saudi Arabia	20,466.92	14

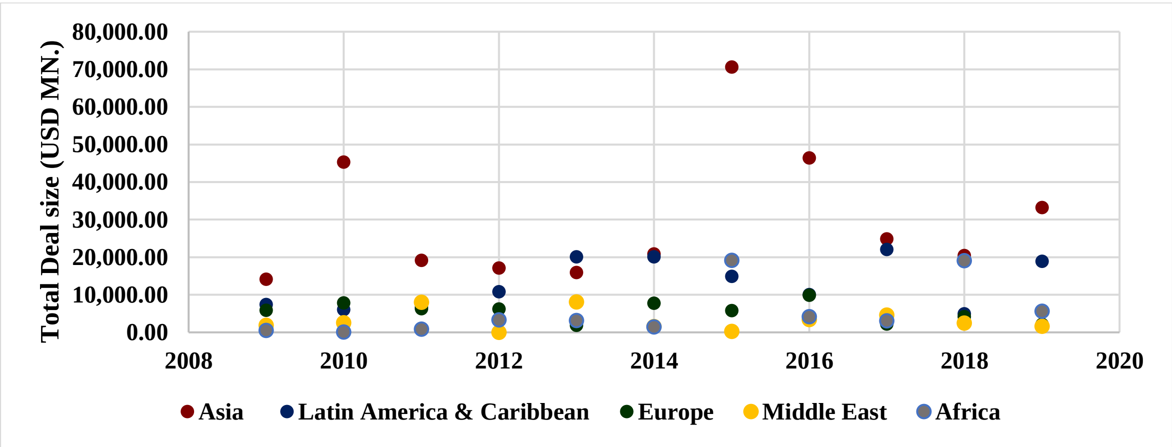
Source: Author calculation (Preqin data) (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the figure)

Figure 5.10-Number of Deals in EMs by Region



Source: Author calculation (Preqin data)

Figure 5.11-Value of Deals in EMs by Region



Source: Author calculation (Preqin data)

Table 5.3-Value of Deals by Country within Emerging Infrastructure Markets

			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Asia	China	Deal Values	790.25	907.2	776.32	3,630.73	1,221.52	3,931.39	4,000.2	13,627.37	12,281	701.23	16,430.98
	India	Deal Values	9,397.32	39,652.60	10,721.49	8,596.24	9,536.22	6,228.53	55,178.25	14,812.45	5,038.6	12,400.70	5,815.25
	Indonesia:	Deal Values	2,700	110	4,112	1,435	1,170	2,972	6,084	399	3,557.9	3,671	309.84
	Philippines	Deal Values	109.35	346	64.72	247.7	1,358.84	4,949.23	4,075.5	13,199	2,007.37	2,281.29	299.55
	Thailand	Deal Values	1,058.18	794.22	1,445.33	13.44	1,694	0	1,055	3,900.88	1,145.03	1,360.74	9,756
	Malaysia	Deal Values	0	0	583.69	2,864	11.5	2,743.45	200	457.43	783.38	0	553.43
	South Korea	Deal Values	68	3,461	1,397.4	266.41	868.15	0	0	0	0	0	0
Asia Region		total deals	**14,123.10**	**45,271.02**	**19,100.95**	**17,053.52**	**15,860.23**	**20,824.60**	**70,592.95**	**46,396.13**	**24,813.28**	**20,414.96**	**33,165.05**
Latin America & Caribbean	Brazil	Deal Values	1,406.11	491.01	1,224.5	4,374.51	7,025.06	8,615	1,100.12	1,169.99	5,400.49	1,884.72	10,445.79
	Colombia	Deal Values	1,890	383.2	2,104	100	31	5,742.61	4,200.15	1,431.30	1,070.29	13.7	3,011.98
	Chile	Deal Values	619.5	1,106	1,509.98	4,030.55	11,791	4,216	3,100.21	1,922.4	2,500.3	970	3,991.21
	Mexico	Deal Values	2,580.12	3,400.04	655	127	313.10	3,097.49	6,100.2	3,251	11,996.6	1,813.84	1,317.44
	Peru	Deal Values	863.56	647	1,100	2,157	910	7,392	412	2,273	1,043	239	138.7
Latin America & Caribbean Region		total deals	**7,359.29**	**6,027.27**	**6,593.48**	**10,789.06**	**20,070.16**	**20,063.10**	**14,912.68**	**10,047.69**	**22,010.68**	**4,921.26**	**18,905.12**
Europe	Czech Republic	Deal Values	25.62	42.62	223	0	0	57.11	121.15	0	0	0	0
	Greece	Deal Values	159.30	59.6	19.49	81.32	0	0	0	295.62	579.16	112.13	0
	Turkey	Deal Values	897.26	7,173	3,050	5,822.89	1,293.18	1,343	5,028.2	591.11	212.70	3,426.30	604
	Poland	Deal Values	4,709.47	111.05	164.99	89.12	477.10	2,068.06	490.4	890.20	817.36	0	571.97
	Russia	Deal Values	0	412.17	2,784.90	187.14	0	4,219.20	70.19	8,067.76	550.9	540.82	876.6
	Hungary	Deal Values	16.01	17.82	17	0	90.01	0	34	0	29.19	64.81	14.89
Europe Region		total deals	**5,807.66**	**7,816.26**	**6,259.38**	**6,180.47**	**1,860.29**	**7,687.37**	**5,743.94**	**9,844.69**	**2,185.31**	**4,144.06**	**2,067.46**
Middle East	United Arab Emirates	Deal Values	50.37	391.34	1,582	0	259.70	1,500	230.21	3,411.08	4,200	1,089	990.5
	Saudi Arabia	Deal Values	1,810.67	2,100	6,417	0	7,820	0	0	0	400.2	1,319.05	600
Middle East Region		total deals	**1,861**	**2,491**	**7,999**	**0**	**8,080**	**1,500**	**230.21**	**3,411.08**	**4,600.2**	**2,408.05**	**1,590.50**

Source: Author calculation (Preqin data)

Continue-Table 5.3-Value of Deals by Country within Emerging Infrastructure Markets

			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Africa	South Africa	Deal Values	0	21.13	789.61	1,982.98	3,111.26	182.69	11,000.21	800	39.4	1,307.41	194.23
	Egypt	Deal Values	472	0	0	1,287.12	0	1,247.44	8,100.25	3,350	3,020.32	17,740	5,377
Africa Region		total deals	472	21.13	789.61	3,270.10	3,111.26	1,430.13	19,100.46	4,150	3,059.72	19,047.21	5,571.23

Source: Author calculation (Preqin data) (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Table 5.4-Volume of Deals by Country within Emerging Infrastructure Markets

			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	total
Asia	China	no of deals	7	25	11	6	13	50	30	31	18	14	24	229
	India	no of deals	95	113	138	127	168	156	234	172	*23	30	*9	1265
	Indonesia:	no of deals	2	1	2	5	1	7	3	5	7	7	2	42
	Philippines	no of deals	3	3	3	3	10	9	14	17	8	7	4	81
	Thailand	no of deals	1	6	4	1	6	0	3	6	6	3	4	40
	Malaysia	no of deals	0	0	2	2	1	3	2	3	4	0	2	19
	South Korea	no of deals	1	5	1	2	3	0	0	0	0	0	0	12
Asia Region		total deals	109	153	161	146	202	225	286	234	66	61	45	1688
Latin America & Caribbean	Brazil	no of deals	4	4	4	10	15	20	11	12	22	22	19	143
	Colombia	no of deals	2	1	1	1	1	9	13	3	4	1	3	39
	Chile	no of deals	2	4	5	6	*26	12	8	9	9	21	14	116
	Mexico	no of deals	10	8	2	2	3	9	10	11	17	16	8	96
	Peru	no of deals	3	5	5	5	5	7	2	3	5	2	5	47
Latin America & Caribbean Region		total deals	21	22	17	24	50	57	44	38	57	62	49	441

Source: Author calculation (Preqin data)

Continue-Table 5.4-Volume of Deals by Country within Emerging Infrastructure Markets

			2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	total
Europe	**Czech Republic**	no of deals	1	1	1	0	0	1	2	0	0	0	0	6
	Greece	no of deals	2	1	1	2	0	0	0	2	*5	5	0	18
	Turkey	no of deals	4	8	12	14	17	11	11	16	*32	18	4	147
	Poland	no of deals	13	3	3	1	7	12	6	5	3	0	10	63
	Russia	no of deals	0	1	2	1	0	3	1	3	*5	2	2	20
	Hungary	no of deals	1	1	1	0	1	0	1	0	1	1	1	8
Europe Region		**total deals**	21	15	20	18	25	27	21	26	46	26	17	262
Middle East	**United Arab Emirates**	no of deals	1	3	2	0	3	1	2	3	4	1	2	22
	Saudi Arabia	no of deals	1	1	3	0	3	0	0	0	2	3	1	14
Middle East Region		**total deals**	2	4	5	0	6	1	2	3	6	4	3	36
Africa	**South Africa**	no of deals	0	1	5	9	*14	8	7	1	2	8	2	57
	Egypt	no of deals	1	0	0	2	0	1	2	3	*19	3	4	35
Africa Region		**total deals**	1	1	5	11	14	9	9	4	21	11	6	92
Total			154	195	208	199	297	319	362	305	196	164	120	2519

Source: Author calculation (Preqin data) (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

5.5 Infrastructure Investment Deals by Target Style

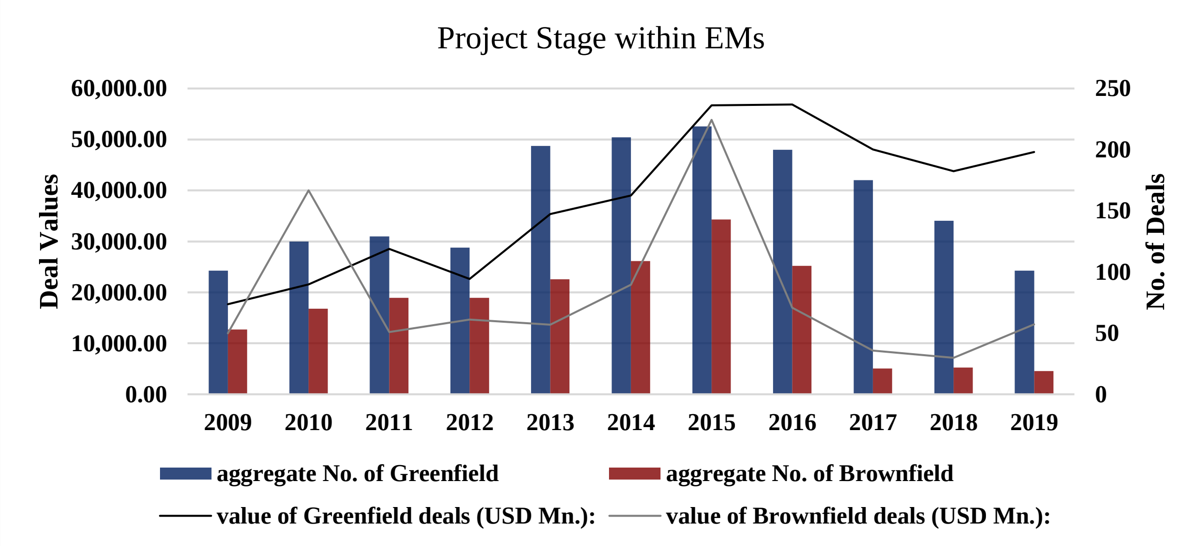
In terms of concentration on the project stage, the need for infrastructure ventures in Emerging Infrastructure Markets had a direct influence on the emergence of a new wave of investors and funds managers wishing to fund infrastructure assets (Inderst, 2010). Therefore, the final strand of the detailed analysis of deal levels in emerging markets is presented in Figure 5.12. Overall, the funds for greenfield deals were greater than the funds for brownfield deals — accounting for 70% of total completed deals in EIM. A total of 1,725 infrastructure deals in the EIM were at the greenfield project stage, with a total value of USD 417,822 million, and designating a comprehensive targeting of growth and development in infrastructure projects within emerging markets. Across the period addressed, greenfield deals afforded remarkable evidence that a number of global institutional investors favoured entering the market with a fresh start (i.e. new infrastructure assets). Nevertheless, the brownfield investment reached USD 214,295,53 million for 794 economic assets.

The analysis of project stage in relation to EIM showed that investment in greenfield assets experienced a steady increase over the period investigated, but investment in brownfield deals in emerging markets fluctuated. Greenfield assets investment recorded a significant start, with USD 17,674.79 million for 101 deals in 2009 compared to USD 11,955.54 million for fifty-three brownfield deals. However, the scale of brownfield deals increased significantly in 2010, and ultimately overtook greenfield assets investment value at USD 40,039 million for seventy deals compared to USD 21,588 million for 125 greenfield assets.

In the following period (i.e. from 2011 to 2016), greenfield deals increased and peaked in 2016 at USD 56,858.65 million for 200 deals, whereas brownfield asset investment values fluctuated negatively for the period 2011 and 2013 and deal size remained below USD 15,000 million for a total number of assets ranging between seventy-nine to ninety-four. However, the rate of investment in brownfield assets rose significantly in 2015 and approximately equalled the investment rates in greenfield deals (i.e. USD 53,850.54 million for 143 brownfield deals compared to USD 56,730 million for 219 greenfield deals).

Furthermore, meanwhile a slight decline occurred in greenfield investment values at the end of the final three years of the examined period, with USD 48,070.79 million for 175 deals in 2018 dropping to USD 47,549.92 million for 101 deals in 2019. Brownfield deals experienced a considerable increase in investment for the same period, with USD 7,159.068 million for twenty-two deals in 2018 rising to USD 13,749.45 million for nineteen deals in 2019.

Figure 5.12-Investment in Emerging Markets Broken Down by Project Stage



Source: Author calculation (Preqin data)

A detailed exploration of project stage in the context of the infrastructure sector over the course of the last eleven years (See Table 5.6), highlighted the polarized nature of infrastructure investment in emerging markets.

Generally, brownfield assets acquired low investment in emerging markets across the five sectors during the investigated period. However, in the transport sector, brownfield assets recorded a significant amount of investment, with USD 191,228.23 million invested in 619 deals across the examined timeframe. Specifically, investment in brownfield assets significantly increased in 2015 and surpassed greenfield assets with 123 deals worth USD 52,075.69 million compared to fifty-one greenfield deals worth USD 21,051.39 million. Further analysis revealed that India acquired the majority of shares in brownfield deals in the transport sector. Indeed, in line with the Indian approach to awarding concession contracts, as highlighted earlier, a key driver for the significant brownfield asset investment was the development and upgradation of assets favoured by various levels of private investors (i.e. large, small, or mid-size investors).

Furthermore, following similar pattern of analysis as that conducted in Section 5.3.1 (Renewable energy deal levels Vs conventional power energy deal levels in EIM), Table 5.6 depicts the comparisons between these two sectors in the context of project stage. It shows that that the majority (98%) of renewable energy investment assets were in greenfield stage (i.e. USD 140,001.58 million for 955 renewable energy deals) and 2% were brownfield assets (i.e. USD 3,273.82 million for forty-four deals). However, in 2017, investors and fund managers invested 100% in the greenfield renewable energy sector (USD 25,141.53 million for 140 deals). As highlighted earlier in this paper, the predominance of investment deals in greenfield-stage renewable energy assets in 2017 were characterized as combined deals in single contracts, and made up fifteen combined deals for a total of sixty-six assets at a total cost of USD3,830.51 million. Furthermore, the largest greenfield renewable assets acquired in 2017 were the Taiwan Strait wind assets.

Meanwhile, the conventional power energy sector acquired significantly more investment than the renewable energy sector, with a total of USD 107,608.21 million for 210 greenfield deals and USD 14,604.65 million for seventy-nine brownfield deals over the addressed period. The greatest amount of greenfield-stage traditional power energy investment during the investigated period was in 2018, with USD 24,859.45 million for eighty-three deals.

Table 5.5-Numbers and Values of Deals by Project Stage within Emerging Infrastructure Markets

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
aggregate No. of **Greenfield**	**101**	**125**	**129**	**120**	**203**	**210**	**219**	**200**	**175**	**142**	**101**	**1725**
value of deals (USD MN.):	17,674.79	21,588	28,549.11	22,660.88	35,351.72	39,012	56,730	56,858.65	48,070.79	43,776.63	47,549.92	417,822.49
aggregate No. of **Brownfield**	**53**	**70**	**79**	79	**94**	**109**	**143**	**105**	**21**	**22**	**19**	**749**
value of deals (USD MN.):	11,955.54	40,039	12,192.98	14,632.65	13,629.95	21,494	53,850.54	16,990	8,602.35	7,159.068	13,749.45	61,299.37

Source: Author calculation (Preqin data)

Table 5.6-Sectoral Deal Levels Breakdown by Project Stage within Emerging Infrastructure Markets

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Transports	Total No. of **Greenfield**	22	26	18	17	21	39	51	48	13	22	17	**294 Deals**
	value of deals (USD MN.):	5,492.42	6,278.78	5,123.67	2,820.69	8,513.63	18,707	21,051.385	38,640.69	12,266.15	11,421.48	19,936.94	**150,252.835**
	Total No. of **Brownfield**	39	64	71	73	62	66	123	86	17	11	7	**619 Deals**
	value of deals (USD MN.):	7,691.47	39,518.21	11,902.45	13,885.57	12,540.68	15,179	52,075.69	12,514	8,364.75	6,298.536	11,257.87	**191,228.226**
	Total No. of transport sector deals	**61**	**90**	**89**	**90**	**83**	**105**	**174**	**134**	**30**	**33**	**24**	**913 Deals**
	value of deals (USD Mn.):	**13,183.89**	**45,797**	**17,026.12**	**16,706.26**	**21,054.31**	**33,886**	**73,127.08**	**51,154.84**	**20,630.9**	**17,720.02**	**31,194.81**	**341,469.061**
Renewable Energy	Total No. of **Greenfield**	39	60	69	68	111	119	115	98	140	82	54	**955 Deals**
	value of deals (USD MN.):	7,442.80	5,246.28	7,957	12,230.18	17,263.51	13,179.1	20,298.51	10,161.20	25,141.53	6,005.71	15,075.76	**140,001.58**
	Total No. of **Brownfield**	4	3	4	2	6	5	5	8	0	1	6	**44 Deals**
	value of deals (USD MN.):	197	434.7	46.02	258.62	217.99	29.64	731.04	164.05	0	18.68	1,176.08	**3,273.82**
	aggregate No. of Renewable Energy sector deals	43	63	73	70	117	124	120	106	141	83	60	**1000 Deals**
	value of deals (USD Mn.):	7,639.80	5,648	8,003	12,488.8	17,482	13,208.74	21,029.55	10,325.25	25,157.28	6,024.39	16,251.84	**142,358.65**

Source: Author calculation (Preqin data)

Cont.-Table 5.6-Sectoral Deal Levels Breakdown by Project Stage within Emerging Infrastructure Markets

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
conventional Power Energy	Total No. of **Greenfield**	13	17	25	13	16	18	30	29	9	25	15	**210 Deals**
	value of deals (USD MN.):	2,836.76	9,634.93	13,973	6,552.22	4,736	5,779	13,992	7,060.71	9,050.14	24,859.45	9,134	**107,608.21**
	Total No. of **Brownfield**	3	1	1	2	20	34	9	5	1	3	0	**79 Deals**
	value of deals (USD MN.):	2,896	33.18	32.10	440	500.27	5,881.48	780	3,455.08	111.65	474.89	0	**14,608.21**
	aggregate No. of Power sector deals	16	18	26	15	36	52	39	34	10	28	15	**289 Deals**
	value of deals (USD Mn.):	5,732.56	9,668.11	14,005	6,992.22	5,236.76	11,661	14,772	10,515.79	9,161.79	25,334.34	9,134	**115,245.35**
Water Utilities	Total No. of **Greenfield**	22	21	16	22	48	23	17	18	10	8	5	**210 Deals**
	value of deals (USD MN.):	1,160.51	428.5	1,161	1,057.79	4,658.11	956.59	1,246.17	866.62	1,570.07	1,244.67	1,663.16	**16,013.19**
	Total No. of **Brownfield**	5	2	3	2	6	2	6	3	1	4	3	**37 Deals**
	value of deals (USD MN.):	947.70	52.91	212.41	48.46	371.01	199.49	224.61	404.84	9.54	276.45	45.35	**2,792.77**
	aggregate No. of Water sector deals	27	23	19	24	54	25	22	21	11	12	8	**246 Deals**
	value of deals (USD Mn.):	2,108.21	481.41	1,373.99	1,106.25	5,029.12	1,156.08	1,470.78	1,271.26	1,579.61	1,521.12	1,708.51	**18,806.68**

Source: Author calculation (Preqin data)

Cont.-Table 5.6-Sectoral Deal Levels Breakdown by Project Stage within Emerging Infrastructure Markets

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Sewage Utilities	Total No. of **Greenfield**	5	1	1	0	7	11	6	7	2	5	10	**62 Deals**
	value of deals (USD MN.):	742.30	32.88	334.19	0	179.98	389.66	141.61	129.43	27.15	245.32	1,739.6	**4,142.1**
	Total No. of **Brownfield**	2	0	0	0	0	2	1	3	2	3	3	**16 Deals**
	value of deals (USD MN.):	223.57	0	0	0	0	204.56	39.21	451.71	145.39	90.512	1,270	**2,424.952**
	aggregate No. of Sewage sector deals	7	1	1	0	7	13	7	10	4	8	13	**71 deals**
	value of deals (USD Mn.):	965.87	32.88	334.19	0	179.98	594.22	180.02	581.14	172.54	335.832	3,009.75	**6,357.44**

Source: Author calculation (Preqin data) (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

5.6 PEIF Investment: Fund-Level Analysis

While the multivariate approach utilized in the previous section can be informative regarding the scale and magnitude of the growth of PEIF investment within EM at the deal level, namely in the first stage of Phase One, this section presents an in-depth analysis of the vehicle structure of PE infrastructure investment within EM at a fund level, and provides further details regarding the structure of the fund vehicles, following the same pattern of PEIF in EM with a deal-level breakdown.

The second stage of the assessment of infrastructure investment concerns the diverse performance mechanisms and structure of PEIF investment vehicles. The analysis found that the aggregate number of closed-end infrastructure investment fund vehicles that exposed or considered EM, or a country/region in EIM, comprised **of 853 infrastructure investment fund** vehicles managed by 405 fund managers, with a cumulative fund size of USD 682,364.83 million. These infrastructure funds included a total of 25 liquidated funds, and 90 that were structured as separately managed account infrastructure funds. The PEIF investment growth is discussed at a detailed fund level over the timeframe Q1-2006- Q4-2019, as illustrated in Figure 5.13.

It should be noted that the reason for including the years 2017, 2018, and 2019 in the analysis, despite the fact that those involved are undergoing a process of structuring their portfolios[24], is to recognize the direction of their intentions or exposure concerning EIM. The majority of the infrastructure funds' size ranged between medium to small, namely from USD 500 MN. to USD 0.49 MN., however, a considerable number of infrastructure funds recorded significant committed funds, calculated to lie in the range of USD 5,000 MN. to USD 22,000 MN., across the period in question.

Overall, the infrastructure fund vehicle assessment displayed a variance pattern at the outset of the period examined, and experienced approximately a 130% increase in fund size from 33 infrastructure funds, totalling USD 33,083.83 MN. in 2006 (circa 3.8% of aggregate fund numbers, and 4.8% of the total fund committed size) to 55 infrastructure fund vehicles with an aggregate size of USD 78,846.17 MN. in 2019

[24] In preqin data source provides the status of the fund vehicle.

(circa 6.4% of aggregate fund numbers, and 11.5% of the total fund committed size). Furthermore, in the first half of the period, the number of infrastructure investment fund vehicles was low, compared with the second half of the period. In particular, from 2006 to 2012 the aggregate number of funds was below 60, and the size of the infrastructure funds was below USD 45,000 MN. The highest values in terms of the infrastructure funded was recorded in 2007, with a total of 47 infrastructure closed-end funds, totalling USD 44,357.07 MN. The primary reason for this low rate was the global financial crisis (GFC of 2008 that negatively influenced and recoded in 2009 the lowest rate of infrastructure fund vehicles across the period concerned, with 40 infrastructure funds totalling USD 21, 987.29 MN. (circa 3.9% of aggregate funds numbers, and 3.2% of the total fund committed size).

The assessment recorded the highest numbers of infrastructure fund vehicles in 2010 and 2012, with 59 in 2010, and 62 in 2012, in the first half period. Nevertheless, the fund size remained low in 2010, and was calculated at USD 29,978.73 MN. (circa 4.3% of the total fund committed size). There was a slight increase in 2012 reaching USD 34,758.71 MN., with a total of 62 infrastructure funds, representing 5% of the total fund committed size. It should be noted that US-domiciled funds acquired the highest rank in the infrastructure fund value, and sought opportunities to diversify their investment portfolios via global exposure. Meanwhile the highest fund size in 2010 was EIG Energy Fund XV, which committed USD 4,121 MN., was managed by EIG Global Energy Partners, and targeted investment in energy infrastructure assets globally, and in OECD countries.

The year 2012 paved the way for a new phase of infrastructure fund size, and initiated the escalation in infrastructure fund scale recorded in the analysis of the second half of the period examined, namely from 2013 to 2019. The analysis determined that there was a large number of high-rate closed-end infrastructure funds in 2013, with 75 various infrastructure funds, and a total committed size of USD 59,020.86 MN. (circa 8.8% of aggregate fund numbers, and 8.6% of the total funds committed size). Meanwhile, the highest number of infrastructure funds committed in 2013 was USD 7,000 MN. by Brookfield Infrastructure Fund II, which is an unlisted PEIF, and the successor to the Brookfield Americas Infrastructure Fund (BAIF). The fund targeted a range of large-scale infrastructure transactions, specifically in the energy, utilities, and transportation sectors, both globally and within North America (40%), Europe (25%), Latin America and the Caribbean (20%), and Australia/New Zealand (15%) regions. The fund targeted both greenfield and brownfield opportunities (Preqin, n.d.).

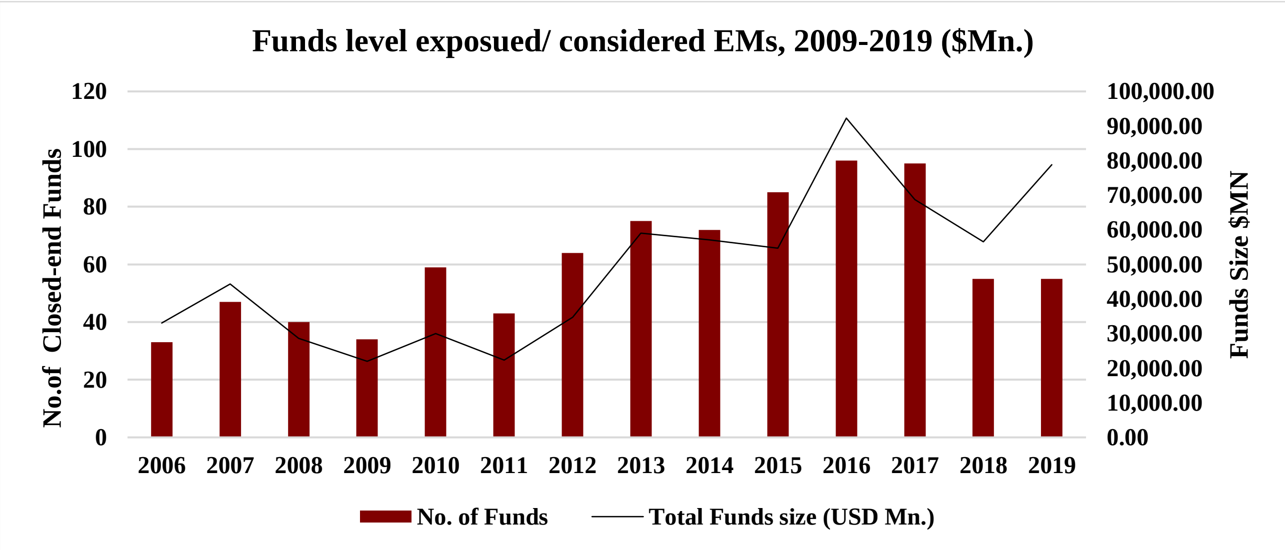
In terms of the quantity of infrastructure funds, in 2015 the infrastructure fund rate rose considerably, compared with 2014, with a total of 85 funds in 2015 (circa 9.9%), compared with 72 in 2014. However, in terms of committed fund size, the opposite was the case; while in 2014, the infrastructure funds closed at a financial value of USD 57,081.34 MN. (circa 8.3%), but in 2015 the infrastructure funds committed values dropped slightly to reach USD 54,722.56 MN. (circa 8%).

In 2016, infrastructure investment funds value rates outpaced others in the period examined, and recorded a significant rate of committed size, namely USD 92, 283.34 MN. (circa 13.5%) for 96 various infrastructure fund vehicles. There were various drivers behind this high rate, the most notable of which were: 1) investors targeted new areas, seeking a return, and promoting an appetite for investing in the infrastructure asset class; 2) a diversity of infrastructure fund strategies was evolved by the fund managers; 3) a region-focused infrastructure investment strategy promoted this progress, led by advanced country regions, particularly North America and Europe; and 4) there was a rising appetite for infrastructure fund investment (Preqin, 2016A; 2016B; 2017). Further detail of the assessment of geographical focus is provided in Section 5.7 (Infrastructure Investment Funds vehicle and Fund Managers Analysis-Geographic Distribution).

The infrastructure fundraising universe continued to be competitive in 2017, especially since the quantity of infrastructure fund vehicles remained high, with 95 diverse infrastructure funds, however at the close of the market, the number of infrastructure funds had declined by 25%, compared with 2016, with only USD 68754.69 MN. in 2017.

Surprisingly, the last two years of the period examined, 2018 and 2019, showed a decline in performance. Furthermore, the analysis found that there was a conflicting pattern regarding the final close of infrastructure fund vehicles in the market. Nevertheless, and despite the competitiveness of 2018 and 2019, these years together supported 55 infrastructure funds, with the differences in the pattern of vehicles involved in the infrastructure funds appearing at the final close of the market. The aggregate infrastructure funds reached a final close in 2019 of USD 78846.17 MN., compared with USD 56,551.71 MN. in 2018. The drivers behind the low rates in 2018 were: 1) a considerable number of investors exiting the market, due to their unexploited commitments in the PE infrastructure industry in previous years; 2) the high amount of PE capital available; and 3) the easy financial monetary policy (Preqin, 2018A). The increased funds value in 2019 was due to a number of reasons: 1) competitiveness between larger and smaller size fund managers, seeking portfolio management abilities, and sources of greater infrastructure deals; and 2) the increase in the number of global institutional investors directly targeting their investment towards infrastructure assets, resulting in strong competition between infrastructure fund managers seeking the best infrastructure investment sources (Preqin, 2019).

Figure 5.13-PE Infrastructure Investment Fund Vehicles



Source: Author calculation (Preqin data)

It should be noted that the figures cited in the analysis for the size of the infrastructure funds includes the assets for which Preqin provided the fund size, namely the known funds value. For further details see Appendix C.3, which presents the aggregate number of funds identified and broken down into further detail, namely the total unknown fund numbers.

The analysis presented in this section illustrates the scale and magnitude of the unlisted infrastructure investment fund vehicles that were exposed or considered in EM, or in a country/region in an EIM, over the period concerned. A variety of methods and mechanisms were available for accessing the infrastructure investment fund markets, and the infrastructure fund vehicle strategies employed risk assessment as pillar, or were risk driven, which minimizes the risk involved, and concentrates on regular and stable cash flow in terms of three strands: the primary geographical infrastructure target, 2) the primary infrastructure industry focus, 3) the infrastructure investment strategy, and 4) the infrastructure target's project style, namely an assessment of regulated and unregulated industries. Therefore, a further in-depth assessment of these infrastructure fund vehicles strategies was conducted, and is discussed in the next sections.

5.7 Analysis of Infrastructure Investment Fund Vehicles, and the Geographical Distribution of Fund Managers

5.7.1 Analysis of the Geographical Strategies of Infrastructure Investment Fund Vehicles

As discussed in Chapter Three, infrastructure investments are diverse and possess a considerable number of opportunities that yield a high rate of return. As Marzuki and Newell (2020) observed, global institutional investors have recently become increasingly aware of the strategy behind the asset allocation of their investments, which caused fund managers to take a series of actions to adjust their investment strategies, and to engage in a major development and growth process. Moreover, identifying and evaluating the infrastructure market as a source offering a maximum rate of return was a critical process in the structuring of infrastructure investment strategies by fund managers. Therefore, the first key measure of the empirical investigation of the first level analysis of PEIF vehicles' expose to, or consideration of, EM countries, namely the fund portfolio analysis, involved the assessment of the geographical allocation strategy of infrastructure investment.

There were a range of infrastructure fund vehicle strategies targeting geographical allocation, and a considerable amount of funds were structured to focus on specific regions, such as Europe, Africa, or North America, while others were designed to seek opportunities in a number of countries under particular classifications, such as OECD countries, Association of Southeast Asian Nations (ASEAN) countries, or Islamic Development Bank member countries. Furthermore, while a number of fund strategies sought to diversify their infrastructure fund portfolio across a range of geographical regions, such as the Greenfield Infrastructure Fund-fund, with a size of USD1651.56 MN., which sought to invest in a diversified portfolio of greenfield infrastructure assets across a range of geographical countries in Europe, other funds targeted a range of large-scale infrastructure transactions by allocating a percentage for geographical investment strategies. For instance, Capital Innovations Customized Infrastructure Separate Account, with a fund size of USD 800 MN. in 2010, focused approximately 35% of their geographic distribution capital on investment in North America, 25% in Europe, 30% in Asia, and 10% in Rest of the World.

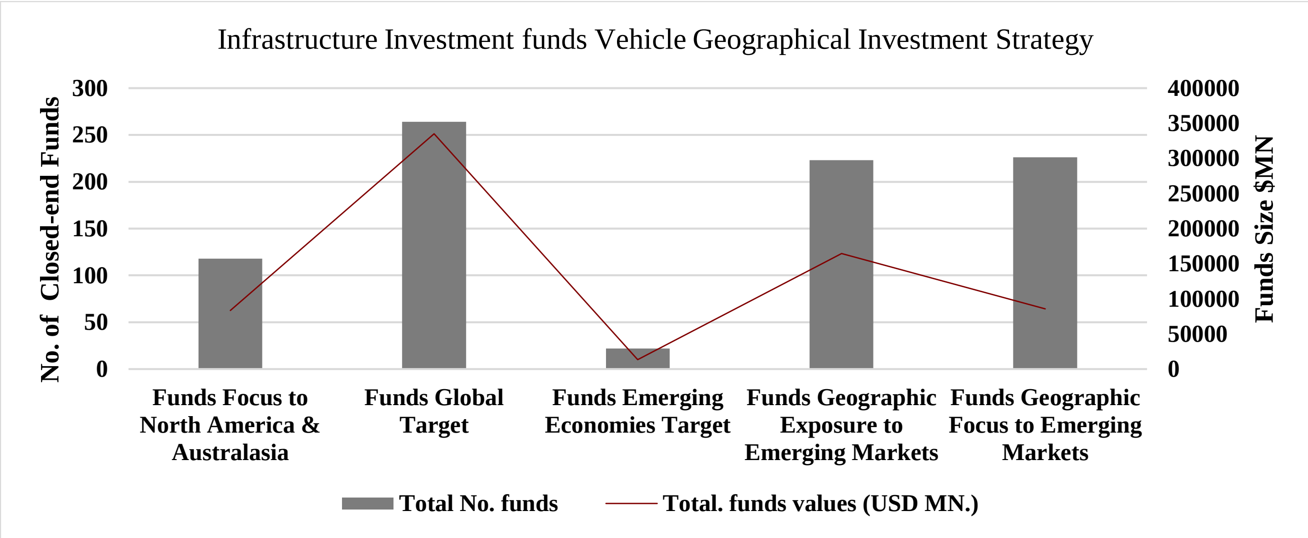
Therefore, there was an identifiable difference between the **primary geographical focus** and the **geographical exposure**[25] of the infrastructure fund investment strategy vehicles. The assessment found that the total funds structure that **exposed,** and/or considered, a country or one region of EM countries accounted for 223 infrastructure fund closed-end vehicles (circa 26%), with an aggregate final close value of USD 164,562.82 MN (circa 24%), while a geographical strategy **focus** of a country, or one region of EM countries, accounted for 226 infrastructure fund vehicles valued at USD 85,969.02 MN. (circa 12.5%), as shown in Figure 5.14, which evidences the focused investment strategy of EQT Infrastructure II on medium-sized infrastructure firms in Northern and Eastern Europe, specifically Greece and Russia, and North America, although with the **flexibility to invest globally**.

Surprisingly, a considerable number of infrastructure fund vehicles across the timeframe assessed accounted for 22 closed-end fund vehicles, with a total size of USD 13,447.02 (circa 2%), with fund managers structuring their investment strategy

[25] A detailed analysis is provided at the end of this section in Table 5.8 Fund Vechiles **Distribution analysis of geographical exposure at regional level**, Q1-2006-Q4-2019, (USD MN.).

to invest 100% in infrastructure assets in growing economies, namely EM. Moreover, the analysis identified a significant number of infrastructure investment fund vehicles (circa 49%), committing USD 334,983.15 MN., with 264 closed-end funds in total, representing 31%, indicating that the fund managers preferred to diversify the geographical strategy of their infrastructure investment globally, and in diverse multi-regions. For instance, in 2009 König & Cie Infrastruktur International I committed in total USD 49.03MN., focused on diversification geography: Asia (20 - 30%), Europe (50 - 60%), Global, and North America (20 - 30%).

Figure 5.14-Overview of Fund Vehicles: Distribution Analysis of Geographical Exposure versus Geographical Focus



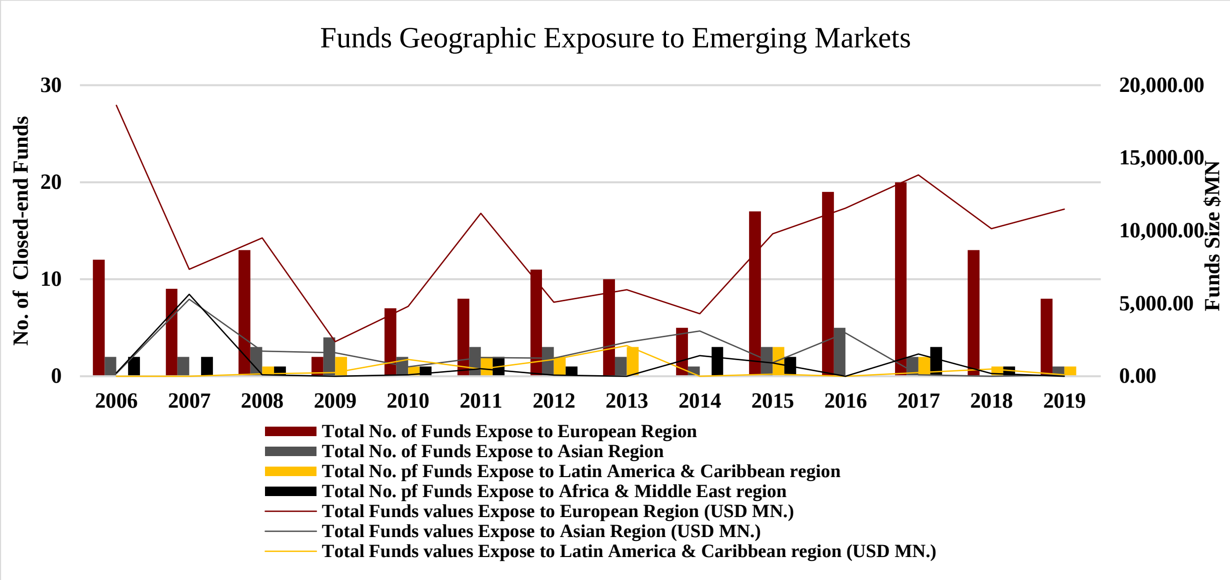
Source: Author calculation (Preqin data)

Despite the significant and similar results of the output assessment in terms of geographical investment strategy, particularly regarding **geographical focus** and **geographical exposure** to emerging countries, a key issue that should be highlighted is the geographical preference of fund managers for favourable regions in which to invest in infrastructure assets. Therefore, a further in-depth analysis of **geographical focus** and **geographical exposure** was conducted to i**dentify the most attractive regions** for fund managers to invest in infrastructure assets. Figure 5.15 and Figure 5.16 capture the fluctuation pattern of the fund managers' investment in mainstream infrastructure. Most notably, the fund managers exposed and focused on the Europe region, recording a conflicting pattern in their investment strategy, specifically with a significant weight of infrastructure funds exposed to the Europe region, namely 154 funds, committing USD 125,994.97 MN. (circa 76.5% of total investment strategy geographical exposure at regional level, compared with 62 infrastructure investment funds focused on European markets, which committed USD 18,457.46 MN. (circa 21.5% of the total investment strategy geographical focus, at regional level.

In contrast, the assessment revealed that 58% of fund managers favoured a focus on the Asian market in their infrastructure investment strategy, with 94 closed-end funds, valued at USD 50,088.31 MN., compared with 13% of funds exposed and considered in their investment assets in the Asian infrastructure investment industry. For instance, the JPMorgan Asian Infrastructure and Related Resources Opportunity Fund committed USD 858.6 MN. in the vintage year 2008. The fund was a pan-Asia infrastructure fund, focusing predominantly on investment in China and India, as well as in other areas in the Asia region, such as South Korea, the Philippines, Thailand, and Indonesia. The fund sought investment in developmental and operational infrastructure projects in transport and regulated utilities, and investment in infrastructure-related companies.

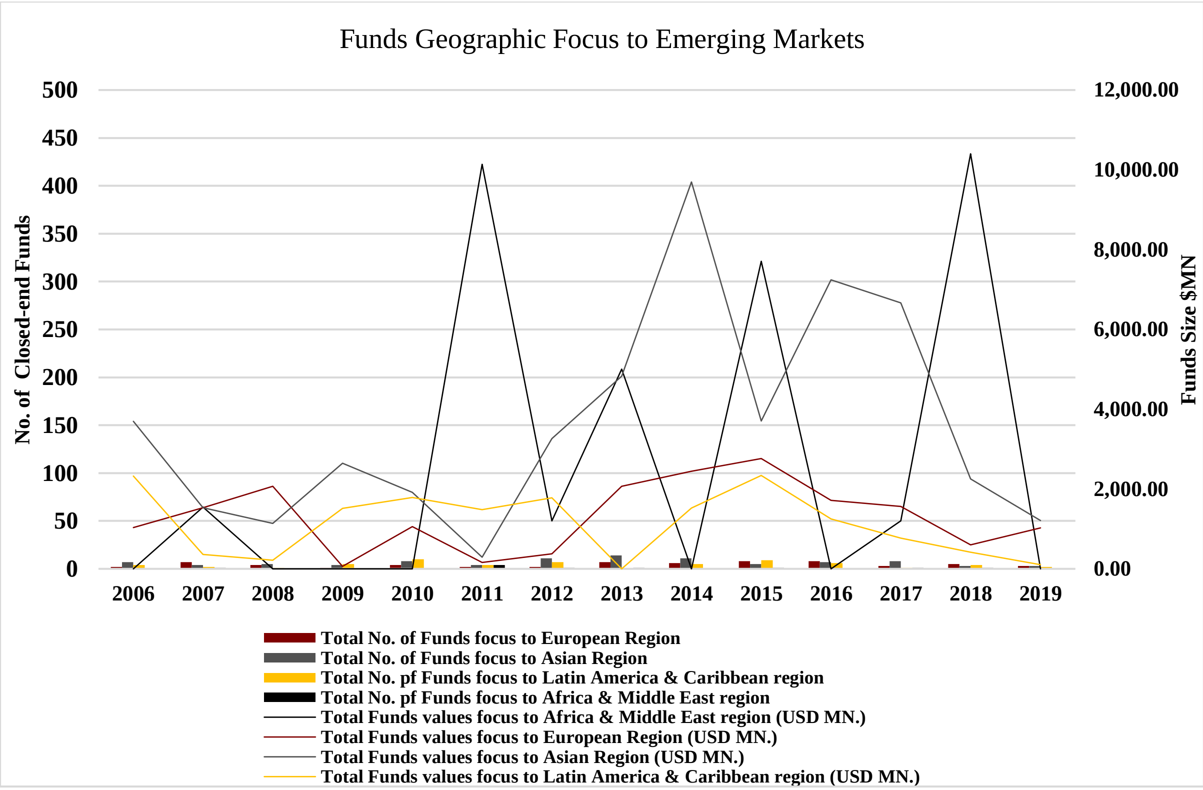
Similarly, a considerable number of fund vehicles focused their investment strategy on the Latin America and Caribbean region, reflecting the preference of fund managers to invest in infrastructure assets. There were 60 fund vehicles, committing a total of USD 15,873.29 MN. (circa 18% the total investment strategy, geographical focus at regional level), compared with 18 fund vehicles in which fund managers committed USD 6,318.53 MN (circa 3.8% of the total investment strategy, geographical exposure at regional level), reflecting an investment strategy that focused on investment in infrastructure assets in the Latin America and Caribbean region.

Figure 5.15-Fund Vehicles Distribution Analysis of Geographical Exposure-Regional Level



Source: Author calculation (Preqin data)

Figure 5.16-Fund Vehicles Distribution Analysis of Geographical Focus-Regional Level



Source: Author calculation (Preqin data)

Following the previous analysis, and as part of the assessment of the geographical allocation strategy of infrastructure investment, an in-depth analysis of PEIF vehicles was conducted, which was divided into three levels[26], and is presented in Figure 5.17. **The first level, local infrastructure fund vehicle level (LFL),** represents infrastructure funds established in a country that focuses their geographical allocation on infrastructure investment either locally, or in other countries within the same level of LFL. The analysis revealed a total of 435 LFL, committing a total of USD 273,970.86 MN. (circa 40.5%). This was broken down further into three categories: 1) advanced local countries fund vehicles, namely fund portfolios targeting maturity markets and advanced countries, such as the EU, Western Europe, and North America, totalling 285 funds, with an aggregate fund value committed of USD 212,016.26 MN.; 2) emerging local countries fund vehicles, which represented fund structures established in one EM country, targeting infrastructure investment in the local market, with a total of 139 closed end funds, representing 9% of the total infrastructure fund vehicles across the period examined, namely 2006-2019; and 3) the Rest of the World, with fund vehicles originating in developing countries, and concentrating their investment locally on a total of 11 infrastructure funds, committing USD 1,465.28 MN.

It was noteworthy that advanced countries concentrated their investment locally, preferring mature markets, and representing 31% of the aggregate LFL. The driver behind this high rate was due to fund managers finding it difficult to monetize their infrastructure investment in foreign markets, namely EM, specifically in the Asian markets (Russ et al., 2018). Furthermore, in the LFL, EM classification, the majority of investors were local, including local banks and private sector pension funds, yet these funds sought to diversify their investments by attracting regional and/or international investors, and other financial institutions, to raise the capital involved. For instance, Macquarie Mexican Infrastructure Fund (MMIF) was Macquarie's first managed fund in the Latin America and Caribbean region, and was the first 'peso-denominated fund' solely focused on investment opportunities in Mexican infrastructure projects. MMIF was comprised of two trusts (dual trust structure) to accommodate different investor profiles: a Mexican BMV listed trust was established for Mexican pension plans, and

[26] A detailed analysis is provided at the end of this section in Table: 5.10. Detailed breakdown of infrastructure investment fund vehicles targeting EIM, Q1-2006-Q4-2019 (USD, MN.), Q1-2006-Q4-2019 (USD, MN.).

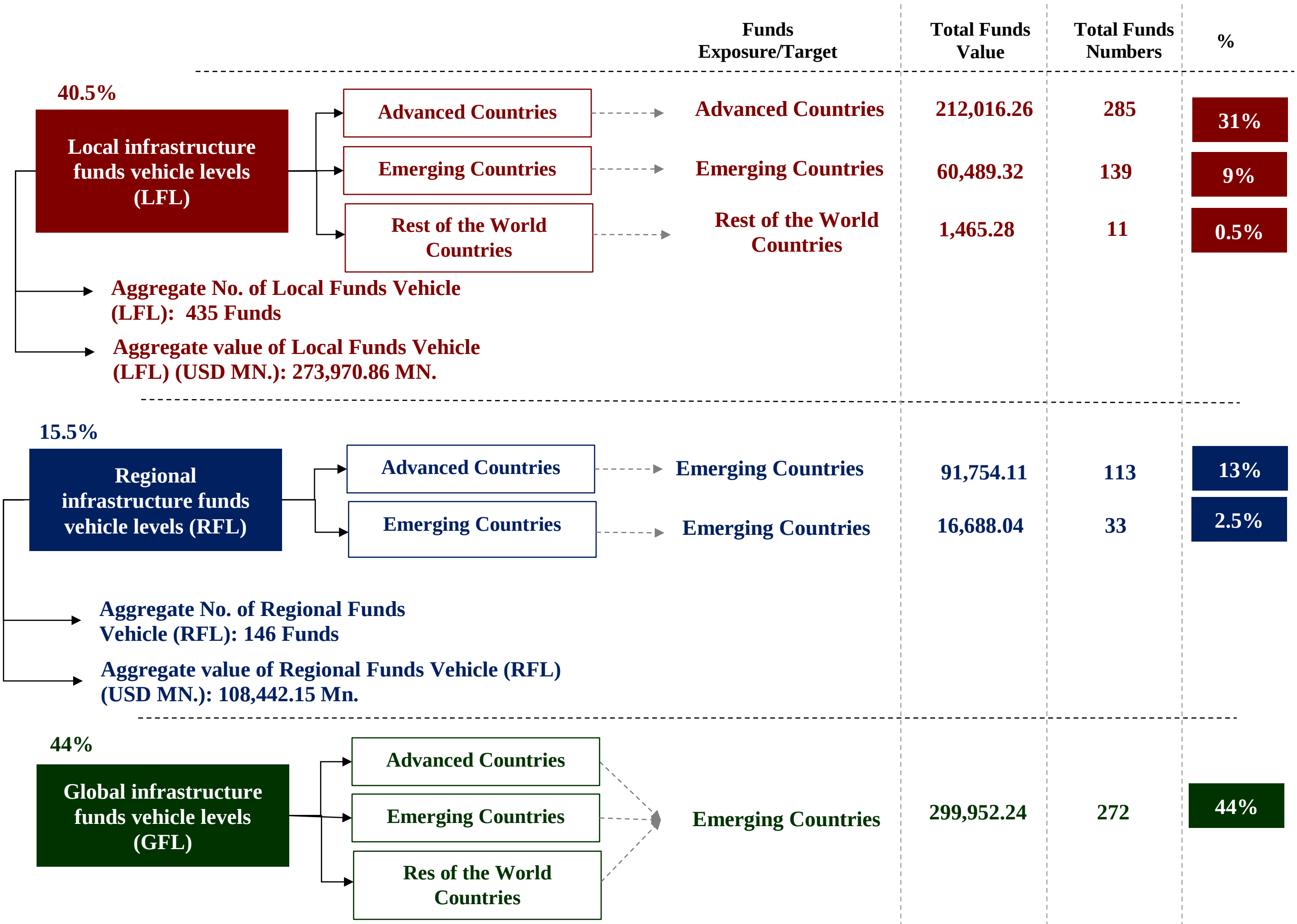
a second trust was established for other Mexican and international investors, including FONADIN's (Mexico Government Infrastructure Fund) investment, which could accommodate investment from insurance companies, sovereign wealth funds, multi-lateral agencies, and other international investors. MMIF targeted investments across infrastructure industries, including roads and railways, airports and ports, water and wastewater, energy, and utilities, as well as the social and communications infrastructure (Preqin, n.d.).

Meanwhile, the second level of fund vehicles, **regional infrastructure fund vehicle level (RFL),** generally focus on identifying infrastructure fund investment vehicles created in emerging markets countries, and concentrate their fund investment in countries within the same region. These RFL totalled 146 funds, committing an aggregate value of USD 108,442.15 MN. (circa 15.5%). Moreover, it was noteworthy that RFL encompassed mature and EM in the same region, such as in the Europe region, the UK, Germany, Turkey, and Greece; and in the Asia region, Singapore, Japan, India, and Malaysia. Therefore, RFL were divided into fund managers in advanced countries who targeted their investment strategy towards EIM, and fund managers in same region seeking opportunities to invest in neighbouring markets. The analysis identified a significant number of fund managers based in mature markets seeking opportunities in, and targeting, growing markets, namely EIM, in their infrastructure investment strategy. In total, there were 113 diverse fund vehicles that committed USD 91,754.11 MN., representing 13% of the aggregate fund vehicles across the timeframe concerned.

The third level of fund vehicles, global infrastructure fund vehicle level (GFL), were based on the location of infrastructure fund investment vehicles, and their investment position in different regions. There were a significant number of GFL, totalling 272 various closed-end infrastructure fund vehicles, with a committed value of USD 299,952.24 MN., representing 44% of the aggregate fund vehicles across the period addressed (2006-2019), as illustrated in Figure 5.17.

Therefore, the drivers behind the RFL and GFL **classifications exploited in the current research distinguished between infrastructure investment strategies in EM**. As highlighted by Jacobs et al. (2018), GFL are characterized by a clear diversification of geographical infrastructure investment strategies that invest in multi-continental areas. They have acquired the flexibility to react to transformations in geographical dimensions, and to avoid the overpriced market. Meanwhile RFL concentrate on a specific region, and provide an in-depth experience in a particular country, constructing regional investment networks in a particular industry, such as conventional power energy or the renewable energy sectors.

Figure 5.17-Infrastructure Investment Fund Vehicles: Breakdown of Exposure to EIM



Source: Preqin; Author's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the Figure)

For more information see Appendix C.3, which presents the aggregate number of funds identified, broken down into further detail, specifically the total number and value of the GFL, RFL, and LFL funds on an annual basis. **Due to the time restrictions on**

the current research, and the need to concentrate on the scope of the research, LFL are excluded from the analysis, and particularly from Sections 5.7 to 5.11.

5.7.2 Analysis of Global Infrastructure Investment Fund Managers: Geographical Dissemination

As discussed earlier, the massive volume of infrastructure investment fund vehicles and fund managers has increasingly determined the preferred Emerging Infrastructure Markets for yield potential with stable returns, according to the structure of their geographical infrastructure investment strategies for their fund vehicles over the last decade. As discussed in Chapter Four (Section 4.4), the aim of the current study was to implement its research objectives and **answer key research questions regarding infrastructure investment within EIM**. Section 5.7.2 provides an in-depth assessment of the location of **GFL and RFL fund managers who targeted** their infrastructure investment towards different regions of EM. The driver behind this investigation was to participate in the process, in order to address the first research question, **Who are the key players in EM?**

The in-depth assessment of fund managers followed the previously detailed classification of infrastructure investment fund vehicles. In particular, the GFL classification was structured according to the different regions of the fund managers, since GFLs are managed by variety of fund managers from various countries of different categorization levels. The analysis identified the following three forms of fund managers, according to their geographical location: 1) fund managers based in advanced countries, such as the US, the UK, Spain, and Japan; 2) fund managers based in emerging countries, such as South Korea, Colombia, China, and the United Arab Emirates; and fund managers based in developing countries, which are referred to herein as the Rest of the World (RoW), and include Israel[27], Bahrain, and Kuwait.

Overall, the majority of global and regional fund managers in the period examined were located in advanced countries, and structured their geographical investment

[27] It should be noted that Israel is generally considered a developed country. However in the preqin's classification, Israel considered part of the rest of the world (RoW).

strategy, in the form of GFL and RFL, to target infrastructure investment within EM. They were outperformed and recorded a significant presence, as illustrated in Table 5.7. A total of 238 fund managers worldwide differentiated their investment and recorded preferences when targeting EM. The majority were located in North America (US and Canada), with 53 aggregate fund managers managing 105 fund vehicles targeting investment at least one country in EIM. These were followed by 61 fund managers from varying majorities in Europe, comprising 44 fund managers managing 80 infrastructure fund vehicles located in the UK, 14 located in France and holding 28 various fund vehicles, and 18 headquartered in Germany with 24 diverse fund vehicles. Asian fund managers, specifically fund managers from Japan and Singapore, acquired a considerable share to target investment in EM, with 20 investment fund vehicles managed by 14 fund managers.

The first detailed investigation addressed the context of the fund managers targeting global markets, including EM, in their infrastructure investment strategy, as illustrated in Figure 5.18**.** The assessment identified a remarkable presence, and strong competition between fund managers based in Europe and North America. Meanwhile US-based fund managers had a significant presence in targeting global markets, including EM, or GFL, with their infrastructure investment accounting for 95 fund vehicles managed by 49 fund managers that achieved a financial close of USD150,998.69 MN.

The second rank of GFL-targeted infrastructure investment in EM were fund managers based in the Europe region, with the majority who targeted global markets in their infrastructure investment, including EM or GFL, being fund managers based in the UK, with 27 fund managers targeting 57 fund vehicles, with a commitment of USD 55,543.75 MN. It was noteworthy that among these 27 UK fund managers, six diversified their investment strategy targeting regional infrastructure investment in their fund vehicles, namely their RFL, with a total of 30 various fund vehicles investing in the Europe region. This comprised 3i fund managers headquartered in the UK, with a structured 3i India Infrastructure Fund with a commitment of USD 1,200 MN targeting global markets. Meanwhile, the structured BEIF II fund had a commitment of USD 487 MN., and the 3i MIA fund a commitment of USD 900.88 MN, invested in the Europe region. Appendix C.4 provides a detailed breakdown of the majority of global fund managers, in terms of their GFL and RFL fund structures.

Moreover, the assessment identified that a considerable number of fund managers were headquartered in France, with five different fund managers committing USD 22,786.86 MN. to 18 investment fund vehicles. Similarly to the fund managers located in UK, the French fund managers differentiated their strategic geographical investment vehicles by allocating three fund managers a total of 15 fund vehicles, targeting regional infrastructure investment alongside global infrastructure investment.

In terms of the **RFL vehicle assessment,** there was a moderate infrastructure investment fund vehicle scale in RFLs structured by global fund managers at the outset of the period examined, as shown in Table 5.7 and Figure 5.19**.**

Overall, analogous to the previous fund managers, GFL assessment fund managers based in the Europe region were significantly represented in the RFL analysis, with 64 diverse fund vehicles, managed by 52 different fund managers, committing a total of USD 39,879.89 MN., represented 75% of the total RFL fund vehicles. Furthermore, the UK represented the highest rate targeting the Europe region, with a total of 23 different RFL fund vehicles, managed by 17 fund managers, with a total of 16,598.69 MN. However, the analysis found that there was a conflicting pattern of strategic geographical infrastructure investment in fund vehicles at an RFL, compared with global strategic investment (GFL). This was evidenced by fund managers located in Spain, six in total, who prefer to target neighbouring markets in the Europe region, investing in infrastructure assets that accounted for six various fund RFL vehicles, with a total committed value of USD 338.16 MN., compared with one GFL vehicle targeting global markets, namely Aleph Renovables México, managed by Aleph Capital, with final closing value of USD 47.04 MN.

Similarly, Asian fund managers, who constituted circa 7% of the total RFL vehicles, preferred to invest in nearby markets with similar characteristics in the Asia region. In particular, a total of 10 fund managers headquartered in Singapore allocated 15 different fund vehicles across the period examined of Q1-2006 to Q4-2019, with geographical strategy investment focusing on investment in economic infrastructure in Asian markets.

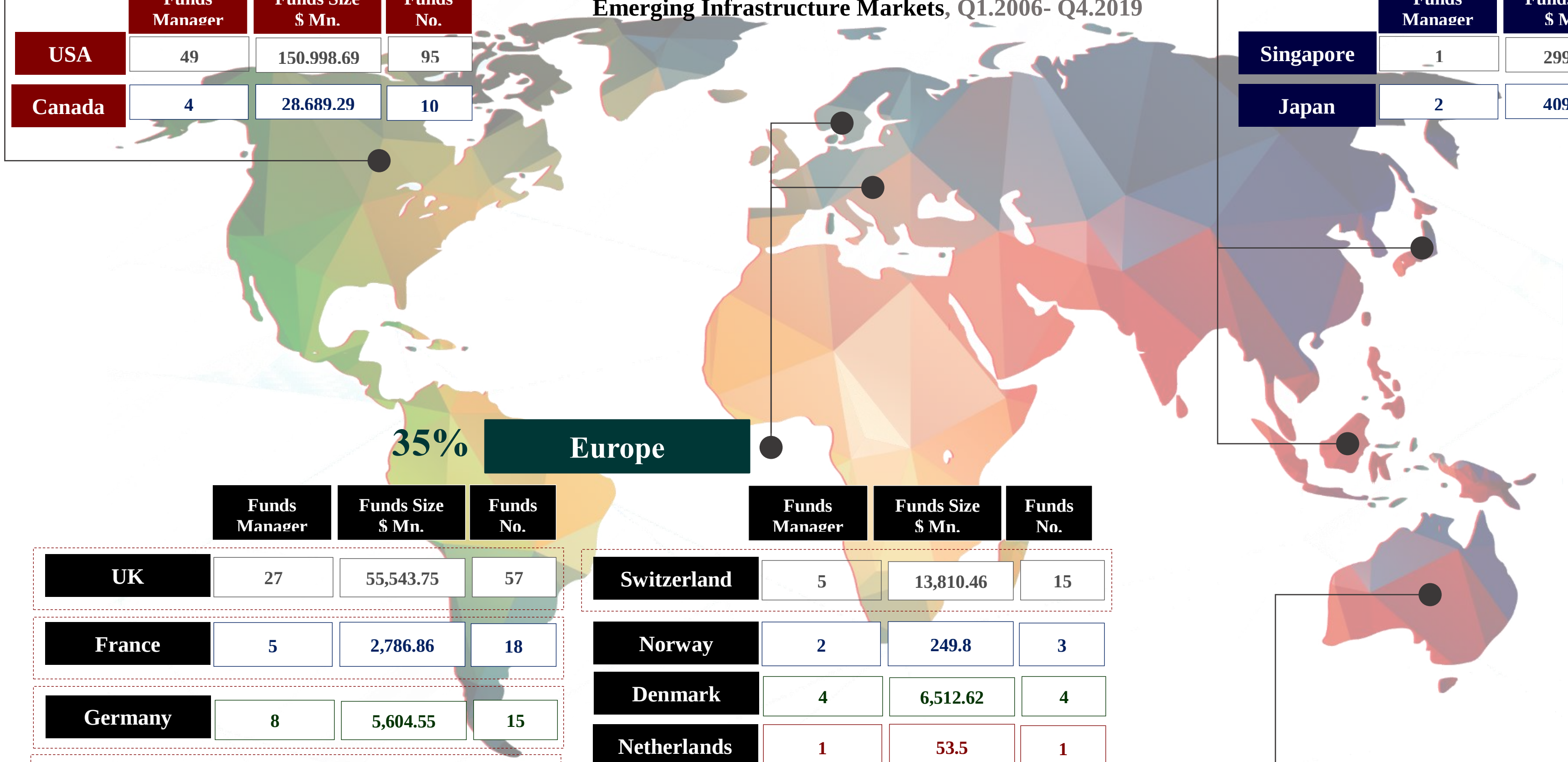
Table 5.7-Breakdown of Global Fund Managers Target Infrastructure Investment Vehicles Focusing on EIM

	GFL						RFL					
	Total Funds Manager Numbers	**%**	**Total Funds Numbers**	**%**	**16124zzz**	**%**	**Total Funds Manager Numbers**	**%**	**Total Funds Numbers**	**%**	**Total Funds Size ($MN)**	**%**
Funds managers based in North America Region	53	33.5%	105	33%	179,687.98	50.5%	-	-	-	-	-	-
Funds managers based in Europe Region	61	38%	125	40%	123,653.07	35%	52	65%	64	63%	39,879.89	75%
Funds managers Based in Australasia	7	4.4%	16	5%	30,364.39	8.5%	-	-	-	-	-	-
Funds managers Based in Asia Region (Singapore and Japan)	3	2.1%	3	1.5%	682.69	0.1%	11	13.75%	17	16.5%	3,645.27	7%
Funds managers Based in Emerging Markets(2,4)	29	18%	54	17%	17,422.71	4.9%	16	20%	20	19.5%	9,225.49	17%
Funds managers Based in RoW(3)	6	4%	11	3.5%	3,715.45	1%	1	1.125%	1	1%	117.4	1%
Total	**158**		**316(1)**		**335,472.79(1)**		**80**		**102**		**52,868.05**	

Note: Total RFL and GFL funds: 418 fund vehicles managed by 238 fund managers committing USD 408,340.84 MN.
(1)Europe region figures include 11 fund managers, managing 30 various fund vehicles divided between global and regional investment geographical targets.
(2)EM fund managers, located in the United Arab Emirates, Egypt, South Africa, Brazil, Mexico, South Korea, Czech Republic, and China.
(3)Rest of the World (RoW) fund managers, located in Bahrain, Kuwait, Israel, and Argentina.
(4)Fund managers based in South Korea diversified their fund portfolio vehicles between global and regional investment geographical targets.

Source: Preqin; Author's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Figure 5.18-Geographical Distribution of Global Fund Managers Targeting the Investment Fund Strategy GFL in Emerging Infrastructure Markets (Source: Preqin; author's own analysis).



Total Funds managers across the world (based on Advanced countries) 124 target investment funds strategy-GFL to Emerging Infrastructure Markets, Q1.2006- Q4.2019

North America 50.5%

	Funds Manager	Funds Size $ Mn.	Funds No.
USA	49	150.998.69	95
Canada	4	28.689.29	10

Asia 3%

	Funds Manager	Funds Size $ Mn.	Funds No.
Singapore	1	299.87	1
Japan	2	409.69	2

Europe 35%

	Funds Manager	Funds Size $ Mn.	Funds No.
UK	27	55,543.75	57
France	5	2,786.86	18
Germany	8	5,604.55	15
Sweden	2	17,127.62	4
Luxembourg	2	1,010.12	2
Portugal	2	709.58	2
Spain	1	47.04	1

	Funds Manager	Funds Size $ Mn.	Funds No.
Switzerland	5	13,810.46	15
Norway	2	249.8	3
Denmark	4	6,512.62	4
Netherlands	1	53.5	1
Finland	1	97.17	1
Ireland	1	100	1

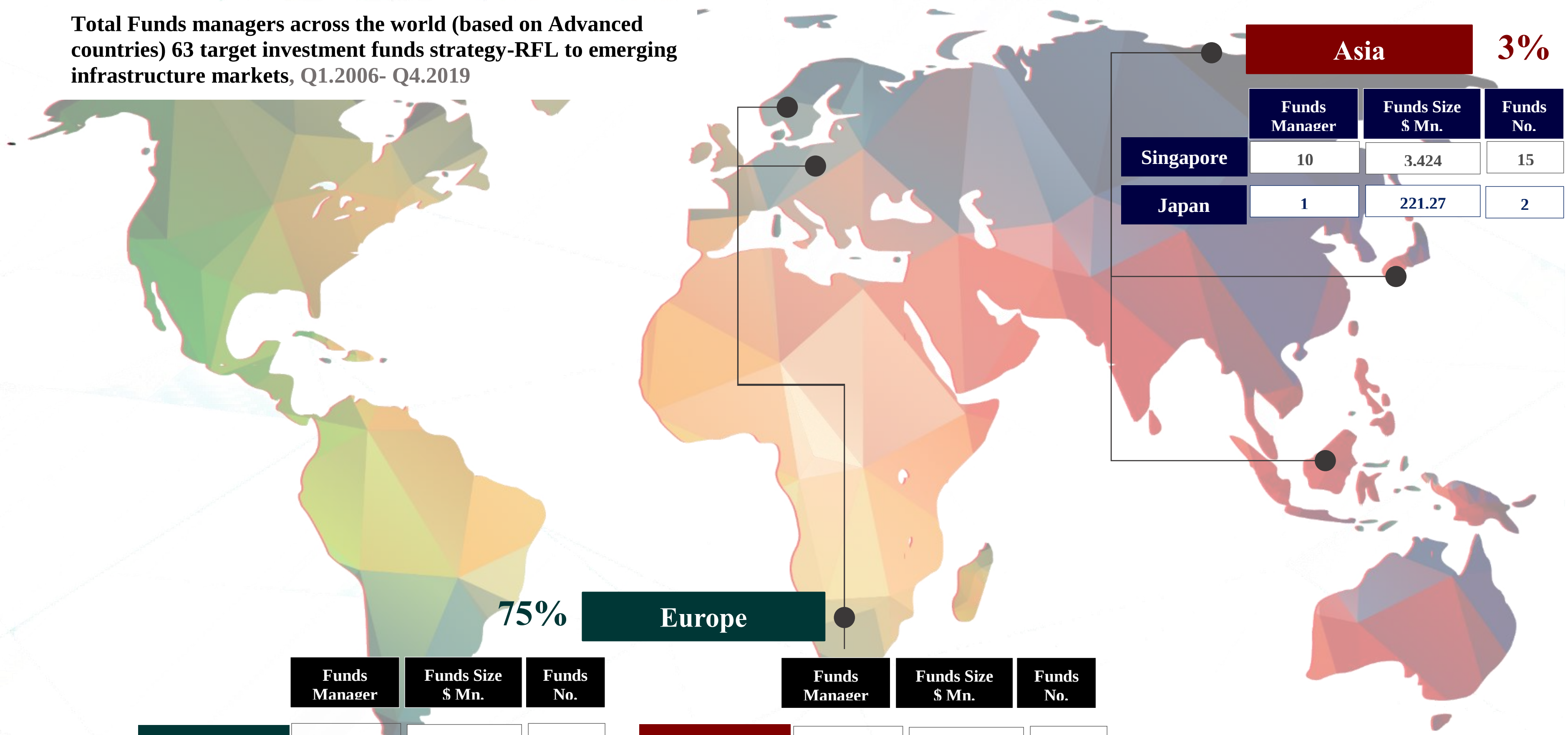
Australasia 16%

	Funds Manager	Funds Size $ Mn.	Funds No.
Australasia	7	30,364.39	16

Represents Funds managers holding GFL and RFL funds vehicles

Figure 5.19-Geographical Distribution of Global Fund Managers Targeting the Investment Fund Strategy RFL in Emerging Infrastructure Markets (Source: Preqin; author's own analysis).

Total Funds managers across the world (based on Advanced countries) 63 target investment funds strategy-RFL to emerging infrastructure markets, Q1.2006- Q4.2019



Asia 3%

	Funds Manager	Funds Size $ Mn.	Funds No.
Singapore	10	3.424	15
Japan	1	221.27	2

Europe 75%

	Funds Manager	Funds Size $ Mn.	Funds No.
UK	17	16,598.69	23
France	9	8,622.55	10
Germany	8	3,079.25	9
Italy	1	5,443.89	2
Luxembourg	3	2,773.32	4
Portugal	2	206.09	2

	Funds Manager	Funds Size $ Mn.	Funds No.
Switzerland	2	566.65	2
Norway	2	249.8	3
Netherlands	3	2,072.93	5
Belgium	1	178.36	1
Spain	6	338.16	6

Table 5.8-Distribution Analysis of Fund Vehicles Geographical Exposure versus Geographical Focus

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Funds global Target	Total no. global target funds	2	11	10	11	16	8	18	25	23	22	33	39	16	30	**264**
	Total global target funds values (USD MN.)	2,250.94	13,575.97	12,688.55	7,799.95	14,713.23	2,813.03	17,594.98	33,703.32	22,249.07	25,618.52	60,043.91	36,453.49	24,454.17	61,024.02	**334,983.15**
Funds EIM target	Total no. funds EIM target	1	1	2	2	2	1	0	3	3	1	2	2	1	1	**22**
	Total EM target fund values (USD MN.)	730.5	300	1,025	904.95	480.88	207.41	0	2,689.34	1,106.35	125.5	947.09	3,200	500	1,230	**13,447.02**
Funds' geographical exposure to EM	Total no. of funds exposed to European region	12	9	13	2	7	8	11	10	5	17	19	20	13	8	**154**
	Total fund values exposed to European region (USD MN.)	18,616.84	7,356.94	9,497.18	2,376.43	4,811.39	11,185.99	5,094.16	5,945	4,294	9,790.59	11,555.27	13,843.37	10,138.25	11,489.56	**125,994.97**
	Total no. of funds exposed to Asian region	2	2	3	4	2	3	3	2	1	3	5	2	0	1	**33**
	Total fund values exposed to Asian region (USD MN.)	192	5,291.86	1,727.6	1,618.5	639.51	1,284.3	1,251.12	2,337.05	3,100	943.5	2,985	104.15	0	95.04	**21,569.63**
	Total no. of funds exposed to Latin America & Caribbean region	0	0	1	2	1	2	2	3	0	3	0	2	1	1	**18**
	Total fund values exposed to Latin America & Caribbean region (USD MN.)	0	0	160	260	1,155	500	1,147	2,103.2	0	150	0	248.29	500	95.04	**6,318.53**
	Total no. of funds exposed to Africa & Middle East region	2	2	1	0	1	2	1	0	3	2	0	3	1	0	**18**
	Total fund values exposed to Africa & Middle East region (USD MN.)	235	5,630	105.21	0	101.68	518	66.52	0	1,409.68	915.1	0	1,518	180.50	0	**10,679.69**
	Aggregate fund numbers exposed to EM	**16**	**13**	**18**	**8**	**11**	**15**	**17**	**15**	**9**	**25**	**24**	**27**	**15**	**10**	**223**
	Aggregate fund values exposed to EM (USD MN.)	**19,043.84**	**18,278.80**	**11,489.99**	**4,254.93**	**6,707.58**	**13,488.29**	**7,558.80**	**10,385.25**	**8,803.68**	**11,799.19**	**14,540.27**	**15,713.81**	**10,818.75**	**11,679.64**	**164,562.82**
Funds' geographical focus on EM	Total no. of funds focusing on to European region	2	7	4	1	4	2	2	7	6	8	8	3	5	3	**62**
	Total fund values focusing on European region (USD MN.)	1,032.43	1,527.43	2,067.23	62.06	1,056.72	156.09	375.91	2,066.91	2,445.53	2,763.74	1,718.99	1,561.52	598.42	1,024.48	**18,457.46**
	Total no. of funds focusing on Asian region	7	4	5	4	8	4	11	14	11	5	7	8	3	3	**94**
	Total fund values focusing on Asian region (USD MN.)	3,697.2	1,529.25	1,141.51	2,647.45	1,914.16	291.18	3,261.39	4,825.5	9696	3,702.86	7,244.89	6,668.87	2,254.48	1,213.57	**50,088.31**
	Total no. of funds focusing on Latin America & Caribbean region	4	2	1	5	10	4	7	0	5	9	6	1	4	2	**60**
	Total fund values focusing on Latin America & Caribbean region (USD MN.)	2,328.92	360.86	217.96	1,517.7	1,786.48	1,482.02	1,776.74	0	1,526.17	2,340.54	1,247.66	770	416.98	101.26	**15,873.29**
	Total no. of funds focusing on Africa & Middle East region	0	1	0	0	0	4	1	1	0	1	0	1	1	0	**10**
	Total fund values focusing on Africa & Middle East region (USD MN.)	0	64.53	0	0	0	422.27	50	208.6	0	321.15	0	50	433.41	0	**1,549.96**
	Aggregate fund numbers focusing on EM	**13**	**14**	**10**	**10**	**22**	**14**	**21**	**22**	**22**	**23**	**21**	**13**	**13**	**8**	**226**
	Aggregate fund values focusing on EM (USD MN.)	**7,058.55**	**3,482.07**	**3,426.70**	**4,227.21**	**4,757.36**	**2,351.56**	**5,464.04**	**7,101.01**	**13,667.70**	**9,128.29**	**10,211.54**	**9,050.39**	**3,703.29**	**2,339.31**	**85,969.02**
North America & Australasia	Total no. of North American and Australian funds focus	1	8	0	3	8	5	8	10	15	14	16	14	10	6	**118**
	Total North American and Australian fund focus values (USD MN.)	4,000	8,720.23	0	4,800.25	3,319.68	3,448	4,140.89	5,141.46	11,254.47	8,051.06	6,540.53	4,337	17,075.5	2,573.2	**83,402.27**

Source: Preqin; Author's own analysis ((this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Table 5.9-Detailed of Infrastructure Investment Fund Vehicles Targeting EIM

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Global fund vehicles (GFL)	Total no. GFL vehicles	7	15	11	19	17	11	12	22	26	22	30	32	16	32	**272**
	Total no. GFL vehicle values (USD MN.)	5,954.88	18,477.94	7,712.89	11,011.79	11,289.07	3,917.93	12,326.12	23,653.67	24,714.44	17,635.11	45,440	34,331.90	20,513.85	62,972.65	**299,952.24**
Regional fund vehicles (RFL)	Total no. of advanced countries' funds targeting EM	9	13	9	2	4	2	11	7	2	11	14	19	6	4	**113**
	Total values of advanced countries' funds targeting EM (USD MN.)	12,572.04	10,205.51	5,281.87	856.5	2,748.59	1,050.08	5,849.82	4,193.43	3,081.08	4,985.09	20,479.54	11,543.76	5,809.28	3,097.52	**91,754.11**
	Total no. of emerging countries' funds targeting EM	0	1	1	3	5	4	2	3	0	5	1	6	1	1	**33**
	Total value of emerging countries' funds targeting EM (USD MN.)	0	3,168.86	211	1,341	2,017.87	1,044.3	1,098.52	4,151.85	0	928	1,500	1,014.2	117.4	95.04	**16,688.04**
	Aggregate no. of RFL vehicles targeting EM	**9**	**14**	**10**	**5**	**9**	**6**	**13**	**10**	**2**	**16**	**15**	**25**	**7**	**5**	**146**
	Aggregate value of RFL vehicles targeting EM (USD MN.)	**12,572.04**	**13,374.37**	**5,492.87**	**2,197.50**	**4,766.46**	**2,094.38**	**6,948.34**	**8,345.28**	**3,081.08**	**5,913.09**	**21,979.54**	**12,557.96**	**5,926.68**	**3,192.56**	**108,442.15**
Local fund vehicles (LFL)	Total no. of advanced countries' funds targeting advanced countries	5	11	13	5	19	14	23	27	26	34	38	32	25	13	**285**
	Total value of advanced countries' funds targeting advanced countries (USD MN.)	9,748.79	9,093.12	14,122.34	7,218.3	11,429.5	13,610.51	11,395.64	22,742.27	17,903.7	25,119.51	15,551.62	15,808.72	26,906.11	11,366.13	**212016.26**
	Total no. of emerging countries' funds targeting EM	10	7	6	5	13	9	16	15	18	12	11	6	6	5	**139**
	Total value of emerging countries' funds targeting EM (USD MN.)	4,669.79	3,411.64	1,302.14	1,559.7	2,392.02	2,343.2	4,088.61	4,253.02	11,382.12	5,733.7	9,210.78	6,056.11	2,771.66	1,314.83	**110489.32**
	Total no. of RoW countries' funds targeting RoW countries	2	0	0	0	1	3	0	1	0	1	2	0	1	0	**11**
	Total value of RoW countries' funds targeting RoW countries t (USD MN.)	138.7	0	0	0	101.68	342.27	0	26.62	0	321.15	101.45	0	433.41	0	**1465.28**
	Aggregate no. of LFL vehicles targeting EM	**17**	**18**	**19**	**10**	**33**	**26**	**39**	**43**	**44**	**47**	**51**	**38**	**32**	**18**	**435**
	Aggregate value of LFL vehicles targeting EM (USD MN.)	**14,557.28**	**12,504.76**	**15,424.48**	**8,778.00**	**13,923.20**	**16,295.98**	**15,484.25**	**27,021.91**	**29,285.82**	**31,174.36**	**24,863.85**	**21,864.83**	**30,111.18**	**12,680.96**	**273970.86**

Source: Preqin; Author's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

5.8 Analysis of Infrastructure Investment Fund Vehicles: Industry Focus

The analysis of GFL and RFL vehicles found that a total of 418 fund vehicles, managed by 238 fund managers, sought investment of USD 408,340.84 MN. in various infrastructure industries. The second level of the assessment of PEIF investment vehicles concerns investments with a focus on industry strategy[28]. The analysis demonstrated that various approaches to investment strategies investing in the infrastructure sphere were employed, with the majority of fund vehicles targeting investment in capital intensive assets and businesses, focusing on regulated, or long-term, contract activities in sectors such as energy and transport, as illustrated in Figure 5.20.

The most common fund structure was that of 139 funds (circa 53%) that sought to diversify their investment fund portfolio within the economic infrastructure industry, with a stronger presence than those with an industry focus across the period examined (2006-2019), as illustrated in Figure 5.21, which shows that the largest infrastructure funds in the market varied their investment among different sectors. There was also a strong correlation between the assessment of investment strategies with an industry focus and the geographical assessment, by region, as the investors aimed to select the most profitable infrastructure assets in which to invest. For instance, Global Infrastructure Partners Capital Solutions Fund invested in debt instruments connected with the energy, transport, water, and waste sectors in greenfield, brownfield, and secondary market infrastructure assets on a global scale, targeting an investment size of USD 20 to 250 MN., per asset (Preqin, n.d.).

The second most prevalent form of fund with an industry focus was that of a considerable number of funds that targeted a wide array of economic assets and social infrastructure. In total, there were 97 of these funds, representing 22.5% of the aggregate number of funds focusing on industry, across the period examined. These diversified funds aimed to invest in areas in which they could have a significant impact,

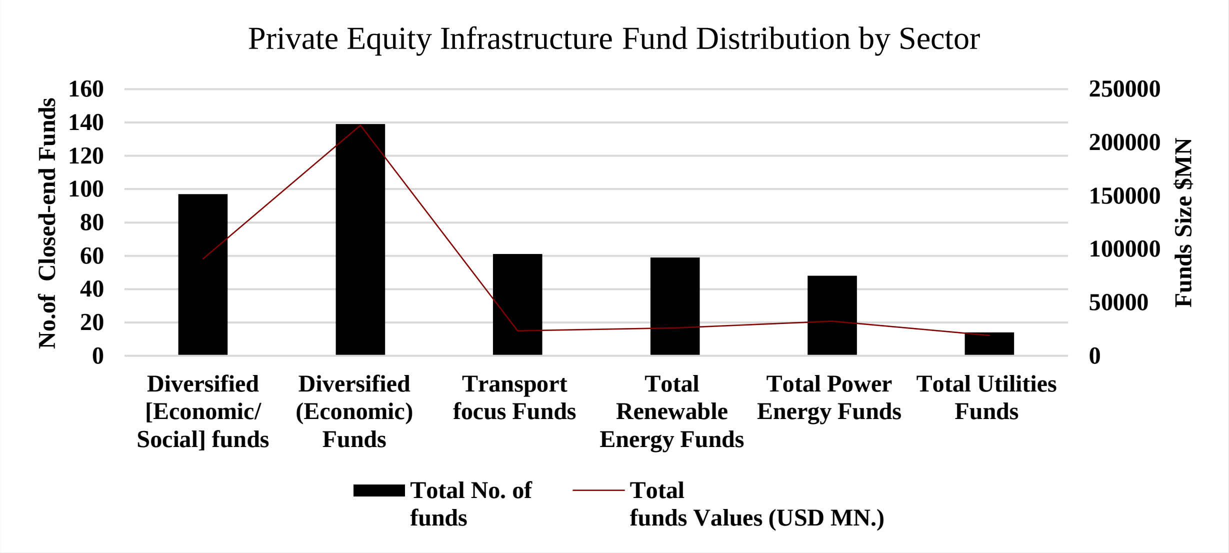
[28]A detailed analysis is provided at the end of this section in Table 5.10. **D**distribution of global funds, **GFL and RFL, with an industry focus** in EM, Q1-2006-Q4-2019, (USD MN.), and Table 5.11-**B**reakdown of fund vehicles, **GFL and RFL industry focus**, Q1-2006-Q4-2019, (USD MN.).

with the target of providing moderate capital growth, and a sustainable return over the long-term.

Despite the significant range of economic diversification in the investment funds' focus, the fund vehicles tended to concentrate on a specific sector, particularly the transport and renewable energy industries, which achieved a similar rank, with 61 funds focusing on the transport sector, and 59 on the renewable energy sector, representing 14.5% and 14.1% respectively, of the funds focusing on a particular sector. However, in terms of fund size, these two forms of sector-focused funds recorded a very low rate at the final close, accounting for USD 23,476.09 MN. for transport-focused industry investment, and USD 26,156.61 MN. for renewable energy industry-focussed investment (circa 5.7% and 6.4% respectively). Moreover, the analysis found that the fund managers continued to structure their fund vehicles around a focus on the transport sector across the period examined, despite the competition with institutional investors, registering only a relatively moderate range for the period 2012-2019, with five to nine fund vehicles with a transport industry focused investment strategy, as shown in Figure 5.21.

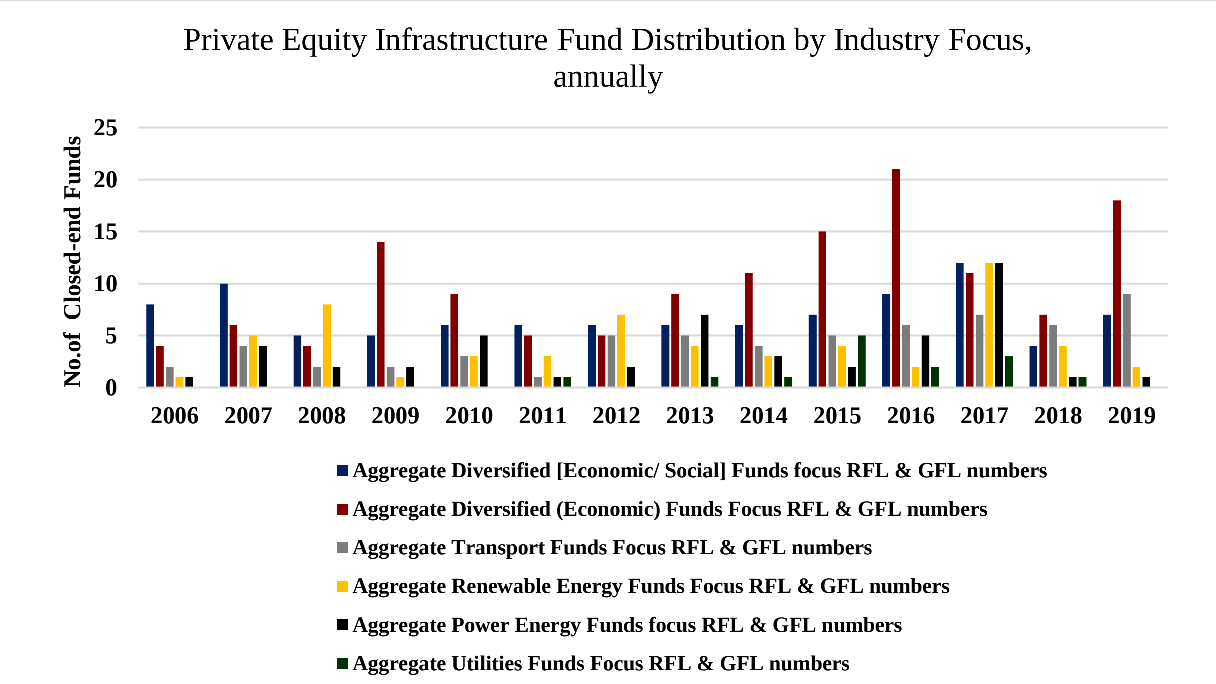
Finally, funds with a conventional power energy industry focus followed a similar pattern in terms of fund size and number, achieving minimum interest, with 48 funds (circa 11.4%) with this focus committing USD 32,434.99 MN. (circa 8%) across the total funds with a sector-specific investment strategy.

Figure 5.20-PEIF Vehicles, GFL and RFL Industry Focus



Source: Preqin; Author's own analysis

Figure 5.21-Breakdown of PEIF Vehicles, GFL and RFL Industry Focus, Distributed Annually



Source: Preqin; Author's own analysis

Since the analysis revealed that fund managers dedicated a number of fund vehicles to targeting investment in renewable energy, transport, and conventional power energy assets, namely specific infrastructure sectors, a detailed descriptive exploration of the three particular funds with an industry focus was conducted, and is provided in the next sub-section, in order to present a comprehensive, in-depth assessment of the most prominent infrastructure assets industries invested in, in EM.

5.8.1 Analysis of Infrastructure Investment Fund Vehicles: Specific Industry Focus Strategy

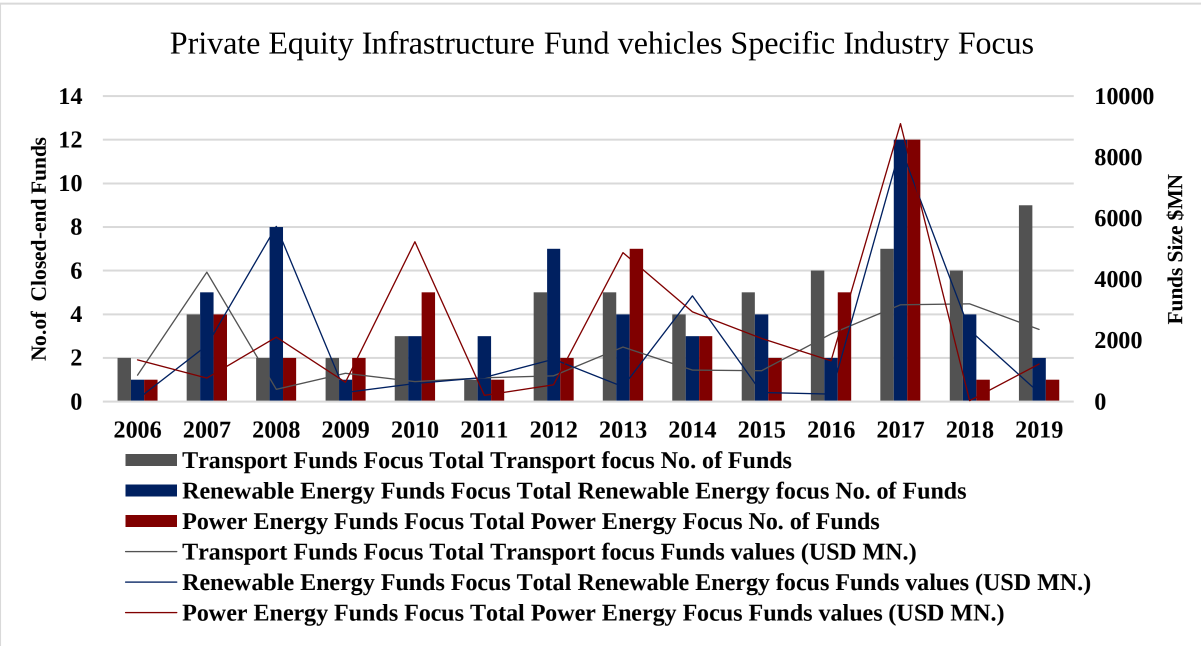
The detailed examination of the key sectoral market trends, in terms of infrastructure investment fund vehicles across the timeframe of last 14 years emphasized the diverse nature of the market. The assessment of the volume of infrastructure investment with a specific fund focus found that fund managers sought to attract investors to invest in the transport industry, specifically in railways, bridges, airports and ports, roads, and highways. As previously stated, these totalled 61 fund vehicles that reached a total final close of USD 23,476.09 MN., as shown in Figure 5.22. While the highest number of funds, nine fund vehicles in total, reached a final close in the market in 2019 of USD 2,359.82 MN., the lowest rate occurred in 2011, with the low rate of funds targeting the transport industry illustrating the limited opportunities offered by fund managers to invest in transport assets.

There was a relatively low recorded rate of fund investment in the renewable energy sector (59 focused fund vehicles, USD 26,156.61 MN.), compared with the high value of deal assets and low cash flow at the beginning of the period in question. Infrastructure investment fund vehicles with a shadow industry-based approach that concentrated on renewable energy assets consistently employed different options to prompt the appetite of investors to invest in renewable infrastructure assets, and to maintain their presence in the market across the period examined. This based on in depth assessment of industry focus investment relates the fund vehicles. Further more, it’s apparent that implementing the Sustainable Development Goals (SGD) agenda in infrastructure assets not only concerns the government and institutional investors of a country, but also encourages fund managers to consider it in their fund strategy. Recently, a number of fund managers included in their investment fund vehicles a strategy to meet the SDG agenda.

In terms of traditional power energy fund vehicles, the assessment highlighted a considerable size of investment over the timeframe concerned, with 48 fund vehicles targeting regulated assets, namely the conventional power energy industry. In terms of the fund vehicles' size, the fund managers successfully attracted investors to invest in fossil energy assets, with a total commitment of USD 32,434.99 MN., which was noteworthy in the context of investment in other specific sectors, such as the transport and renewable energy industries.

Despite the fluctuation across the period in question, the fund managers of conventional power energy funds retained a presence in the market, with a significant number recorded in 2017. This was reflected in the primary acquisition targets of power generation, namely independent power projects and related assets with unique financial or physical characteristics, which totalled 12 fund vehicles, reaching a final close of USD 9,098.53 MN. Moreover, these funds considered investment in various regulated sub-sectors, such as industrial projects with power/steam applications or requirements, distribution utilities, transmission projects, district heating and cooling, contracted pipeline, and other midstream assets.

Figure 5.22-Breakdown of PEIF Vehicles, GFL and RFL Specific Industry Focus in EM



Source: Preqin; Author's own analysis

Table 5.10-Distribution of GFL and RFL within Industry Focus in EM

			2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Infra. Primary Sector (Funds)	**Diversified [Economic/ Social] Funds Focus**	**Total Diversified [Economic/ Social] No. funds**	8	10	5	5	6	6	6	6	6	7	9	12	4	7	**97**
		Total. Diversified [Economic/ Social] funds values (USD MN.)	5871.42	6230.98	2372.08	979.51	3062.7	2995.94	5499.41	8915.29	5104.28	4148.68	10592.1	9675.87	4873.34	20693.4	**91015**
	Diversified (Economic) Funds Focus	**Total Diversified (Economic) No. Funds**	4	6	4	14	9	5	5	9	11	15	21	11	7	18	**139**
		Total. Diversified (Economic) Funds values (USD MN.)	10335.06	18774.86	2581.57	10382.77	6508.22	1235.30	11002.36	13359.90	12271.25	14117.81	52738.04	8206.74	13033.44	41594.30	**216141.62**
	Transport Funds Focus	**Total Transport focus No. of Funds**	2	4	2	2	3	1	5	5	4	5	6	7	6	9	**61**
		Total Transport focus Funds values (USD MN.)	867	4235.26	400.01	923.54	658.5	780	840.77	1786.87	1030.5	1013.41	2218.33	3165.47	3196.61	2359.82	**23476.09**
	Renewable Energy Funds Focus	**Total Renewable Energy focus No. of Funds**	1	5	8	1	3	3	7	4	3	4	2	12	4	2	**59**
		Total Renewable Energy focus Funds values (USD MN.)	80.24	1841.22	5730.44	292.47	593.36	791.07	1385.07	488.82	3457.19	300.95	247.04	8322.68	2338.86	287.2	**26156.61**
	conventional Power Energy Funds Focus	**Total conventional Power Energy Focus No. of Funds**	1	4	2	2	5	1	2	7	3	2	5	12	1	1	**48**
		Total conventional Power Energy Focus Funds values (USD MN.)	1368	769.99	2110.36	631	5232.65	200	546.85	4878.03	2932.3	2068	1338.98	9098.53	30.3	1230	**32434.99**
	Utilities Funds Focus	**Total Utilities No. Funds**	0	0	0	0	0	1	0	1	1	5	2	3	1	0	**14**
		Total. Utilities Funds values (USD MN.)	0	0	0	0	0	10	0	2568.04	3000	1898.35	285	8420.57	2934.57	0	**19116.53**

Source: Preqin; Author’s own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Table 5.11-Breakdown of Fund Vehicles-GFL and RFL-Industry Focus

				2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Infra. Primary Sector (Funds)	Diversified [Economic/ Social] Funds Focus	Advanced Countries	Total Diversified [Economic/ Social] No. funds	8	6	5	5	5	5	6	6	6	6	8	8	3	5	**82**
			Total. Diversified [Economic/ Social] funds values (USD MN.)	5871.42	3740.98	2372.08	979.51	2637.7	2645.94	5499.41	8915.29	5104.28	4076.85	9092.1	9141.77	4803.41	20273.4	**85154.14**
		Emerging Countries	Total. Diversified [Economic/ Social] funds values (USD MN.)	0	3	0	0	1	1	0	0	0	1	1	4	1	2	**14**
			Total. Diversified [Economic/ Social] funds values (USD MN.)	0	2400	0	0	425	350	0	0	0	71.83	1500	534.1	69.93	420	**5770.86**
		RoW Countries	Total. Diversified [Economic/ Social] funds values (USD MN.)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
			Total. Diversified [Economic/ Social] funds values (USD MN.)	0	90	0	0	0	0	0	0	0	0	0	0	0	0	**90**
	Aggregate Diversified [Economic/ Social] Funds focus RFL & GFL numbers			**8**	**10**	**5**	**5**	**6**	**6**	**6**	**6**	**6**	**7**	**9**	**12**	**4**	**7**	**97**
	Aggregate Diversified [Economic/ Social] Funds focus RFL & GFL Values (USD MN.)			**5871.42**	**6230.98**	**2372.08**	**979.51**	**3062.7**	**2995.94**	**5499.41**	**8915.29**	**5104.28**	**4148.68**	**10592.1**	**9675.87**	**4873.34**	**20693.4**	**91015**
	Diversified (Economic) Funds Focus	Advanced Countries	Total Diversified (Economic) No. Funds	3	4	4	12	7	4	4	8	7	14	17	8	5	10	**107**
			Total. Diversified (Economic) Funds values (USD MN.)	9,604.56	13764.86	2581.57	9272.77	5152.82	1035.3	9970.36	11685.9	11747.48	14017.81	52118.04	7356.74	12416.04	39836.22	**200560.47**
		Emerging Countries	Total Diversified (Economic) No. Funds	0	2	0	2	2	0	1	1	4	1	3	3	1	8	**28**
			Total. Diversified (Economic) Funds values (USD MN.)	0.00	5010	0	1110	1355.4	0	1032	1674	523.77	100	320	850	500	1758.08	**14233.25**
		RoW Countries	Total Diversified (Economic) No. Funds	1	0	0	0	0	1	0	0	0	0	1	0	1	0	**4**
			Total. Diversified (Economic) Funds values (USD MN.)	730.50	0	0	0	0	200	0	0	0	0	300	0	117.4	0	**1347.9**
	Aggregate Diversified (Economic) Funds Focus RFL & GFL numbers			**4**	**6**	**4**	**14**	**9**	**5**	**5**	**9**	**11**	**15**	**21**	**11**	**7**	**18**	**139**
	Aggregate Diversified (Economic) Funds Focus RFL & GFL Values (USD MN.)			**10335.06**	**18774.86**	**2581.57**	**10382.77**	**6508.22**	**1235.3**	**11002.36**	**13359.9**	**12271.25**	**14117.81**	**52738.04**	**8206.74**	**13033.44**	**41594.3**	**216141.62**
	Transport Funds Focus	Advanced Countries	Total Transport focus No. of Funds	1	3	1	2	3	1	4	5	4	3	5	7	5	6	**50**
			Total Transport focus Funds values (USD MN.)	737	4092.36	189.01	923.54	658.5	780	752.22	1786.87	1030.5	921.6	2018.33	3165.47	3138.22	1838.43	**22032.05**
		Emerging Countries	Total Transport focus No. of Funds	1	0	1	0	0	0	1	0	0	2	1	0	1	3	**10**
			Total Transport focus Funds values (USD MN.)	130	0	211	0	0	0	88.55	0	0	91.81	200	0	58.39	521.39	**1301.14**
		RoW Countries	Total Transport focus No. of Funds	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
			Total Transport focus Funds values (USD MN.)	0	142.9	0	0	0	0	0	0	0	0	0	0	0	0	**142.9**
	Aggregate Transport Funds Focus RFL & GFL numbers			**2**	**4**	**2**	**2**	**3**	**1**	**5**	**5**	**4**	**5**	**6**	**7**	**6**	**9**	**61**
	Aggregate Transport Funds Focus RFL & GFL Values (USD MN.)			**867**	**4235.26**	**400.01**	**923.54**	**658.5**	**780**	**840.77**	**1786.87**	**1030.5**	**1013.41**	**2218.33**	**3165.47**	**3196.61**	**2359.82**	**23476.09**
	Renewable Energy Funds Focus	Advanced Countries	Total Renewable Energy focus No. of Funds	1	5	8	1	3	3	6	4	2	4	2	10	3	2	**54**
			Total Renewable Energy focus Funds values (USD MN.)	80	1841.22	5730.44	292.47	593.36	791.07	1318.55	488.82	2707.19	300.95	247.04	8006.68	2288.86	287.2	**24974.09**
		Emerging Countries	Total Renewable Energy focus No. of Funds	0	0	0	0	0	0	1	0	0	0	0	2	1	0	**4**
			Total Renewable Energy focus Funds values (USD MN.)	0	0	0	0	0	0	66.52	0	0	0	0	316	50	0	**432.52**
		RoW Countries	Total Renewable Energy focus No. of Funds	0	0	0	0	0	0	0	0	1	0	0	0	0	0	**1**
			Total Renewable Energy focus Funds values (USD MN.)	0	0	0	0	0	0	0	0	750	0	0	0	0	0	**750**
	Aggregate Renewable Energy Funds Focus RFL & GFL numbers			**1**	**5**	**8**	**1**	**3**	**3**	**7**	**4**	**3**	**4**	**2**	**12**	**4**	**2**	**59**
	Aggregate Renewable Energy Funds Focus RFL & GFL Values (USD MN.)			**80.24**	**1841.22**	**5730.44**	**292.47**	**593.36**	**791.07**	**1385.07**	**488.82**	**3457.19**	**300.95**	**247.04**	**8322.68**	**2338.86**	**287.2**	**26156.61**

Source: Preqin; Author’s own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Continue-Table 5.11-Breakdown of Fund Vehicles-GFL and RFL-Industry Focus

				2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Infra. Primary Sector (Funds)	conventional Power Energy Funds Focus	Advanced Countries	Total Conventional Power Energy Focus No. of Funds	1	1	2	1	2	1	1	6	3	1	3	10	0	1	**33**
			Total Conventional Power Energy Focus Funds values (USD MN.)	1368	132	2110.36	400	4281.09	200	500.45	4637.03	2932.3	2000	1188.88	8557.47	0	1230	**29537.58**
		Emerging Countries	Total Conventional Power Energy Focus No. of Funds	0	2	0	1	3	0	1	1	0	1	2	1	1	0	**13**
			Total Conventional Power Energy Focus Funds values (USD MN.)	0	437.99	0	231	951.56	0	46.4	241	0	68	150.1	149.17	30.3	0	**2305.52**
		RoW Countries	Total Conventional Power Energy Focus No. of Funds	0	1	0	0	0	0	0	0	0	0	0	1	0	0	**2**
			Total Conventional Power Energy Focus Funds values (USD MN.)	0	200	0	0	0	0	0	0	0	0	0	391.89	0	0	**591.89**
	Aggregate Conventional Power Energy Funds focus RFL & GFL numbers			**1**	**4**	**2**	**2**	**5**	**1**	**2**	**7**	**3**	**2**	**5**	**12**	**1**	**1**	**48**
	Aggregate Conventional Power Energy Funds focus RFL & GFL Values (USD MN.)			**1368**	**769.99**	**2110.36**	**631**	**5232.65**	**200**	**546.85**	**4878.03**	**2932.3**	**2068**	**1338.98**	**9098.53**	**30.3**	**1230**	**32434.99**
	Utilities Funds Focus	Advanced Countries	Total Utilities No. Funds	0	0	0	0	0	0	0	1	1	2	2	2	1	0	**9**
			Total. Utilities Funds values (USD MN.)	0	0	0	0	0	0	0	2568.04	3000	988.19	285	8370.57	2934.57	0	**18146.37**
		Emerging Countries	Total Utilities No. Funds	0	0	0	0	0	1	0	0	0	0	0	1	0	0	**2**
			Total. Utilities Funds values (USD MN.)	0	0	0	0	0	10	0	0	0	0	0	50	0	0	**60**
		RoW Countries	Total Utilities No. Funds	0	0	0	0	0	0	0	0	0	3	0	0	0	0	**3**
			Total. Utilities Funds values (USD MN.)	0	0	0	0	0	0	0	0	0	910.16	0	0	0	0	**910.16**
	Aggregate Utilities Funds Focus RFL & GFL numbers			**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	**5**	**2**	**3**	**1**	**0**	**14**
	Aggregate Utilities Funds Focus RFL & GFL Values (USD MN.)			**0**	**0**	**0**	**0**	**0**	**10**	**0**	**2568.04**	**3000**	**1898.35**	**285**	**8420.57**	**2934.57**	**0**	**19116.53**

Source: Preqin; Author's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

5.9 Analysis of Infrastructure Investment Fund Vehicles: Primary Strategy Concentration

As discussed in Chapters Two and Three, investment in infrastructure assets involves multifaceted and complex mechanisms, and a range of elements behind such infrastructure funds exist in the infrastructure investment industry that are represented by risk and return elements (PWC, 2017D). In particular, the forecasting of the degree of risk, the amount of cash flow, and the regulated return percentage varies, depending on the geographical area, the type of infrastructure asset, and the maturity level of the project, which is to say whether it is at the brownfield or greenfield stage. This section presents a detailed breakdown of infrastructure investment fund vehicles in the context of various possible strategies[29], as illustrated in Figure 5.23.

The assessment found that various forms of infrastructure investment strategy were employed by fund managers, the most favorable of which across the period examined, in terms of fund vehicle size, was Value Added Strategy, with aggregate fund managers attracting various investors, and accounting for USD 128,968.19 MN. (circa 31.5%) for 68 fund vehicles.

The current market highlighted the significant need for Core Plus infrastructure investment strategies for a number of reasons: 1) to protect cash flow from inflation; 2) they are branded with economic stability against fluctuations, namely low volatility; and 3) they represent a resource for regular long term investment (Kkon et al., 2019). The second most significant investment strategy, in terms of fund vehicle size, was the Core Plus investment strategy, consisting of 99 closed-end funds that reached a final close in the market of USD 110,918.25 MN. (circa 27.2%).

Although a significant volume of investment strategies, in terms of fund size, employed Value-Added and Core Plus fund vehicles, the Core infrastructure strategy also possessed a significant presence in the market in terms of the quantity of funds, with a total of 84 various fund vehicles committing USD 72,824.27 MN. (circa 17.8% of the

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[29]A detailed analysis is provided at the end of this section in Table 5.12-Distribution of GFL and RFL vehicles targeting investment in EM, Q1-2006-Q4-2019, (USD MN.), and Table 5.13-Breakdown of **GFL and RFL vehicles with an infrastructure investment strategy**, Q1-2006-Q4-2019, (USD MN.).

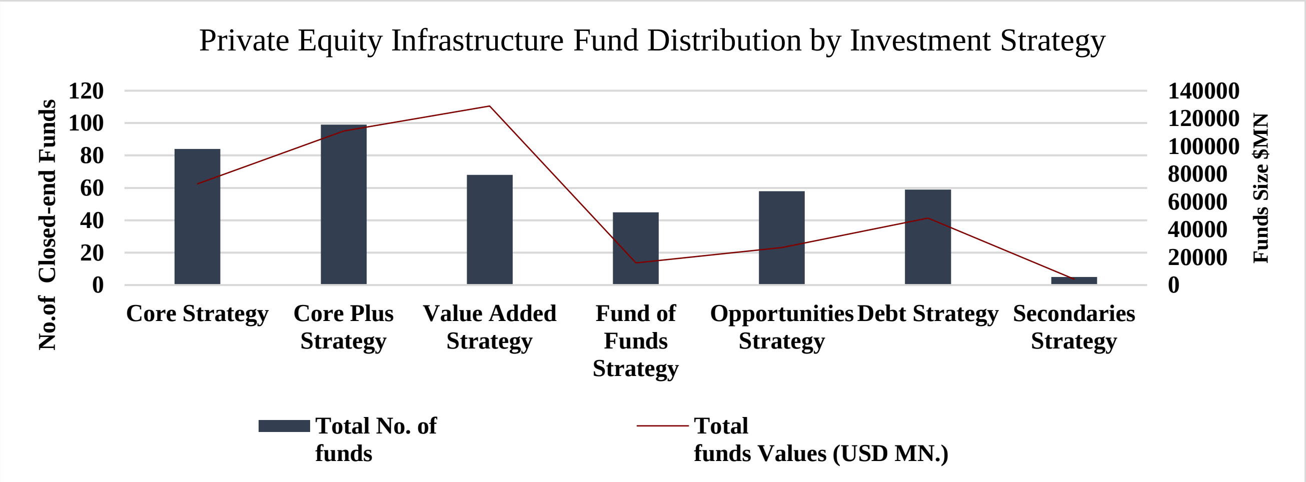
aggregate fund scale across the timeframe examined). For instance, Alterna Core Capital Asset Fund I, launched in 2009, was a debut vehicle managed by Alterna Capital Partners that concentrated on core capital assets with specific features, such as developed physical and long-life assets in OECD markets. In terms of its industry focus, the vehicle targeted the energy and transport sectors, with a specific sub-sector of sea ports, railways, and transportation facilities. Similarly, Alinda Infrastructure Fund III, launched by Alinda Capital Partners, committed USD 1,000 MN. in 2016. The fund preferred steady, predictable cash flows, alongside limited commodity, and therefore targeted core infrastructure opportunities in OECD countries, or European transport assets, energy, and telecommunications sectors.

The analysis captured the annual difference of Core and Core Plus infrastructure investment strategies, as illustrated in Figure 5.24. The vehicles with a Core Plus strategy were ranked the highest across the period in question, with the highest weight of fund vehicles with a Core Plus strategy in 2017, which had a total of 16 Core Plus funds. The fund managers targeted Core infrastructure, particularly in the second half of the period, with the quantity of Core fund vehicles below seven in the first seven years, but increasing to 11 diverse funds in 2016.

Similarly, a low rate of debt finance strategies were registered at the beginning of the period examined, with an aggregate fund commitment of USD 48,325.17 MN for 59 fund vehicles. However, global fund managers increasingly targeted this form of investment strategy after the GFC, and in 2010 there were five fund vehicles focusing on providing debt to invest in infrastructure assets. Furthermore, over the course of the 14 years examined, debt finance investment strategies increased significantly to reach their highest rate in 2017, with 10 various fund vehicles. There were numerous drivers behind this escalation, the most prominent being: 1) the reduction in the role of banks for financing infrastructure assets as the market grew, and 2) economic instability and financial regulation directing fund managers to consider private debt strategies (Preqin, 2020).

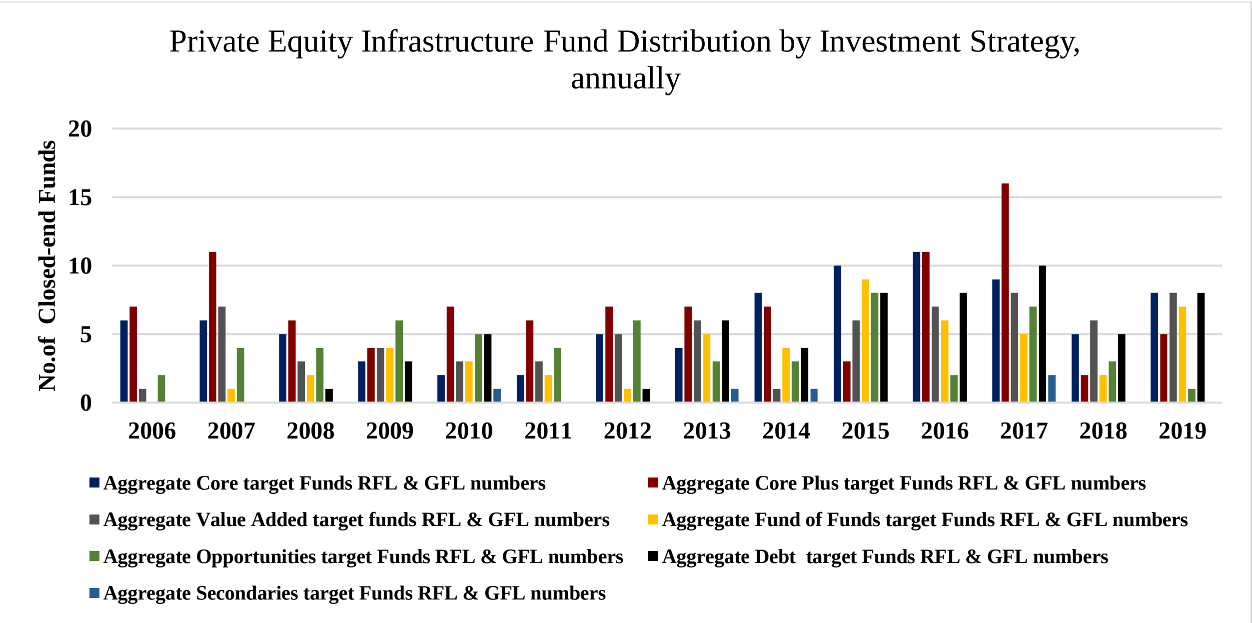
Moreover, the assessment found that the opportunistic investment fund strategy registered only a relatively low rate, in terms of fund size, with total of 58 fund vehicles launched by fund managers committing USD 27,103.17 (circa 6.6%) across the period in question. The largest fund commitment of these opportunistic investment strategies was that made by KIAMCO Power Energy Private Fund Special Asset Trust 3, which was launched in the market in 2013 by KDB Infrastructure Investments Asset Management, and reached a final close of USD 2,236.85 million, targeting investment in greenfield power plants and renewable energy infrastructure assets throughout the Asia region.

Figure 5.23-Breakdown of PEIF Vehicles, GFL and RFL-Infrastructure Investment Strategy



Source: Preqin; Author's own analysis

Figure 5.24-Breakdown of PEIF Vehicles, GFL and RFL Investment Strategy Target, Distributed Annually



Source: Preqin; Author's own analysis

Table 5.12-Distribution of GFL and RFL Vehicles Targeting Investment in Emerging Infrastructure Markets

			2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Infrastructure Investment Strategy (Funds)	Core Funds Target	Total Core target No. funds	6	6	5	3	2	2	5	4	8	10	11	9	5	8	**84**
		Total. Core target funds values (USD MN.)	10592.29	9383	3968.46	2293.71	567.47	1609.49	2813.6	1070.01	5199.07	5867.69	13458.77	4041.78	7216.2	4742.73	**7282.4.27**
	Core Plus Funds Target	Total Core Plus target No. Funds	7	11	6	4	7	6	7	7	7	3	11	16	2	5	**99**
		Total. Core Plus target Funds values (USD MN.)	6983.89	6072.11	4671.04	1447.3	3553.34	2044.87	2621.94	10236.51	12692.56	1379	20706.17	22804.79	7540.02	8164.71	**110918.25**
	Value Added Target	Total Value Added target No. of Funds	1	7	3	4	3	3	5	6	1	6	7	8	6	8	**68**
		Total Value Added target Funds values (USD MN.)	80	12750.3	2358.19	3601.86	3419.62	835.24	10444.4	6613.54	3600	5210.03	24543.8	7274	7118.44	41118.77	**128968.19**
	Fund of Funds Target	Total Fund of Funds target No. of Funds	0	1	2	4	3	2	1	5	4	9	6	5	2	7	**45**
		Total Fund of Funds target focus Funds values (USD MN.)	0	200	190.78	1862.45	1280.88	540.41	343.72	3153.94	960.18	1885.32	2594.91	1017.6	844.34	1031.39	**15905.92**
	Opportunities Funds Target	Total Opportunities target Focus No. of Funds	2	4	4	6	5	4	6	3	3	8	2	7	3	1	**58**
		Total Opportunities target Focus Funds values (USD MN.)	860.5	3442.9	1911.6	2950.14	1594.51	982.3	2846.07	2647.85	1926.2	1860	485.1	2366	2000	1230	**27103.17**
	Debt Funds Target	Total Debt target Focus No. of Funds	0	0	1	3	5	0	1	6	4	8	8	10	5	8	**59**
		Total Debt target Focus Funds values (USD MN.)	0	0	105.69	1038.83	5282.71	0	204.1	7838.2	3317.51	7346.16	5630.74	5985.69	1714.53	9860.98	**48325.14**
	Secondaries Funds Target	Total Secondaries target Focus No. of Funds	0	0	0	0	1	0	0	1	1	0	0	2	0	0	**5**
		Total Secondaries target Focus Funds values (USD MN.)	0	0	0	0	357	0	0	438.9	100	0	0	3400	0	0	**4295.9**

Source: Preqin; Author's own analysis

Table 5.13-Breakdown of GFL and RFL Vehicles within Infrastructure Investment Strategy

				2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Infrastructure Investment Strategy (Funds)	Core Funds Target	Advanced Countries	Total Core target No. funds	6	5	5	3	2	2	4	4	5	8	10	8	5	6	**73**
			Total. Core target funds values (USD MN.)	10592.29	9245.01	3968.46	2293.71	567.47	1609.49	2767.2	1070.01	5001.5	5782.78	13258.77	3591.78	7216.2	3684.73	**70649.4**
		Emerging Countries	Total Core target No. funds	0	1	0	0	0	0	1	0	3	2	1	1	0	2	**11**
			Total. Core target funds values (USD MN.)	0	137.99	0	0	0	0	46.4	0	197.57	84.91	200	450	0	1058	**2174.87**
		RoW Countries	Total Core target No. funds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
			Total. Core target funds values (USD MN.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Aggregate Core target Funds RFL & GFL numbers			**6**	**6**	**5**	**3**	**2**	**2**	**5**	**4**	**8**	**10**	**11**	**9**	**5**	**8**	**84**
	Aggregate Core target Funds RFL & GFL Values (USD MN.)			**10592.29**	**9383**	**3968.46**	**2293.71**	**567.47**	**1609.49**	**2813.6**	**1070.01**	**5199.07**	**5867.69**	**13458.77**	**4041.78**	**7216.2**	**4742.73**	**72824.27**
	Core Plus Funds Target	Advanced Countries	Total Core Plus target No. Funds	7	8	5	2	5	3	7	6	6	3	9	16	2	5	**84**
			Total. Core Plus target Funds values (USD MN.)	6983.89	5672.11	4460.04	337.3	2358.34	1484.87	2621.94	8562.51	11942.56	1379	18906.17	22804.79	7540.02	8164.71	**103218.25**
		Emerging Countries	Total Core Plus target No. Funds	0	2	1	2	2	2	0	1	0	0	1	0	0	0	**11**
			Total. Core Plus target Funds values (USD MN.)	0	310	211	1110	1195	360	0	1674	0	0	1500	0	0	0	**6360**
		RoW Countries	Total Core Plus target No. Funds	0	1	0	0	0	1	0	0	1	0	1	0	0	0	**4**
			Total. Core Plus target Funds values (USD MN.)	0	90	0	0	0	200	0	0	750	0	300	0	0	0	**1340**
	Aggregate Core Plus target Funds RFL & GFL numbers			**7**	**11**	**6**	**4**	**7**	**6**	**7**	**7**	**7**	**3**	**11**	**16**	**2**	**5**	**99**
	Aggregate Core Plus target Funds RFL & GFL Values (USD MN.)			**6983.89**	**6072.11**	**4671.04**	**1447.3**	**3553.34**	**2044.87**	**2621.94**	**10236.51**	**12692.56**	**1379**	**20706.17**	**22804.79**	**7540.02**	**8164.71**	**110918.25**
	Value Added Target	Advanced Countries	Total Value Added target No. of Funds	1	5	3	4	2	3	5	5	1	5	7	8	5	8	**62**
			Total Value Added target Funds values (USD MN.)	80	7450.3	2358.19	3601.86	2947.17	835.24	10444.4	6372.54	3600	5110.03	24543.8	7274	7001.04	41118.77	**122737.34**
		Emerging Countries	Total Value Added target No. of Funds	0	2	0	0	1	0	0	1	0	1	0	0	0	0	**5**
			Total Value Added target Funds values (USD MN.)	0	5300	0	0	472.45	0	0	241	0	100	0	0	0	0	**6113.45**
		RoW Countries	Total Value Added target No. of Funds	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**1**
			Total Value Added target Funds values (USD MN.)	0	0	0	0	0	0	0	0	0	0	0	0	117.4	0	**117.4**
	Aggregate Value Added target funds RFL & GFL numbers			**1**	**7**	**3**	**4**	**3**	**3**	**5**	**6**	**1**	**6**	**7**	**8**	**6**	**8**	**68**
	Aggregate Value added target Funds RFL & GFL Values (USD MN.)			**80**	**12750.3**	**2358.19**	**3601.86**	**3419.62**	**835.24**	**10444.4**	**6613.54**	**3600**	**5210.03**	**24543.8**	**7274**	**7118.44**	**41118.77**	**128968.19**
	Fund of Funds Target	Advanced Countries	Total Fund of Funds target No. of Funds	0	0	2	4	3	2	1	5	4	2	4	2	1	0	**30**
			Total Fund of Funds target focus Funds values (USD MN.)	0	0	190.78	1862.45	1280.88	540.41	343.72	3153.94	960.18	1813.49	2414.91	682.53	774.41	0	**14017.7**
		Emerging Countries	Total Fund of Funds target No. of Funds	0	0	0	0	0	0	0	0	0	1	2	3	1	7	**14**
			Total Fund of Funds target focus Funds values (USD MN.)	0	0	0	0	0	0	0	0	0	71.83	180	335.07	69.93	1031.39	**1688.22**
		RoW Countries	Total Fund of Funds target No. of Funds	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
			Total Fund of Funds target focus Funds values (USD MN.)	0	200	0	0	0	0	0	0	0	0	0	0	0	0	**200**
	Aggregate Fund of Funds target Funds RFL & GFL numbers			**0**	**1**	**2**	**4**	**3**	**2**	**1**	**5**	**4**	**3**	**6**	**5**	**2**	**7**	**45**
	Aggregate Fund of Funds target Funds RFL & GFL Values (USD MN.)			**0**	**200**	**190.78**	**1862.45**	**1280.88**	**540.41**	**343.72**	**3153.94**	**960.18**	**1885.32**	**2594.91**	**1017.6**	**844.34**	**1031.39**	**15905.92**

Source: Preqin; Author's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Continue-Table 5.13-Breakdown of GFL and RFL Vehicles within Infrastructure Investment Strategy

				2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Infrastructure Investment Strategy (Funds)	Opportunities Funds Target	Advanced Countries	Total Opportunities target Focus No. of Funds	0	1	4	5	2	4	3	3	2	7	1	3	2	1	**38**
			Total Opportunities target Focus Funds values (USD MN.)	0	1200	1911.6	2719.14	530	982.3	1659	2647.85	1600	1785.1	485	1482	1500	1230	**19731.99**
		Emerging Countries	Total Opportunities target Focus No. of Funds	1	2	0	1	3	0	3	0	1	1	1	4	1	0	**18**
			Total Opportunities target Focus Funds values (USD MN.)	130	2100	0	231	1064.51	0	1187.07	0	326.2	74.9	0.1	884	500	0	**6497.78**
		RoW Countries	Total Opportunities target Focus No. of Funds	1	1	0	0	0	0	0	0	0	0	0	0	0	0	**2**
			Total Opportunities target Focus Funds values (USD MN.)	730.5	142.9	0	0	0	0	0	0	0	0	0	0	0	0	**873.4**
	Aggregate Opportunities target Funds RFL & GFL numbers			**2**	**4**	**4**	**6**	**5**	**4**	**6**	**3**	**3**	**8**	**2**	**7**	**3**	**1**	**58**
	Aggregate Opportunities target Funds RFL & GFL Values (USD MN.)			**860.5**	**3442.9**	**1911.6**	**2950.14**	**1594.51**	**982.3**	**2846.07**	**2647.85**	**1926.2**	**1860**	**485.1**	**2366**	**2000**	**1230**	**27103.17**
	Debt Funds Target	Advanced Countries	Total Debt target Focus No. of Funds	0	0	1	3	5	0	1	6	4	5	6	6	2	4	**43**
			Total Debt target Focus Funds values (USD MN.)	0	0	105.69	1038.83	5282.71	0	204.1	7838.2	3317.51	6436	5340.74	5363.6	1575.84	9250.9	**45754.12**
		Emerging Countries	Total Debt target Focus No. of Funds	0	0	0	0	0	0	0	0	0	0	2	3	3	4	**12**
			Total Debt target Focus Funds values (USD MN.)	0	0	0	0	0	0	0	0	0	0	290	230.2	138.69	610.08	**1268.97**
		RoW Countries	Total Debt target Focus No. of Funds	0	0	0	0	0	0	0	0	0	3	0	1	0	0	**4**
			Total Debt target Focus Funds values (USD MN.)	0	0	0	0	0	0	0	0	0	910.16	0	391.89	0	0	**1302.05**
	Aggregate Debt target Funds RFL & GFL numbers			**0**	**0**	**1**	**3**	**5**	**0**	**1**	**6**	**4**	**8**	**8**	**10**	**5**	**8**	**59**
	Aggregate Debt target Funds RFL & GFL Values (USD MN.)			**0**	**0**	**105.69**	**1038.83**	**5282.71**	**0**	**204.1**	**7838.2**	**3317.51**	**7346.16**	**5630.74**	**5985.69**	**1714.53**	**9860.98**	**48325.14**
	Secondaries Funds Target	Advanced Countries	Total Secondaries target Focus No. of Funds	0	0	0	0	1	0	0	1	1	0	0	2	0	0	**5**
			Total Secondaries target Focus Funds values (USD MN.)	0	0	0	0	357	0	0	438.9	100	0	0	3400	0	0	**4295.9**
		Emerging Countries	Total Secondaries target Focus No. of Funds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
			Total Secondaries target Focus Funds values (USD MN.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
		RoW Countries	Total Secondaries target Focus No. of Funds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
			Total Secondaries target Focus Funds values (USD MN.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Aggregate Secondaries target Funds RFL & GFL numbers			**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**1**	**0**	**0**	**2**	**0**	**0**	**5**
	Aggregate Secondaries target Funds RFL & GFL Values (USD MN.)			**0**	**0**	**0**	**0**	**357**	**0**	**0**	**438.9**	**100**	**0**	**0**	**3400**	**0**	**0**	**4295.9**

Source: Preqin; Author's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

5.10 Analysis of Infrastructure Investment Fund Vehicles: Project Stage Target

Recently, PEIF investment has increasingly acquired a prominent role in delivering greenfield assets, and is recognized as primary source for reducing the gap in infrastructure asset demand, particularly in EIM. Thus, a detailed assessment of PE infrastructure investment, with a project stage focus, was conducted, the findings of which are presented in Figure 5.25.

The assessment observed that the majority of fund managers sought opportunities to invest in the most promising infrastructure assets that generated a high rate of return, regardless of the form of the project stage, whether greenfield, brownfield, or secondary, with total of 157 closed-end fund vehicles committing USD 138,693.29 MN. (circa 34%). Moreover, a considerable number of fund managers (19.5%) invested in mid-sized infrastructure assets, emphasising greenfield projects, but also selectively pursuing brownfield acquisitions where they could achieve their target returns, with a total of 94 fund vehicles with a total final closing commitment of USD 79,871.53 MN. For instance, BlackRock Global Energy & Power Infrastructure Fund II, launched in 2014, reached a final closing commitment of USD 2,500 MN. The fund was comprised of a two-bucket structure, with one bucket directly concentrating on the acquisition of mature, stabilized assets, and the other on new infrastructure assets, namely brownfield and greenfield projects, respectively. Similarly, the vintage fund (2009) Central American Mezzanine Infrastructure Fund CAMIF, managed by LAP Latin American Partners, achieved a final close in the market of USD 150 MN. The fund was structured to target brownfield projects, namely operational projects. In addition, CAMIF aimed to invest in companies with current cash flow and expansion programmes, although it also considered greenfield projects on a case-by-case basis (Preqin, n.d.).

Surprisingly, the assessment revealed that a considerable number of fund managers (21.7%) sourced opportunities to invest in infrastructure assets with predictable cash flows supported by regulation, availability-based contracts, and market position, with a total of 41 unlisted fund vehicles targeting primary mature infrastructure assets, namely brownfield and secondary assets, with a total commitment of USD 88,696.75

MN. There were various drivers behind this approach, with the most recognizable being: 1) mature assets characterized by low risk/return rates, compared with greenfield assets with a high risk level, particularly in the construction phase; 2) investment to provide 'value-added' opportunities in existing undervalued infrastructure projects, and late-stage assets, delivering operational improvement for the asset and generating a stable, predictable cash flow and yield return in the short term, compared with the execution of new projects; and 3) investment within the same region to reduce the risks of the credit market, and the volatility of currency exchange (Russ, et al., 2016; Khon et al., 2019).

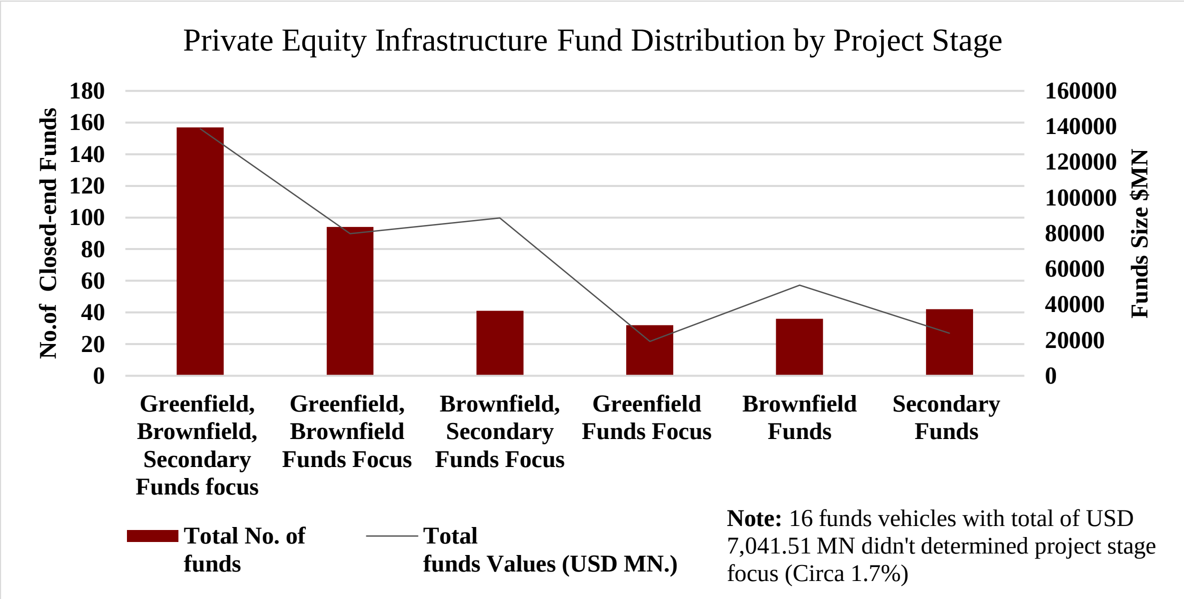
Alongside investment in mature infrastructure projects, was noteworthy that platforms focused on the **brownfield stage,** with an aggregate of 36 closed-end vehicles reaching a total final close in the market of USD 50,797.74 MN. (circa 12.45), due to the fact that these fund managers focused on regulatory environments with a high internal rates of return (IRR).

Although the majority of investment concentrated on the greenfield and brownfield project stages, the analysis identified that many fund vehicles sought to provide stable and predictable cash-flows, with a steady growth of the investment portfolio value, by investing in **secondary stage infrastructure** assets, with 42 unlisted funds totalling USD 23,925.02 MN. (circa 6%), as shown in Figure 5.25.

As discussed previously, the aim of structuring investment fund vehicles is to seek opportunities to provide stable and predictable cash-flows, with a steady growth of the investment portfolio value. This was analysed via a selective assessment of projects in both the greenfield and brownfield stages of development, over the last 14 years (Q1-2006 to Q4-2019), particularly in EM, as summarized in Figure 5.26. As the figure shows, PE fund managers recorded a significant performance in the infrastructure market, across the period examined, with the greatest number of funds (19) in 2016. These funds were targeted to recognize investment opportunities at various stages of infrastructure assets.

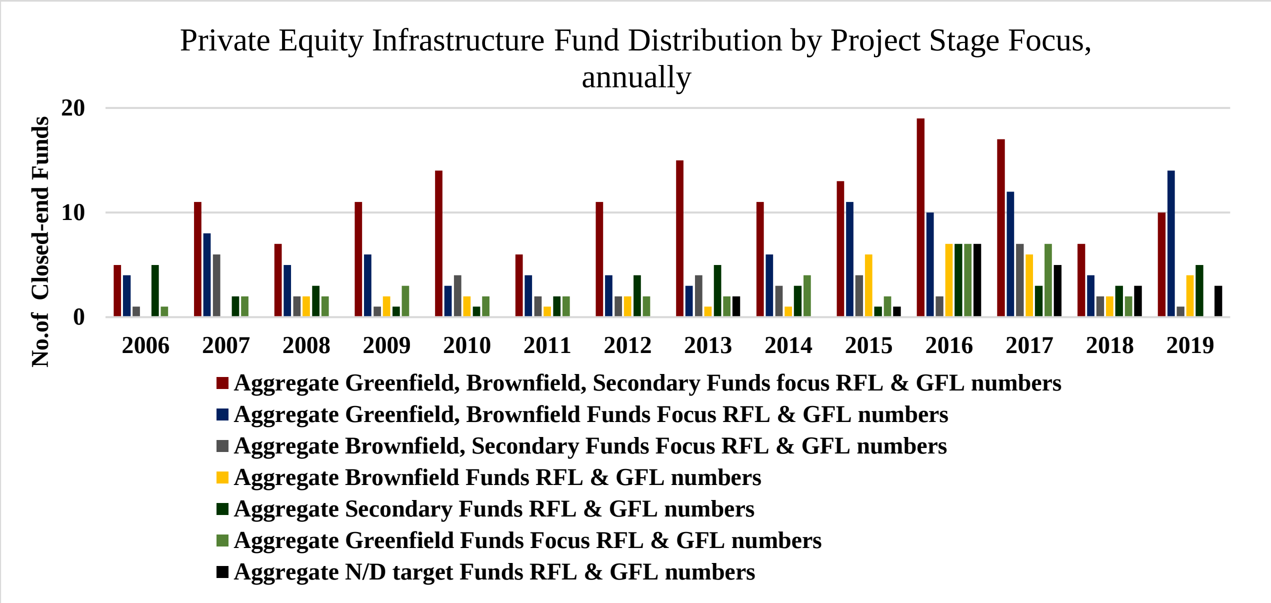
The analysis found that there was a similar pattern in terms of funds concentrating on greenfield and brownfield assets, across the period examined. Both of the unlisted funds recorded a significant level in the market, and registered a high quantity of PE funds in 2016 and 2017, with seven funds in total with a project stage focus. Similarly, in terms of fund size, the highest volume of PE funds with a brownfield focus was in 2016, totalling USD 23,746.07 MN., with funds with a greenfield assets focus totalling USD 4,250.73 MN.

Figure 5.25-Breakdown of PEIF Vehicles, GFL and RFL-Project Stage Focus



Source: Preqin; Author’s own analysis

Figure 5.26-Breakdown of PEIF Vehicles, GFL and RFL-Project Stage Focus, Distributed Annually



Source: Preqin; Author’s own analysis

Table 5.14-Distribution of Investment Fund Vehicles, GFL and RFL-Project Stage Focus in Emerging Infrastructure Markets

			2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Infrastructure Project Stage (Funds)	Greenfield, Brownfield, Secondary Funds Focus	Total Greenfield, Brownfield, Secondary No. funds	5	11	7	11	14	6	11	15	11	13	19	17	7	10	**157**
		Total. Greenfield, Brownfield, Secondary funds values (USD MN.)	4987.95	12831.54	2491.01	5250.29	6205.38	1437.41	6366.98	8003.55	11435.21	9196.74	16338.08	23691.06	11430.41	19027.68	**138693.29**
	Greenfield, Brownfield Funds Focus	Total Greenfield, Brownfield No. Funds	4	8	5	6	3	4	4	3	6	11	10	12	4	14	**94**
		Total. Greenfield, Brownfield Funds values (USD MN.)	2861.44	4366.88	2474.61	5570.89	1487.93	941.08	1617.57	8929.37	7294.35	9277.37	16739.77	3810.19	702.37	13797.71	**79871.53**
	Brownfield, Secondary (mature assets) Funds Focus	Total Brownfield, Secondary No. of Funds	1	6	2	1	4	2	2	4	3	4	2	7	2	1	**41**
		Total Brownfield, Secondary Funds values (USD MN.)	6198.85	11280.86	1569.66	49.03	6726	1031.79	410.24	9816.04	3801.48	969.41	5504.5	9003.91	10334.98	22000	**88696.75**
	Greenfield Funds Focus	Total Greenfield focus No. of Funds	1	2	2	3	2	2	2	2	4	2	1	7	2	0	**32**
		Total Greenfield focus Funds values (USD MN.)	80	3123.94	217.62	1119.83	879.11	357.98	1262.9	2397.49	3282.48	1340.59	0.1	4250.73	1002.23	0	**19315**
	Brownfield Funds Focus	Total Brownfield Focus No. of Funds	0	0	2	2	2	1	2	1	1	6	7	6	2	4	**36**
		Total Brownfield Focus Funds values (USD MN.)	0	0	1811.57	761.25	703.61	614.3	8413.59	1100	1325	2257.49	23746.07	2303.35	140.12	7621.39	**50797.74**
	Secondary Funds Focus	Total Secondary No. Funds	5	2	3	1	1	2	4	5	3	1	4	3	3	5	**42**
		Total. Secondary Funds values (USD MN.)	4398.44	249.09	4638.29	428	53.5	1609.49	1203.18	1332.5	657	480	4405.97	1181.91	892.42	2395.23	**23925.02**

Source: Preqin; Author’s own analysis

Table 5.15-Breakdown of Fund Vehicles, GFL and RFL- Project Stage Focus

				2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Infrastructure Project Stage (Funds)	**Greenfield, Brownfield, Secondary Funds Focus**	**Advanced Countries**	**Total Greenfield, Brownfield, Secondary No. funds**	5	7	7	10	10	3	9	13	11	11	16	17	6	7	**132**
			Total. Greenfield, Brownfield, Secondary funds values (USD MN.)	4987.95	7250.65	2491.01	5140.29	4112.93	877.41	5246.43	6088.55	11435.21	9021.84	14398.08	23691.06	10930.41	17849.68	**123521.5**
		Emerging Countries	**Total. Greenfield, Brownfield, Secondary funds values (USD MN.)**	0	3	0	1	4	2	2	2	0	2	2	0	1	3	**22**
			Total. Greenfield, Brownfield, Secondary funds values (USD MN.)	0	5437.99	0	110	2092.45	360	1120.55	1915	0	174.9	1640	0	500	1178	**14528.89**
		RoW Countries	**Total. Greenfield, Brownfield, Secondary funds values (USD MN.)**	0	1	0	0	0	1	0	0	0	0	1	0	0	0	**3**
			Total. Greenfield, Brownfield, Secondary funds values (USD MN.)	0	142.9	0	0	0	200	0	0	0	0	300	0	0	0	**642.9**
	Aggregate Greenfield, Brownfield, Secondary Funds focus RFL & GFL numbers			**5**	**11**	**7**	**11**	**14**	**6**	**11**	**15**	**11**	**13**	**19**	**17**	**7**	**10**	**157**
	Aggregate Greenfield, Brownfield, Secondary Funds focus RFL & GFL Values (USD MN.)			**4987.95**	**12831.54**	**2491.01**	**5250.29**	**6205.38**	**1437.41**	**6366.98**	**8003.55**	**11435.21**	**9196.74**	**16338.08**	**23691.06**	**11430.41**	**19027.68**	**138693.29**
	Greenfield, Brownfield Funds Focus	**Advanced Countries**	**Total Greenfield, Brownfield No. Funds**	2	4	5	5	3	4	4	3	4	9	9	6	1	7	**66**
			Total. Greenfield, Brownfield Funds values (USD MN.)	2,000.94	1976.88	2474.61	4570.89	1487.93	941.08	1617.57	8929.37	6503.06	9137.54	16619.77	2691.12	465.04	12797.63	**72213.43**
		Emerging Countries	**Total Greenfield, Brownfield No. Funds**	1	2	0	1	0	0	0	0	1	2	1	6	2	7	**23**
			Total. Greenfield, Brownfield Funds values (USD MN.)	130.00	2100	0	1000	0	0	0	0	41.29	139.83	120	1119.07	119.93	1000.08	**5770.2**
		RoW Countries	**Total Greenfield, Brownfield No. Funds**	1	2	0	0	0	0	0	0	1	0	0	0	1	0	**5**
			Total. Greenfield, Brownfield Funds values (USD MN.)	730.50	290	0	0	0	0	0	0	750	0	0	0	117.4	0	**1887.9**
	Aggregate Greenfield, Brownfield Funds Focus RFL & GFL numbers			**4**	**8**	**5**	**6**	**3**	**4**	**4**	**3**	**6**	**11**	**10**	**12**	**4**	**14**	**94**
	Aggregate Greenfield, Brownfield Funds Focus RFL & GFL Values (USD MN.)			**2861.44**	**4366.88**	**2474.61**	**5570.89**	**1487.93**	**941.08**	**1617.57**	**8929.37**	**7294.35**	**9277.37**	**16739.77**	**3810.19**	**702.37**	**13797.71**	**79871.53**
	Brownfield, Secondary (mature assets)Funds Focus	**Advanced Countries**	**Total Brownfield, Secondary No. of Funds**	1	4	1	1	4	2	1	4	3	3	2	7	2	1	**36**
			Total Brownfield, Secondary Funds values (USD MN.)	6198.85	10970.86	1358.66	49.03	6726	1031.79	343.72	9816.04	3801.48	952.5	5504.5	9003.91	10334.98	22000	**88092.32**
		Emerging Countries	**Total Brownfield, Secondary No. of Funds**	0	2	1	0	0	0	1	0	0	1	0	0	0	0	**5**
			Total Brownfield, Secondary Funds values (USD MN.)	0	310	211	0	0	0	66.52	0	0	16.91	0	0	0	0	**604.43**
		RoW Countries	**Total Brownfield, Secondary No. of Funds**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
			Total Brownfield, Secondary Funds values (USD MN.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Aggregate Brownfield, Secondary Funds Focus RFL & GFL numbers			**1**	**6**	**2**	**1**	**4**	**2**	**2**	**4**	**3**	**4**	**2**	**7**	**2**	**1**	**41**
	Aggregate Brownfield, Secondary Funds Focus RFL & GFL Values (USD MN.)			**6198.85**	**11280.86**	**1569.66**	**49.03**	**6726**	**1031.79**	**410.24**	**9816.04**	**3801.48**	**969.41**	**5504.5**	**9003.91**	**10334.98**	**22000**	**88696.75**
	Greenfield Funds Focus	**Advanced Countries**	**Total Greenfield focus No. of Funds**	1	2	2	2	1	2	1	2	1	2	0	4	1	0	**21**
			Total Greenfield focus Funds values (USD MN.)	80	3123.94	217.62	888.83	440	357.98	1216.5	2397.49	2800	1340.59	0	3951.56	943.84	0	**17758.35**
		Emerging Countries	**Total Greenfield focus No. of Funds**	0	0	0	1	1	0	1	0	3	0	1	3	1	0	**11**
			Total Greenfield focus Funds values (USD MN.)	0	0	0	231	439.11	0	46.4	0	482.48	0	0.1	299.17	58.39	0	**1556.65**
		RoW Countries	**Total Greenfield focus No. of Funds**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
			Total Greenfield focus Funds values (USD MN.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Aggregate Greenfield Funds Focus RFL & GFL numbers			**1**	**2**	**2**	**3**	**2**	**2**	**2**	**2**	**4**	**2**	**1**	**7**	**2**	**0**	**32**
	Aggregate Greenfield Funds Focus RFL & GFL Values (USD MN.)			**80**	**3123.94**	**217.62**	**1119.83**	**879.11**	**357.98**	**1262.9**	**2397.49**	**3282.48**	**1340.59**	**0.1**	**4250.73**	**1002.23**	**0**	**19315**

Source: Preqin; Author's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Continue-Table 5.15-Breakdown of Fund Vehicles, GFL and RFL- Project Stage Focus

				2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Infrastructure Project Stage (Funds)	Brownfield Funds Focus	Advanced Countries	Total Brownfield Focus No. of Funds	0	0	2	2	1	1	2	1	1	3	5	4	1	2	**25**
			Total Brownfield Focus Funds values (USD MN.)	0	0	1811.57	761.25	503.21	614.3	8413.59	1100	1325	1347.33	23536.07	1461.46	109.82	7400	**48383.6**
		Emerging Countries	Total Brownfield Focus No. of Funds	0	0	0	0	1	0	0	0	0	0	2	1	1	2	**7**
			Total Brownfield Focus Funds values (USD MN.)	0	0	0	0	200.4	0	0	0	0	0	210	450	30.3	221.39	**1112.09**
		RoW Countries	Total Brownfield Focus No. of Funds	0	0	0	0	0	0	0	0	0	3	0	1	0	0	**4**
			Total Brownfield Focus Funds values (USD MN.)	0	0	0	0	0	0	0	0	0	910.16	0	391.89	0	0	**1302.05**
	Aggregate Brownfield Funds RFL & GFL numbers			**0**	**0**	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**6**	**7**	**6**	**2**	**4**	**36**
	Aggregate Brownfield Funds RFL & GFL Values (USD MN.)			**0**	**0**	**1811.57**	**761.25**	**703.61**	**614.3**	**8413.59**	**1100**	**1325**	**2257.49**	**23746.07**	**2303.35**	**140.12**	**7621.39**	**50797.74**
	Secondary Funds Focus	Advanced Countries	Total Secondary Focus No. of Funds	5	2	3	1	1	2	4	5	3	1	4	2	3	5	**41**
			Total Secondary Focus Funds values (USD MN.)	4398.44	249.09	4638.29	428	53.5	1609.49	1203.18	1332.5	657	480	4405.97	1150.88	892.42	2395.23	**23893.99**
		Emerging Countries	Total Secondary Focus No. of Funds	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**1**
			Total Secondary Focus Funds values (USD MN.)	0	0	0	0	0	0	0	0	0	0	0	31.03	0	0	**31.03**
		RoW Countries	Total Secondary Focus No. of Funds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
			Total Secondary Focus Funds values (USD MN.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Aggregate Secondary Funds RFL & GFL numbers			**5**	**2**	**3**	**1**	**1**	**2**	**4**	**5**	**3**	**1**	**4**	**3**	**3**	**5**	**42**
	Aggregate Secondary Funds RFL & GFL Values (USD MN.)			**4398.44**	**249.09**	**4638.29**	**428**	**53.5**	**1609.49**	**1203.18**	**1332.5**	**657**	**480**	**4405.97**	**1181.91**	**892.42**	**2395.23**	**23925.02**
	Not Determined project stage Funds Focus	Advanced Countries	Total N/D target Focus No. of Funds	0	0	0	0	0	0	0	2	0	1	1	5	3	2	**14**
			Total N/D target Focus Funds values (USD MN.)	0	0	0	0	0	0	0	420	0	26.6	485	2648.71	1938	1023.2	**6541.51**
		Emerging Countries	Total N/D target Focus No. of Funds	0	0	0	0	0	0	0	0	0	0	1	0	0	1	**2**
			Total N/D target Focus Funds values (USD MN.)	0	0	0	0	0	0	0	0	0	0	200	0	0	300	**500**
		RoW Countries	Total N/D target Focus No. of Funds	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
			Total N/D target Focus Funds values (USD MN.)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Aggregate N/D target Funds RFL & GFL numbers			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**1**	**2**	**5**	**3**	**3**	**16**
	Aggregate N/D target Funds RFL & GFL Values (USD MN.)			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**420**	**0**	**26.6**	**685**	**2648.71**	**1938**	**1323.2**	**7041.51**

Source: Preqin; Author's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

5.11 Infrastructure Investment Funds vehicle Analysis-Selective Investment Strategies Analysis

As discussed in Chapter Three (Section 3.4.2.3 Drivers Behind the Selection of Alternatives Investments)) the EM positioned as medium-to-high risk/return in particular, in terms of value added and opportunistic investment strategies (as illustrated in Figure 3.6), and as discussed in Sections 5.9 and 5.10), acquired significant weight in the period concerned, representing 31.5% of the total. Meanwhile, the downside of risk and return associated with opportunistic and debt investment forms of PEIF strategies was represented by a moderate percentage (6.6% and 12%, respectively), particularly when targeting EM across the period in question. Thus, as part of the remit of the present research to identify the level of infrastructure investment challenges and difficulties within EM, an in-depth exploration of this form of strategy was conducted to identify the preferred ways of employing it, in terms of geographical investment allocation, by EM region, with a primary industry focus, and by project stage. This is summarized in Table 5.26.

5.11.1 Geographical Investment Strategy

The first level of the assessment identified the presence of a conflicting pattern of geographical investment allocation, with a considerable number of fund managers seeking opportunities to target the Asian market, deploying their capital to invest in opportunistic investment strategies, with total commitment of USD 10,990.16 MN for 18 funds (40.5%). The majority of the fund portfolios were structured to add value to the economic infrastructure in transforming markets, including five various fund vehicles focusing on EM, and 32 vehicles committing USD 87,425.87 MN., representing 68% of the total value added strategy. Similarly, the fund managers provided private debt finance to global infrastructure markets, including EM, by allocating opportunities to yield a high rate of investment return, with 26 funds committing USD 37,286.68 MN. (circa 44%). For example, **AMP Capital Investors ran eight fund portfolios** (AMP Capital Asian Giants Infrastructure Fund, AMP Capital Global Infrastructure Fund, AMP Capital Global Infrastructure Fund II, AMP Capital Infrastructure Debt Fund (EUR), AMP Capital Infrastructure Debt Fund II

(USD), AMP Capital Infrastructure Debt Fund III, AMP Capital Infrastructure Debt Fund IV, and AMP Capital Infrastructure Debt Fund IV) as separately managed accounts over the period examined. Although the primary geographical focus was on mature markets, namely Australasia, OECD, and North America, the funds also had a geographical exposure across a number of growing markets, and targeted mainly **brownfield assets.** The primary industry focus of these eight fund portfolios was on conventional power energy, transport (transportation services and rail transport), renewable energy, and utilities service industries, and the primary focus of the strategy was **infrastructure debt**. The fund size of each portfolio ranged from USD 6,200 MN. to 503.21 MN. However, the performance of the global fund vehicles differed in terms of their opportunistic strategy, with a considerable rate of capital launched to exploit opportunities for infrastructure investment globally, with 13 various fund vehicles reaching a final close of USD 5,215.3 MN. (circa 22.4%).

Moreover, it was noteworthy that the vehicles targeted project finance debts in the Europe region, which generated predictable cash flows, for instance there was a considerable amount of investment in operational projects after the construction period, and projects secured by long-term offtake agreements, with 19 different fund vehicles, with total a commitment of USD 32,203.39 MN. (circa 19%). For instance, UBS Asset Management, located in the UK, launched the UBS Infrastructure Debt Platform in the market in 2015, and achieved a final close of 636.23 MN. The fund pursued an investment strategy that concentrated on construction, targeting an investment grade portfolio of proprietary debt investments with superior returns. Furthermore, UBS Asset management assisted borrowers across the entire debt structure using a variety of debt instruments (Preqin, n.d.).

In terms of the Latin America & Caribbean region, vehicles specifically sought opportunistic projects in a range of mid-market infrastructure, characterized by relatively low rates compared with other regions. These recorded a total of USD 3,086.07 MN. (circa 18%) for 11 fund vehicles, compared with seven closed-end funds employing debt strategy totalling USD 1,047.77 MN. (circa 2.2%). Similarly, the fund managers also structured their closed-end funds to target infrastructure in the Africa-based market, with a comparatively low opportunity strategy. In total, eight (13%) such fund vehicles committed USD 3,445.62 MN.

Surprisingly, the Middle Eastern markets failed to attract fund managers to invest in their infrastructure asset using the three strategies of value added, opportunistic, and private debt finance, with only one fund vehicle, InfraMed Infrastructure, launched by InfraMed Management in 2012, seeking opportunities to **add value** to infrastructure assets, with a total commitment of USD 500.45 MN., and four fund vehicles committing USD 3,155 MN for **opportunistic investment** fund strategies, and two providing a total private debt of USD 208.39 MN.

5.11.2 Industry Focus Strategy

In terms of industry focus, the analysis demonstrated a strong recognition across the three forms of investment vehicles, namely value added, opportunistic, and debt financing strategies, targeting their infrastructure fund to build a diversified portfolio of unlisted infrastructure investments with the ability to yield a stable, predictable cash yield, and an attractive internal rate of return, as shown in Table 5.26. Indeed, a massive amount of capital was deployed that concentrated on diversification of the fund portfolio across the transport, renewable energy, conventional power energy, and utilities industries, namely the economic infrastructure industry, with a 65.5% concentration of value added infrastructure investment (a total of 26 fund vehicles with a total commitment of USD 84,552.87MN.), 45.5% for opportunistic assets (23 fund vehicles with a total commitment of USD 12,084.4 MN.), and 36.4% for private debt strategy (15 fund vehicles with a total commitment of USD 17,588.60MN.).

Meanwhile, in terms of the economic diversification of investment strategies, a considerable number of funds sought to build a diversified economic/social portfolio across multiple partners, infrastructure assets, and utility scale technologies, as well as currencies and investment-grade counterparties, with 31.5% of fund vehicles (21 fund vehicles committing USD 15,234.39 MN.) providing private debt capital. This infrastructure investment approach was followed by 21% principally targeting opportunities in infrastructure assets to diversify the fund portfolio between economic and social infrastructure assets, aiming to invest in regulated and semi-regulated assets, with 11 closed-end fund vehicles totalling a USD 5,721.37 MN. commitment. The third rank of portfolio diversification/construction was represented by acquisitions of existing undervalued assets, and late-stage projects offering 'value-add' opportunities in operational improvement, with a total of 13 funds achieving a final close of USD 22,830.01 MN. (circa 17.7%).

In terms of specific fund concentration, the assessment observed a fluctuation favouring routes concerning an industry focus, in particular, while opportunistic and debt financing funds principally targeted investment in transport sectors, with 10 unlisted vehicles achieving a final close of USD 3,921.35 MN., and eight fund vehicles reaching a final close of USD 2,426.28 MN. (circa 14% per fund). In contrast, the most attractive investments in the value added fund strategy, after the diversification portfolio, sought to provide capital to projects in the conventional power energy industry, with eight fund vehicles (7.5%) with a total commitment of USD 9,581.97 MN.

5.11.3 Project Stage Investment Strategy

A detailed depiction of the volume of investment fund vehicles by project stage, targeting Emerging Infrastructure Markets regions over the last 14 years, 2006-2019, is provided in Table 5.16. Overall, the assessment revealed a significant variance between the various forms of fund vehicles targeting EM, with the majority of fund vehicles targeting investment across a wide array of project stages, including greenfield, brownfield, and secondary, with 20 opportunities investment vehicles, and 29 value added funds, and a total commitment of USD 9,924.62 MN. and 50,873.70 MN. (circa 36.6% and 39.5%), respectively. In contrast, private debt funds invested solely in mature assets, namely brownfield and secondary projects, with eight unlisted fund vehicles achieving a financial close of USD 15,105.95 MN. (circa 31%), and 13 various closed-end fund vehicles concentrating on brownfield projects, with a total commitment of USD 13,825.52 MN. (circa 28.6%). For instance, Cube Infrastructure Fund, a Luxembourg SICAV launched in 2008, achieved a commitment of USD 1358.66 MN. The fund targeted brownfield assets in a wide range of infrastructure sectors, including the energy, transportation, and utilities services, including the water sub-sector. The vehicle invested primarily in brownfield infrastructure and public service assets located in the Europe region. There were various drivers behind targeting this region, with the most important being: 1) to generate cash flow in Euros in the long-term; 2) to secure a regulated income; 3) to invest in the market that is characterized by solid growth potential; and 4) to minimize the cross-currency risk generated by the fund's portfolio, namely a minimum of 60% of the cash-flow.

The analysis also identified a considerable number of vehicles focusing on underlying funds, with greenfield and brownfield strategies, namely 16 different funds seeking opportunities in infrastructure projects, with a total commitment of USD 7,002.57 MN. (circa 26%).

5.11.4 Investment Strategy Mix

Despite the specific fund investment strategies structured by fund managers, namely Core, Core Plus, Value Added, and opportunistic debt finance), the infrastructure investment universe is unstable, and provides a wide range of opportunities that require the adoption of a series of procedures to generate a regulated cash flow and a stable return. Thus, a number of fund managers exploited various forms of investment fund strategies in their infrastructure asset investments. For instance, a leading Asia's Private Sector Infrastructure Fund (LEAP), a vehicle launched by Asian Development Bank (ADB), in partnership with Japan International Cooperation Agency (JICA). The fund targeted support of private infrastructure investments across the Asia region, and LEAP's mandate was branded by a flexibility to invest in a wide range of assets, including 1) diverse development stages; and 2) a variety of patterns, such as public-private partnerships, Joint Ventures (J.V.), infrastructure concessions, and company financing. In terms of investment strategy, LEAP utilized various instruments, such as debt, equity, and mezzanine instruments, and concentrated on diversifying into a wide range of infrastructure industries, such as transport; water utilities; and conventional power energy, with a sub-sector of power generation, and a focus on the renewable energy industry.

Table 5.16-Variation of Investment Strategies Targeting Emerging Infrastructure Markets

Geographic Strategy	Primary Strategy	Total Funds Numbers	%	Total Funds Size ($MN)	%
Opportunistic strategy Global target funds – Including EM	Opportunistic investment	13	22.4%	5,215.3	19%
	Value Added[(1)]	32	47%	87425.87	68%
	Debt Investment	26	44%	37286.68	77%
Asia Region target funds	Opportunistic investment	18	31%	10,990.16	40.5%
	Value Added	7	10.3%	2,076	1.6%
	Debt Investment	4	7%	328.74	**0.7%**
Europe Region target funds	Opportunistic investment	4	6.9%	1,211.02	4.5%
	Value Added	20	29.4%	32,411.93	25%
	Debt Investment	19	32%	9346.37	19%
Latin America & Caribbean region targets funds	Opportunistic investment	11	19%	3,086.07	11%
	Value Added	7	10.3%	1580.18	1.2%
	Debt Investment	7	12%	1047.77	2.2%
Middle East region target funds	Opportunistic investment	4	6.7%	3,155	12%
	Value Added	1	1.5%	500.45	0.4%
	Debt Investment	2	3.3%	108.39	0.2%
Africa region target funds	Opportunistic investment	8	14%	3,445.62	13%
	Value Added	1	1.5%	5,000	4.8%
	Debt Investment	1	1.7%	207.19	0.9%

Industry Focus	Primary Strategy	Total Funds Numbers	%	Total Funds Size ($MN)	%
Diversified [Economic/ Social] Funds focus	Opportunistic investment	11	19%	5,721.37	21%
	Value Added	13	20%	22830.01	17.7%
	Debt Investment	21	37%	15,234.39	31.5%
Diversified (Economic) Funds Focus	Opportunistic investment	23	40%	12,084.4	44.5%
	Value Added	26	40.6%%	84552.87	65.5%
	Debt Investment	15	26%	17,588.60	36.4%
Transport Funds Focus	Opportunistic investment	10	17%	3,921.35	14.5%
	Value Added	6	9%	6216.04	5%
	Debt Investment	8	14%	2,426.28	5%
Renewable Energy Funds Focus	Opportunistic investment	8	14%	1,038.99	4%
	Value Added	10	15.6%	3198.46	2.5%
	Debt Investment	4	7%	1,690.4	3.5%
conventional Power Energy Funds focus	Opportunistic investment	6	10%	4,337.06	16%
	Value Added	12	12.5%	9581.97	7.3%
	Debt Investment	8	14%	11,335.47	23.5%
Utilities Funds Focus	Opportunistic investment	-	-	-	-
	Value Added	1	2.3%	2568.04	2%
	Debt Investment	1	3%	50	0.1%

Project Stage	Primary Strategy	Total Funds Numbers	%	Total funds Values (USD MN.)	%
Focus on Greenfield, Brownfield, Secondary	Opportunistic investment	20	34.5%	9,924.62	36.6%
	Value Added	29	42%	5,0873.70	39.6%
	Debt Investment	15	25%	5,647.05	12%
Focus on Greenfield, Brownfield	Opportunistic investment	16	27.5%	7,002.57	26%
	Value Added	16	23.5%	9,098.34	7%
	Debt Investment	10	17%	7,589.86	16%
Focus on Brownfield, Secondary (mature assets)	Opportunistic investment	1	2%	66.52	0.2%
	Value Added	7	10%	30,918.04	24%
	Debt Investment	8	13.5%	15,105.95	31%
Focus on Greenfield	Opportunistic investment	10	17%	4,795.66	18%
	Value Added	9	13%	6,953.54	5.4%
	Debt Investment	7	12%	4,890.23	10%
Focus on Brownfields	Opportunistic investment	4	7%	1,298.8	4.8%
	Value Added	5	7.4%	29,852.36	23%
	Debt Investment	13	8.7%	13,825.52	28%
Focus on Secondaries	Opportunistic investment	2	3.5%	1,480	5.4%
	Value Added	1	1.4%	360	0.3%
	Debt Investment	6	10.5%	1,266.53	31%
Not Determined project stage	Opportunistic investment	5	8.5%	2,535	9%
	Value Added	1	1.4%	438	0.7%
	Debt Investment	-	-	-	-

Note:
[(1)]includes five fund vehicles targeting infrastructure investment market in emerging countries.
Total opportunistic investment strategy fund vehicles: 58 fund vehicles with a total fund size of USD 27,103.17 MN.
Total value added investment strategy fund vehicles: 68 fund vehicles with total fund size of USD 128,968.19 MN.
Total debt investment strategy fund vehicles: 59 fund vehicles with a total fund size of USD 48,325.14 MN.

Source: Preqin; Author's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

The previous sections discussed the general distribution of PEIF investments seeking opportunities in Emerging Infrastructure Markets under four key pillars in the period addressed, namely Q1-2006 to Q-4-2019: total infrastructure fund exposure (or consideration of investment in EM); the funds' geographical target allocation; the funds' industry focus; the funds' focus, in terms of primary infrastructure strategies, and the fund's focus, in terms of project stage. A key issue identified across the assessment of the PEIF investment was the scale of infrastructure investment in EM, and the global infrastructure that fund managers considered in their investment strategy when investing in at least one market in emerging countries.

5.12 Conclusion

Despite the fact that the infrastructure investment gap is widening, and that there is an experience deficit in critical infrastructure projects, due to the underinvestment in greenfield and brownfield assets in EIM, the analysis revealed that emerging markets are currently experiencing a significant wave of transformative growth that has prompted progress in PEIF investment across the period addressed. Indeed, the growth of PEIF investment in Emerging Infrastructure Markets over the period analyzed, namely Q1-2009 to Q4-2019, across 23 emerging countries, has been unprecedented, with the aggregate number of infrastructure investment deals in emerging markets comprising **2,519 infrastructure assets,** with a cumulative deal cost of USD 632,116.51 million (see Figure 5.2) and **853 infrastructure investment fund** vehicles managed by 405 fund managers, with a cumulative fund size of USD 682,364.83 million, targeting EM, over the period Q1-2006 to Q4-2019 (see Figure 5.13).

Furthermore, the development of infrastructure investment markets has been fuelled by a powerful need to engage global institutional investors and fund managers in EIM. This implication of the growth in PEIF investment reflects the large number of opportunities existing within infrastructure investment markets in Emerging Infrastructure Markets.

In the context of PEIF- Deals level, the results presented in Chapter Five identified three distinct phases of PEIF investment within emerging markets when evaluating the deal levels over the timeframe examined. First, the recovery of the GFC phase for the period 2009 to 2012, which was marked by a low rate of investment, due to the difficulties and challenges that emerging markets encountered when seeking to reduce the negative impact of GFC in infrastructure investment deal levels. Significant efforts were expended in subsequent years to maintain the level of investment, if not to increase it, by unlocking the capital of institutional investors and fund managers for infrastructure investment. These efforts impacted significantly on years 2013-2016, which witnessed a significant rate of infrastructure investment deal levels, and was known as a ‘booming phase’. This phase attracted different types of institutional investors and fund managers to invest in infrastructure by allocating several financial instruments and investment vehicles across various infrastructure industries, in both new deal assets, and to rejuvenate existing assets. The last phase in the period 2016 to 2019 was a reduction phase, as global investors and funds managers’ appetite for infrastructure investment commitments in EIM declined, and the investment approaches to existing assets, namely stake and project acquisition, and secured debt for development projects, shifted, compared with investment in a new projects, such as awarding concession contracts for infrastructure assets. Furthermore, the Preqin reports cited the fact that the following additional sources impacted negatively on asset deals, causing the decline in investment rate: 1) the growth of debt financing accessibility, 2) the need for infrastructure assets in EIM, and 3) increasing numbers of investors and fund managers seeking direct investment, which engendered increased competition for investment in infrastructure assets, and difficulties in identifying attractive investment opportunities (Preqin, 2016B; 2017; 2019).

In the context of sectoral analysis, the evidence indicated that global investors and fund managers appeared to prefer transport sector infrastructure over other sectoral industry, as this represented 54% of the total number of deals (see Figure 5.3). Meanwhile the energy industry highlighted the increased focus of investors in Emerging Infrastructure Markets, including in both renewable energy and conventional energy, which constituted 42% of the total deals. This progression was directed by the private sector, and played a critical role in funding and providing infrastructure services. This concurred with the findings of Bhattacharya et al. (2012) that over 40%

of annual predicted spending will, in future, be targeted towards the energy industry, specifically power plants and electricity-generation projects.

However, the energy sector is extremely inconsistent, due to its variable behaviors, such as concern regarding performance; its regulatory framework, namely renewable energy motivations, and regulations in EIM countries; and global institutional efforts to realize the SDG's agenda causing a higher level of political risk. In contrast, the transport sector constituted a moderately solid sector, subject to a relatively constant regulatory framework.

In summary, the assessment was consistent with the projected infrastructure investment in Emerging Infrastructure Markets, indicating that policymakers, academic researchers, and professional reports are in agreement regarding the need for infrastructure investment targets, with a focus on emerging markets and developing countries, and an initial placement on the energy and transport sectors (Regan, 2017; OECD, 2017B; Branchoux et al., 2018).

This research highlighted the fact that a number of EIM have gravitated towards the use of PEIF investment, in order to deliver some of their most critical infrastructure development needs. Emerging markets have embraced this mode of development, especially in the face of emerging countries beginning to explore global foreign institutional investors and fund managers during the course of period examined. The assessment the level of PEIF investment deals in EIM provided a comprehensive picture of past trends, and recognized the importance of investment in infrastructure, which revealed that the magnitude of infrastructure deals in the Asian, Latin American and Caribbean regions over the period examined outperformed across the Emerging Infrastructure Markets regions, specifically by 52% of the total infrastructure investment deals for the Asian region, and 24% of the total infrastructure investment deals for the Latin American and Caribbean region) (see Figure 5.9).

Despite the fact that the European, Middle Eastern, and African regions delivered a considerable improvement, and increased their shares within the comparison period, with the three regions in total representing 24%, the volume of financial transactions for infrastructure investment deals for these regions remained at a low rate. In his study, Timmis (2018) argued that there are a number of drawbacks to this situation: 1) it raised the transaction costs for the market parties, 2) it reduced the number of investors able to participate in a number of infrastructure sectors, and 3) it scaled up a range of risks, namely systematic and liquidity risks.

A further broad perspective assessment of PEIF investment depicted significant progress within infrastructure investment in EIM that established a foundation, and mapped the pathways for different levels of global institutional investors, fund managers, and financial intermediaries. Specifically, infrastructure investment involved greenfield assets, and the designated strategic position of greenfield assets amid the PEIF investment universe represented the bulk of investment capital, compared with brownfield assets, accounting for 70% of the total deals. The assessment underpinned the conclusions of the empirical research and extant academic studies that greenfield infrastructure investment projects are the projects most targeted for investment by global institutional investors and fund managers. This implied that investors prefer to contribute to establishing the environment of the infrastructure investment industry that supports other activities in the industry, and enhances the capital growth, despite the long-term return that could be yielded by investment in new start assets (Niroomand and Nissan, 2012; Déau and Touati, 2014). Furthermore, a significant share of greenfield assets investment vehicles targeted re-financing infrastructure deals stake and project acquisition, and secured debt for development projects.

In the context of PEIF-Funds level, the assessment discussed in this chapter found that there were a range of performance mechanisms and structures of PEIF investment vehicles targeted towards investment in EM, and noted their prominent role in delivering infrastructure assets. There were a number of drivers behind this approach, with the most recognizable being: 1) institutional investors diversifying their investment portfolio by seeking opportunities in new areas, seeking a return, and inspiring an appetite to invest in the infrastructure asset class; 2) the variety of infrastructure fund investment strategies developed by fund managers; 3) the competitiveness between larger and smaller sized fund managers seeking portfolio management abilities; and 4) the increased number of global institutional investors targeting their investment towards infrastructure assets, resulting in strong competition between infrastructure fund managers seeking the best infrastructure investment sources (Preqin, 2016A,B, 2017; 2019).

Nevertheless, the PEIF investment market experienced a number of difficulties and challenges encountered by fund managers encountered across the period examined, including 1) a considerable number of investors exiting the market, due to their unexploited commitments in the PE infrastructure industry; 2) the high degree of availability of PE capital; and 3) non-challenging financial monetary policies (Preqin, 2018B).

Due to the competition in the infrastructure investment market, specifically that with institutional investors, and between smaller and larger fund managers, infrastructure fund vehicle strategies were structured according to a range of elements, including forecasting the degree of risk, the amount of cash flow, and the regulated return percentage, all of which varied, and were dependant on the geographical area, the type of infrastructure asset, and the maturity level of the project, in terms of whether it was at the brownfield or greenfield stage.

Over the last 14 years, namely 2006-2019, EM have exhibited a persistent growth and development within the infrastructure investment universe, inspiring PE fund managers to participate in the process in EIM. The analysis of PEIF investment revealed that a considerable number of fund vehicles considered investing in growing markets, namely in **emerging countries, or in at least one market in the Europe or Asia regions,** in their investment fund strategy, and specifically in their geographical allocation strategy. Meanwhile, the evaluation of GFL and RFL fund managers found that EM are considered to represent the best opportunity for investment, delivering a considerable rate of return, and a predictable cash-flow (approximately 60% of PEIF, 853 fund vehicles). Indeed, the assessment found that a considerable number of fund managers chose to invest in the market of one or two emerging countries as part of their global geographical investment strategy. Meanwhile, other fund managers preferred to target their fund investment towards neighboring markets, particularly those in the Europe or Asia region, demonstrating that many preferred to minimize the level of risk, and to avoid investing in foreign markets, or to invest only a small percentage (10-20%) of their fund portfolio in these markets. **It was apparent that**

fund managers were more concerned about their investments, because of the commitment and responsibility to generate a stable return, with few willing to risk invest directly in infrastructure assets.

From a fund **vehicle, industry focus perspective**, fund managers diversified their fund portfolio across economic infrastructure assets, with funds focusing on industry vehicles (circa 53%). They thereby aimed to make investments that could exert a significant impact, with the aim of providing moderate capital growth and a sustainable return over the long-term. Furthermore, and as part of the overall structure of their investment strategy for fund vehicles, the investment strategy with an industry focus correlated strongly with the geographical assessment strategy, specifically the regional assessment, when identifying the most profitable market to invest in infrastructure assets. This finding concurred with the observation made by Russ et al. (2018) that some infrastructure sectors tend to be more attractive to investment in different geographical areas.

Moreover, the analysis of PEIF highlighted that recently, fund managers have targeted their fund vehicles towards specific industries for two primary reasons: 1) seeking a regulated return income, and a stable cash-flow in sectors such as transport, with a sub-sector of toll roads, and the conventional power energy sector; and 2) involvement in the global trend for participating in green infrastructure assets, to address global warming, and implement the SDG agenda, by concentrating on the renewable energy industry.

The assessment of the PEIF investment vehicles' industry focus found that the PE investment markets concentrated on Value Added (circa 31.5%) and Core Plus (circa 27.2%) fund vehicle strategies. As highlighted by Kkon et al. (2019), the current market has a strong need for Core Plus infrastructure investment strategies for a number of reasons, including 1) protecting cash flow from inflation; 2) the fact that they are branded with economic stability against fluctuations, namely low volatility; and 3) the desire for resources for regular long-term investment.

In the last 14 years, PEIF investment has increasingly acquired a prominent role in delivering greenfield assets, and is recognized as primary source for reducing the gap in infrastructure asset demand, particularly in EIM. Indeed, the majority of fund managers (circa 34%) in the period examined sought opportunities to invest in the most promising infrastructure assets that generated a high rate of return, regardless of their project stage, whether greenfield, brownfield, or secondary. However, a considerable number of PE fund managers exhibited a preference for investing in mature infrastructure assets, namely brownfield and secondaries, for a number of reasons: 1) mature assets are characterized by low risk/return rates, compared with greenfield assets that are high risk, particularly in the construction phase; 2) investment provides 'value-added' opportunities to existing, undervalued infrastructure projects, and late-stage assets, which is to say that it delivers operational improvement for the asset, and it also generates a stable predictable cash flow and yields returns in short-term, compared with executing new projects; and 3) investment within the same region reduces the risks of the credit market, and the volatility of currency exchange (Russ, et al., 2016; Khon et al., 2019).

In summary, acquiring a global spectrum investment strategy that includes investment in various forms of infrastructure assets in growing markets, is a fundamental strength that secures a stable return, generates cash flow, and reduces the level of risk involved, investor community believe this to be the case. Furthermore, EM provide opportunities for infrastructure asset development, and private sectors should engage in this growth to reduce the shortfall in the capital intensive assets.

Chapter Five established an understanding of the key players in infrastructure investment in EIM, together with the geographical allocations, and the sectoral targets that facilitated the investigation of the challenges and difficulties regarding the amount and scale of PEIF investment in EM, which was incorporated in the formation of the subsequent primary research strategy (Chapter Six), which employed SSI with global investors, financial intermediaries, and infrastructure firms. This represented a logical, dynamic development from the general overview of global investors and fund managers to that of specific investors in EIM who were selected for interview according to multi-stage purposive sampling analyses.

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Chapter Six: Emerging Markets: Opportunities and Challenges for Global Infrastructure Investors and fund managers

6.0 Emerging Markets: Opportunities and Challenges for Global Infrastructure Investors and Fund Managers

6.1 Introduction

The preceding chapter examined the issue of investment deals, including deal profiling in Emerging Infrastructure Markets (EIM) and country preferences, along with the types of asset involved. In addition, it examined infrastructure investment vehicles, including the strategy applied for PE infrastructure investment in EM.

The findings from Chapter Five indicated that EMs are currently experiencing a significant wave of transformative growth prompting an increase in PEIF investment across the period addressed. There has been unprecedented growth in PEIF investment in EIM over the period under analysis (i.e. Q1-2009 to Q4-2019) across twenty-three emerging countries, with the aggregate number of infrastructure investment deals in EMs comprising **2,519 infrastructure assets,** with a cumulative cost of $632,116.51 million (USD) (see Figure 5.2) and **853 infrastructure investment fund** vehicles managed by 405 fund managers, with a cumulative fund size of) $682,364.83 million (USD), targeting EM, or countries/regions in EIM, over the period Q1-2006 to Q4-2019. These empirical findings posed a further analysis value in contextualising the qualitative findings.

Indeed, the current chapter firstly, undertakes a comprehensive analysis of the key players in PE infrastructure investment in EM, offering insights into the challenges pertaining to the degree and scale of PEIF investment in EIM. Secondly, it employs both qualitative and quantitative data to identify global PE institutional investors, along with the motivation and barriers impacting on the decision making process of fund managers concerning infrastructure Investment Policy (IP) in EIM. This chapter therefore focuses on the empirical analysis and is considered the core of the research. In addition, this chapter forms the next stage of the empirical research (see Figure 6.1) and is structured to underpin research Key Q. 1 (Who have been the key PE investors within EIMs?), Sub-Q.5 (What are the factors which influence the ability of Emerging Infrastructure Markets to finance the infrastructure they need to develop?), Sub-Q.6

(What role does procurement and delivering projects plays in attracting infrastructure investment?) and fulfil Research Objective Four:

> *To critically evaluate the main opportunities and barriers influencing global investment flows into Emerging Infrastructure markets, and the barriers to these flows.*

Emerging Markets (EM) have recently increased the scale of the private capital investment market, attracting global institutional private equity investors with the most recognisable investment vehicle structure (i.e. PE fund investment) capable of accessing core economic infrastructure assets. A number of academic researchers have attempted to assess elements attracting global investors in PE institutions in EM, including: (1) the capital set aside for funding various types of infrastructure class-assets (i.e. in response to the vital need for financing, particularly from non-quoted firms); (2) the attraction of global investors to industries characterised by the availability of stable cash flow levels across the economic cycle; (3) the greater potential for returns; and (4) key aspects of existing economic sectors, i.e. the financial development market (Groh, 2009; Jover and Malambo, 2014). Conway (2011) stated that the exposure of global institutional investors to EM has led to a shift in perception, resulting in a willingness to consider investing in EM as a strategic, rather than tactical, approach

Nevertheless, the PEIF investment process in EM has encountered a number of challenges. These include recognised critical aspects known to influence the investment decisions of global investors in emerging countries (Mingo et al., 2018), i.e. macro-level instability; economic instability; political unrest; and a lack of knowledge and experience (Gao et al., 2010). This include specific challenges, including: (1) a lack of effective government; (2) high levels of inconsistency in policy making; (3) insufficient risk adjusted returns in relation to investment; and (4) risks present in the overall environment (Tiryaki and dos Santos, 2017).

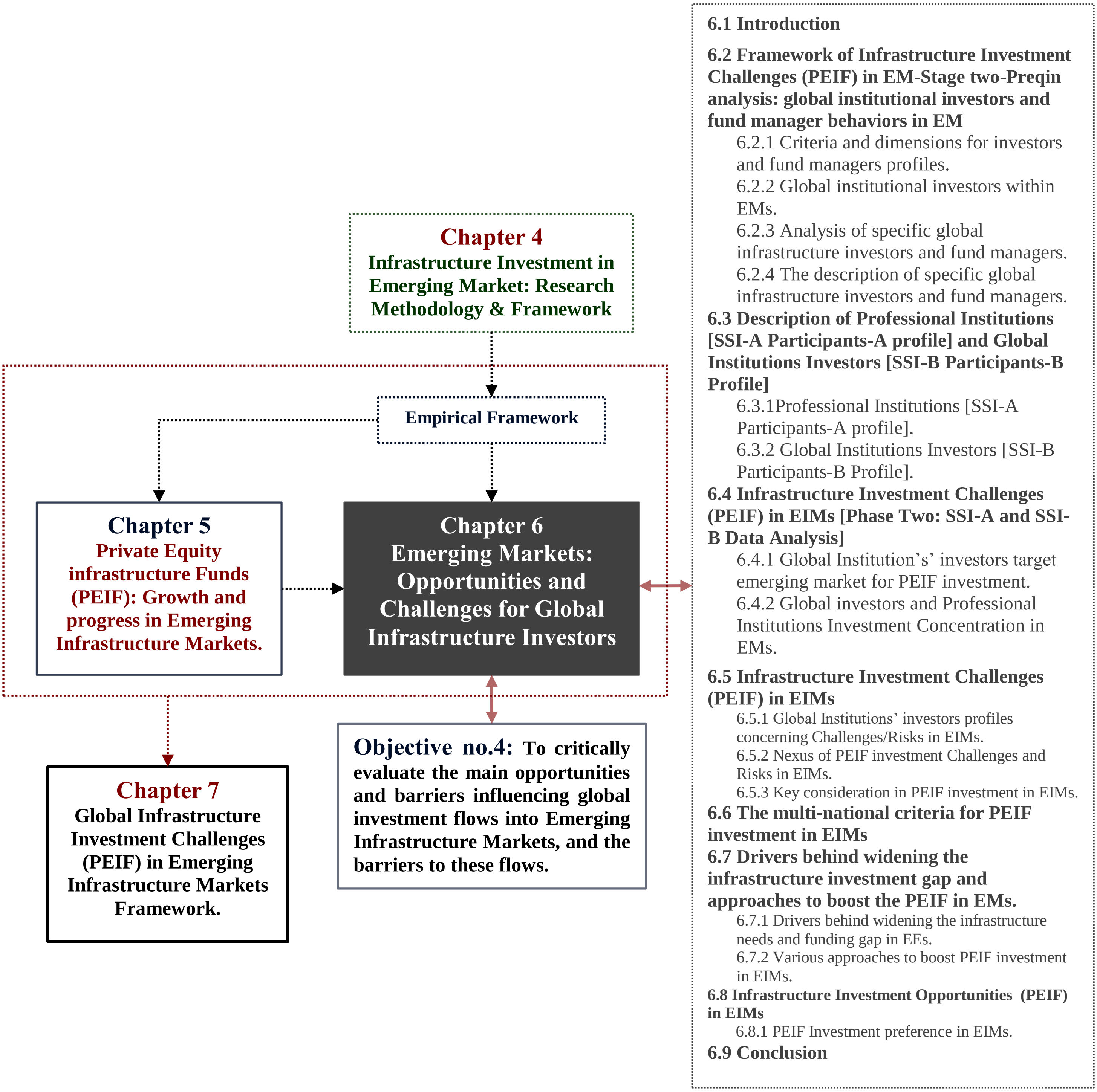
This chapter contributes to existing knowledge concerning international challenges and factors currently influencing PE investment flows into infrastructure projects within emerging infrastructure markets. It is based on the Preqin data analysis regarding

PEIF in EM, alongside an understanding of the perspectives of both global investors and main players regarding the challenges preventing their entrance into EM. In particular, it presents a structural design for the bilateral path of Semi-Structured Interviews (SSI) with professional institutions, global investors and fund managers. This pursues a logical dynamic development from holistic philosophical global professional institutions observing and evaluating PEIF investment in EM. It also considers the perspective of the most active investors and fund managers in PEIF investment in EM during the addressed timeframe (i.e. Q1-2009-Q4-2019), as extracted from the Preqin data stream.

The first section of this chapter comprises the introduction. Section **6.2** examines the detailed outcomes of the analysis of PEIF investor profiles (i.e. identifying the key players in PE infrastructure investment in EIM) used to recognized particular challenges and barriers associated with PE infrastructure investment deals within EM. Section **6.3** discusses SSI-A, conducted with professional institutions in the market in order to identify the philosophical overviews of the challenges and difficulties witnessed by global investors in relation to infrastructure investment in EM. In addition, focuses on the interviews with selective investors (SSI-B) and represents the second route of interviews signified by SSI-B.

The second part of this chapter is a detailed analysis of SSI in infrastructure investment in EIM. In particular,Sections **6.4** and **6.5** analyse the major findings concerning global professional institutions' and key PE investors' perspectives in relation to PEIF investment in EIM as reported in the empirical data provided by SSI-A and SSI-B. Specifically, they identify the key drivers and motives resulting in PEIF investment in EIM, and the reasons for the concentration of PEIF in specific EM areas. In addition, they highlight the most significant challenges and difficulties pertaining to PEIF investment in EIM, and the relevant factors and influences impacting infrastructure investment decisions. Section **6.6** provides insight into multiple criteria and dimensions, and additional measurements global private investors utilize to evaluate the EM they plan to enter to invest in economic infrastructure assets. Meanwhile, Section **6.7** offers in-depth assessment of the drivers behind widening the infrastructure Investment gap and approaches to boosting PEIF in EMs. Section **6.8** summarizes the identified opportunities for PEIF investment in EM. Section **6.9** summarizes the key points arising from the two forms of interview analysis concerning significant challenges relating to global infrastructure investment in EM.

Figure 6.1-Structural Context of Chapter Six



6.2 Framework of Infrastructure Investment Challenges (PEIF) in EM -Stage Two-Preqin Analysis: Global Institutional Investors and Fund Manager Behaviours in EM

The second stage of phase two of the empirical work and the framework for the challenges facing infrastructure investment in EM (see Figure 4.2 Chapter Four) reinforced the comprehensive perspective required to cover the analysis and detailed outcomes of PEIF investment in EM to fulfill Objective Four of this research. the interviews with specific investors and fund managers was utilised to explore the perspective of specific investors and fund managers and so assist the in-depth investigations into PEIF investment within EM. It was considered specifically beneficial for gaining an understanding of specific investors' experience and knowledge of infrastructure assets within specific geographic locations, which exhibited a significant development in the infrastructure of the EIM investment industry.

The massive volume of infrastructure investment fund vehicles and fund managers has increasingly determined the preferred Emerging Infrastructure Markets for yield potential with stable returns, according to the structure of their geographical infrastructure investment strategies for their fund vehicles over the last decade. Consequently, investors and fund managers have increasingly delineated the potential stable returns and recognized the most promising capital markets of EIM (i.e. allocating their investment to the most potentially attractive geographical and industrial region within EM) (Pries and Berla, 2015; Preqin, 2018A).

The current section is structured to go beyond the deals and fund vehicle levels-rates and numbers- within emerging markets, and correlate the in depth assessment of deals and fund vehicles levels at the investor level by examining investors and fund managers experiences and recognition of infrastructure assets within Emerging Infrastructure Markets (i.e. The third step of infrastructure investment in emerging markets empirical analysis process). Specifically, the current section draws upon a number of measurements and dimensions pertaining to the growth of investors and fund managers with regard to the investing and delivery of critical infrastructure assets within EIM (i.e. investors profiling criteria) (see Figure 4.2 in Chapter Four).

Therefore, this section is initiated with an in-depth analysis of investors' profiles with regard to infrastructure investment within EM; and acquired holistic perspective of the key players of global Investors and funds managers the most active in the markets, followed by list institutional investors and fund managers with the highest infrastructure investment rates in Emerging Infrastructure Markets.

6.2.1 Criteria and Dimensions for Investors and Fund Managers Profile

The key measurements of investigation considers the approaches of investors in Emerging Infrastructure Markets (i.e. investors portfolio analysis) comprises of: 1) Identification of most investors and funds managers targeting investment in EIM within the examined time frame (2009-2019), 2) a detailed breakdown of the type of investors, investors' countries and AUM in EIM, 3) An exploration of investment structures in EIM (i.e. type of industry, financial breakdown, and project stage); and 4) Exploration of the most attractive region/country for infrastructure investment within emerging markets (see Figure 4.5 and Figure 4.6).

Alongside the aforementioned dimensions, and as highlighted in Chapter Four (Section 4.10.1.1 The analysis of Preqin Database-Deals in Emerging Markets), investors and fund managers invested in E.M. are divided into three forms: Local institutional investors and fund managers levels (LL), Regional institutional investors and fund manager levels (RL), and global institutional investors and fund manager levels (GL). In this research further assessment of GL and RL investors has been conducted, as presented in Table 6.1). However, due to the research time restriction, and to concentrate on the scope of the research, the local institutional investors and fund managers levels (LL) will excluded from the analysis[30].

[30] The analysis reveals that there is requirement for additional and increase volume of international investment to enter emerging markets. In spite of the significant volume of local institutional investors are mandates to invest in local assets. However, in the context of the scale investment needs a requirement to attract international institutions investment community.

Table 6.1- Breakdown of Global Investors and Funds Managers Infrastructure Investment within EIMs

	Total Deals Numbers	**Total Deals Size ($MN)**	**%**
Local institutional investors and fund managers levels (LL)	1,725 deals	319,348.44	50%
Regional institutional investors and fund managers levels (RL)	147 deals	75,152.41	12%
Global institutional investors and fund managers levels (GL)	647 deals	237,615.66	38%

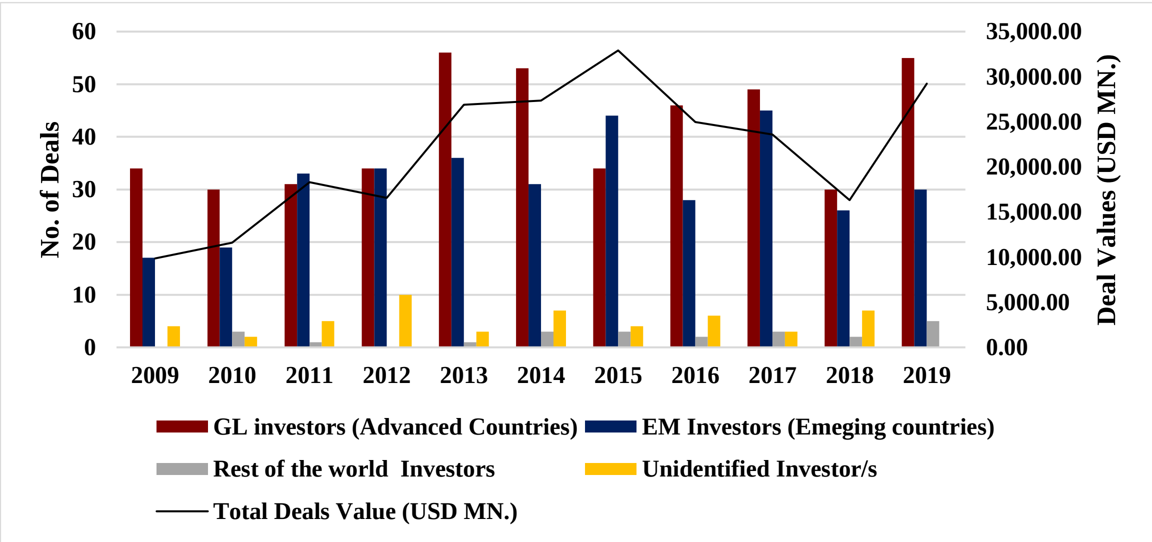
Source: Preqin; Author's own analysis

An in depth analysis represents first level assessment of investors profiles as they pertain to GL investors' locations. GL classification has been structured based on investors' location and their investment positions in different regions. In addition, GL is branded with a variety of investors, funds managers and infrastructure firms from various countries of different classifications levels; and investors from advanced countries (ex. USA, Canada and Japan countries), emerging countries (e.g. Spain and Turkey, Saudi Arabia countries) and developing countries (e.g. Ivory Coast, Uruguay, and Kuwait). The driver behind this categorization is the observation that other participants from the addressed Emerging Infrastructure Markets countries, and their contributors from the rest of the world are involved in infrastructure deals within EIM, as depicted in Figure 6.2.

Overall, global investors and fund managers positioned in advanced countries have acquired significant weight over other investors in terms of their investment in emerging markets (i.e. representing 46% compared to 35% EM investors and 19 RoW investors). The in-depth analysis illustrates the pronounced development and growth of global investors in Emerging Infrastructure Markets, with a total deal value of USD 237,615.66 million for 647 deals for the period 2009-2019.

In the context of quantity of deals, the analysis spotted significant progress and development by increasing the number of assets that engaged the global investors, who quantified 31 deals invested in by 34 investors from advanced countries, and cost USD 9,856.73 million in 2009 compared to 70 deals invested in by 55 investors and fund managers from advanced countries worth USD 29,224.77 million at the end of the period examined. In addition, the most notable participants in terms of global investors and fund managers in infrastructure deals in E.M. was in **2015** for aggregate; there were 56 global institutional investors for 60 deals worth USD 26,887.32 million. On the other hand, **in the context of deal values**, the highest scale of global investors investing in EM was USD 32,98.52 MN. There were 74 deals from 34 investors and fund managers from advanced countries.

Figure 6.2-GL Investors and Funds managers Scale of Infrastructure Investment within EIMs



Source: Author calculation (Preqin data)

Table 6.2- GL Investors and Funds managers within Emerging Infrastructure Markets

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Investors location	(1)No. of GL Investors	34	30	31	34	56	53	34	46	49	30	55
	(2)No. of EM Investors	17	19	33	34	36	31	44	28	45	26	30
	(3)No. of RoW Investors	0	3	1	0	1	3	3	2	3	2	5
	Unidentified Investor/s	4	2	5	10	3	7	4	6	3	7	0
Total Investors		**55**	**54**	**70**	**78**	**96**	**94**	**85**	**82**	**100**	**65**	**90**
Deals no. and Values	**Total No. of deals**	**31**	**35**	**46**	40	**60**	**70**	**74**	**64**	**82**	**75**	**70**
	Total Deals Value (USD MN.)	**9,856.73**	**11,589.2**	**18,315**	**16,578**	**26,887.32**	**27,356.47**	**32,908.52**	**24,960.81**	**23,606.84**	**16,332**	**29,224.77**
Industry	aggregate No. of transport sector deals	12	14	15	6	13	21	23	12	14	5	13
	value of deals (USD Mn.):	4,371.31	5,293.05	10,353	5,499	13,031.43	14,021.79	10,847.395	11,043.88	4,234.62	4,018	12,146.67
	aggregate No. of **Renewable Energy** sector deals	11	15	21	27	39	38	33	36	61	54	41
	value of deals (USD Mn.):	2,533.55	2,546	1,356.28	8,211.95	11,876.47	11,140.73	9,879.69	6,607.21	15,779.02	4,608.90	9,628.16

Note (1):
(1)No. of GL Investors: Represents investors' locations in Advanced Countries (USA, Canada, Japan, France, UK, Spain, Germany, Norway, Italy, Denmark, Sweden, Austria, Ireland, Luxembourg. Switzerland, Finland, Portugal, and Australia)
(2)No. of EM Investors: Refers to investors' locations in emerging countries (those examined in this research), in addition, some of investors in the EM countries addressed participated in deals in other of the examined countries
(3)No. of ROW Investors: Refers to investors located in the rest of the world (Qatar, Kuwait, Israel, Kenya, Isle of Man, Argentina, Cyprus, Ecuador, Bulgaria, Bahrain, Iraq, Lebanon, Ivory Coast, Jordan, Dominican Republic, Bermuda, and Lithuania)
Note (2): Macquarie Infrastructure and Real Assets (MIRA) located in three countries (France, UK, and South Korea)
Note (3): Abengoa an IT and Infrastructure company has two offices located in Sweden and Spain and jointly invested in EM

Source: Preqin; Author's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Continue-Table 6.2-GL Investors and Funds Managers within Emerging Infrastructure Markets.

		2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Industry	aggregate No. of **Power** sector deals	3	4	7	5	7	8	14	6	4	11	10
	value of deals (USD Mn.)	1,350.83	3,658	9,106.53	2,695.91	1,979	2,942.79	11,919.24	6,649.91	2,472	7,187.27	3,897.97
	aggregate No. of **Water** sector deals	3	2	3	2	0	1	3	5	3	5	3
	value of deals (USD Mn.)	1,601.04	91.34	828	125	0	30.01	222.98	204.36	1,121.20	518.27	1,046.61
	aggregate No. of **Sewage** sector deals	2	0	0	0	1	2	1	5	0	0	3
	value of deals (USD Mn.)	652	0	0	0	7.31	48.9	39.21	456.13	0	0	2,505.36
Asia	No. of deals	12	10	20	11	11	14	24	23	7	6	9
	value of deals (USD Mn.)	2,139.09	2,909.3	2,173	4,215	2,283.97	3,178.84	4,357.75	1,359.17	6,622.68	3,718	6,574.29
Latin America & Caribbean	No. of deals	14	16	9	18	34	39	28	24	41	45	43
	value of deals (USD Mn.)	4,574.99	5,399.61	3,001	8,324.94	13,839	17,038.86	14,936.575	7,337	10,768.16	3,269.10	15,755.45
Europe	No. of deals	3	4	11	4	1	10	10	10	12	15	11
	value of deals (USD Mn.)	859.98	768.09	5,122	2,321.59	23.39	4,498	924.30	8,703.62	1,017.06	683.52	728.44
Middle East	No. of deals	1	4	5	0	4	1	2	3	5	1	2
	value of deals (USD Mn.)	1,810.67	2,491.34	7,999	0	8,020	1,500	239.21	3,411.08	2,874.06	500	621.61
Africa	No. of deals	1	1	1	7	10	6	9	4	17	8	5
	value of deals (USD Mn.)	472	21.13	20.05	1,715.98	2,720	1,140.81	12,450.68	4,150	2,325	8,161.55	5,545

Source: Preqin; Author's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Continue-Table 6.2-GL Investors and Funds Managers within Emerging Infrastructure Markets.

		2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Project Stage	aggregate No. of **Greenfield**	23	30	37	34	52	55	59	47	74	69	66
	value of deals (USD MN.):	6,119.21	9,520	10,831	11,354	18,632.91	20,367.94	28,879.80	21,287.58	20,973.71	13,677	26,092.04
	aggregate No. of **Brownfield**	8	5	9	6	8	15	15	17	8	5	4
	value of deals (USD MN.):	3,737.52	2,069.23	7,484.09	5,224	8,254.41	6,988.53	4,028.72	3,673.23	2,633.13	2,851.74	2,026
Total deals numbers invested by GL investors and Fund Managers 647 **Total deals value invested by GL investors and Fund Managers USD 237,615.66 million**												

Source: Preqin; Author's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

6.2.2 Global Institutional Investors within EMs

As highlighted in the previous section (5.2 Private Equity Infrastructure Funds Investment (PEIF) Analysis-Deals level), a fluctuating pattern was observed between the amount of infrastructure investment **deals sizes** and **deals numbers** within emerging markets. Therefore, an infrastructure deals classifications assessment approach to identify global institutional investors and fund managers' behaviours within EM was observed on two grounds: 1) The volume of infrastructure numbers of deals; and 2) the magnitude of infrastructure investments deals; the sizes of which were investigated by GL investors in EIM, as exhibited in Table 6.2.

Numbers for GL investors infrastructure investments deals within the EM analysis

As exhibited previously, the data investigated revealed a high level of distribution of infrastructure investment over the addressed period, having delivered an overview of the global institutional investors. This made them a significant volume of capital to re-invest in Emerging Infrastructure Markets. The driver behind the magnitude of infrastructure funds has persistently been to provide attractive returns for institutional investors. Indeed, further details of GL investors and funds managers assessment resulted in the most repetitive investors and fund managers engaged in infrastructure investment in emerging markets within the given timeframe.

Overall, despite the moderate investment scales set by global investors at the outset of the examined period, the magnitude of infrastructure deals invested by GL investors and funds managers over the period examined were outperformed. Indeed, the steady progressive development of investment in the markets recorded a significant presence from global investors within emerging markets, as depicted in Figure 6.3.

In summary, a total of 263 investors worldwide differentiated their investment and recorded preferences when investing in emerging markets. The lions share belongs to the USA with 66 aggregate investors and other institutional firms targeting investment in EIM. These were followed by 141 various investors from varying majorities in Europe comprising 44 investors positioned in Spain, 28 located in France, and 13 headquartered in Italy. Asian investors (i.e. investors from Japan and

Singapore) acquired a considerable share of emerging markets infrastructure, and the investment industry accounted for 23 investors and infrastructure firms.

Further assessment of the aforementioned global institutional investors and infrastructure firms revealed a total of 40 investors differentiating their investment and recording a significant preference to invest in emerging markets, as presented in Table 6.3, which delivered a detailed breakdown of the majority of GL investors' investment deals within EIM on an annual basis.

Figure 6.3-Geographic Distribution of Global Investors in Infrastructure Assets in Emerging Infrastructure Markets

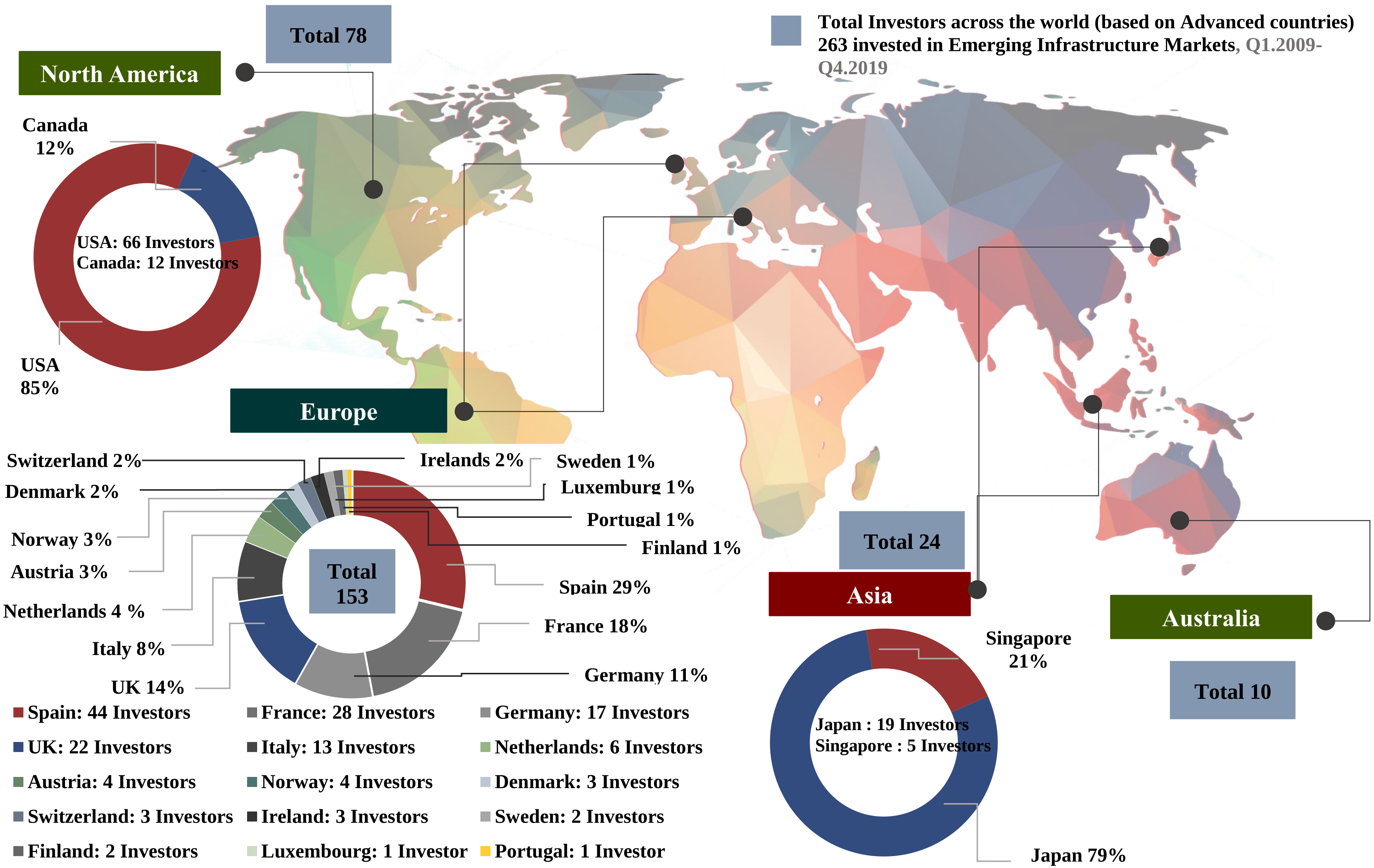


Table 6.3- GL Investors and Funds Managers Breakdown Infrastructure Deals within Emerging Infrastructure Markets

	Investors Profile			Financial transactions		Funds profile	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total deals
	Investor Name	**Investor Location**	**Type of investors**	**(1)Total Deal size (USD MN.)**	**(1)Total Debt (USD MN.)**													
1	**Enel green power SpA**	**Italy**	**Renewable energy company**	**4,515.17**	**2,189.76**	-	-	-	-	1	1	4	6	3	9	8	1	**33**
2	**Engie**	**France**	**Corporate Investor**	**8,574.46**	**2,063.6+** partially 500	Lereko Metier Sustainable Capital Fund, Lereko Metier REIPPP Fund	-	-	1	6	3	1	0	3	5	2	1	**22**
3	**Actis**	**UK**	**Fund Manager**	**7,800**	**4,252.51**	Actis Energy Infrastructure Fund II Actis Energy Infrastructure Fund III Actis Energy Infrastructure Fund IV	-	1	0	0	5	1	2	1	4	-	1	**15**
4	**Aleatica**	**Spain**	**Corporate Investor**	**5,406.1**	**1,171.1**	-	1	2	-	-	1	6	-	2	-	-	-	**12**
5	**Grupo Isolux Corsán**	**Spain**	**Construction engineering company**	**2,468.61**	**-**	-	3	-	1	-	1	4	-	1	-	-	-	**10**
6	**Abengoa**	**Spain**	**IT and Infrastructure company**	**3,901.31**	**1,927.64+**undis closed debt	-	-	2	1	1	-	6	-	-	-	-	-	**10**
7	**Astaldi SpA**	**Italy**	**Construction company- Renewable**	**5,799.4**	**513**	-	3	-	1	1	-	-	3	2	-	-	-	**10**
8	**Iberdrola SA**	**Spain**	**electric utility company-Renewable**	**1,638.38**	**-**	-	0	2	-	-	-	3	1	-	2	-	2	**10**
9	**Mainstream Renewable Power**	**Ireland**	**Infrastructure Firm**	**6,525.28**	**5,542.29**	-	-	-	-	-	4	-	1	1	2	-	2	**10**
10	**Acciona**	**Spain**	**Infrastructure Firm-Renewable**	**5,859**	**3,534.1+**1 undisclosed debt financing	-	2	1	-	-	-	-	1	4	1	-	1	**10**
11	**EDF Group**	**France**	**Corporate Investor**	**893.92**	**671.98**	-	1	-	5	1	-	1	1	-	-	-	-	**9**
12	**Alstom Transport SA**	**France**	**Corporate Investor**	**9,456.7**	**-**	-	1	-	1	-	3	1	2	1	-	-	-	**9**
13	**SunEdison**	**USA**	**Corporate Investor**	**941.77**	**767.77**	-	-	-	-	1	1	3	3	-	-	-	-	**8**

(1) Note: Total deals size and amount of debt are accounted based on investor participation in the asset, therefore, probability of duplicate assets value is assumed

Source: Preqin; Author's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Continue-Table 6.3-GL Investors and Funds Managers Breakdown Infrastructure Deals within Emerging Infrastructure Markets

	Investors Profile			Financial transactions		Funds profile	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total deals
	Investor Name	Investor Location	Type of investors	(1)Total Deal size (USD MN.)	(1)Total Debt (USD MN.)													
14	AES Corporation	USA	Electric power distribution company	4,063.31	1,681	-	-	-	1	3	3	1	-	-	-	-	-	8
15	Macquarie Infrastructure and Real Assets (MIRA)	UK	Fund Manager	2,784	323.5	Macquarie Mexican Infrastructure Fund Macquarie Global Infrastructure Fund II Macquarie Everbright Greater China Infrastructure Fund Philippine Investment Alliance for Infrastructure Macquarie State Bank of India Infrastructure Fund	-	-	3	-	2	2	-	1	-	-	-	8
16	Scatec Solar	Norway	Renewable energy company	1,610.06	1,111.24	-	-	1	-	1	-	-	1	2	3	-	-	8
17	FCC Construcción [Fomento de Construcciones y Contratas]	Spain	Construction company	19,428.67	4,258	-	1	-	-	-	3	1	2	-		-	-	7
18	Solar Pack	Spain	Renewable energy company	391.4	190.4	-	-	2	-	-	3	-	-	1	1	-	-	7
19	ACS Group	Spain	Construction company	9,235.91	2,221.23	-	1	-	-	-	1	2	-	-	1	-	2	7
20	Arroyo Energy Investors	USA	Fund Manager	237.1	69.1	Arroyo Energy Investors Fund II	-	-	-	-	-	-	-	-	-	6	1	7
21	Total Eren	France	Corporate Investor	1,069.93	504.93	-	-	1	-	-	2	-	-	-	-	2	2	7
22	Canadian Solar	Canada	Fund Manager	260.09	116.91	-	-	-	-	-	-	-	-	2	-	1	3	6
23	Global Infrastructure Partners	USA	Infrastructure Firm	1,140.83	738.72	India Infrastructure Fund	2	1	1	1	-	-	1	-	-	-	-	6
24	Building Energy	USA	Renewable energy company	37.3	37.3	-	-	-	-	-	-	-	1	-	-	5	-	6
25	GE Energy Financial Services	USA	Corporate Investor	1,583.48	1,200	-	-	1	1	-	1	-	-	1	-	1	1	6

(1) Note: Total deals size and amount of debt are accounted based on investor participation in the asset, therefore, probability of duplicate assets value is assumed

Source: Preqin; Author's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Continue-Table 6.3 -GL Investors and Funds Managers Breakdown Infrastructure Deals within Emerging Infrastructure Markets

	Investors Profile			Financial transactions		Funds profile	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total deals
	Investor Name	Investor Location	Type of investors	(1)Total Deal size (USD MN.)	(1)Total Debt (USD MN.)													
26	Mitsui & Co - Corporate Development Business Unit	Japan	Corporate Investor	3,516.09	1,495.22	-	2	1	-	-	3	-	-	-	-	-	-	6
27	Bouygues Group	France	Conglomerate company	6,439.16	-	-	1	-	-	-	4	-	-	-	1	-	-	6
28	Suez Environnement	France	Utilities services company	1,559.4	-	-	-	-	-	-	-	-	-	2	0	2	2	6
29	Salini Impregilo	Italy	Construction company-Renewable	7,440.18	1,155	-	-	2	1	-	-	1	-	1	-	-	-	5
30	Scotta	Italy	electric power company-Renewable	19	19	-	-	-	-	-	-	-	-	-	-	5	-	5
31	VINCI Concessions SAS	France	Infrastructure Company	6,3270.94	92.81	-	1	-	-	-	3	-	-	1	-	-	-	5
32	Cap Vert Energie SAS	France	Renewable energy company	45	-	-	-	-	-	-	-	-	-	-	-	5	-	5
33	European Bank for Reconstruction and Development	UK	Bank	55	55	-	-	-	-	-	-	-	-	-	-	5	-	5
34	X-ELIO	Spain	Solar energy equipment supplier	317.92	147.92	-	-	2	-	-	-	-	-	-	1	2	-	5
35	Sacyr Vallehermoso	Spain	construction company	1,05.145	810	-	-	-	-	-	-	1	2	-	1	-	1	5
36	Grenergy Renovables	Spain	Renewable energy company	100.3	100.3	-	-	-	-	-	-	-	-	2	2	-	1	5
37	Toyota Tsusho Corporation	Japan	Corporate Investor	7,960	320+2 undisclosed debt financing	-	-	-	-	-	-	-	-	-	3	2	-	5
38	SUNfarming Group	Germany	Solar energy equipment supplier company	63.3	18.99	-	-	-	-	-	-	-	-	-	-	-	4	4
39	Norfund	Norway	Investment company	1,378.54	1,030.82	-	1	-	-	1	--	-	1	-	1	-	-	4
40	FMO	Netherlands	Investment Bank	815.12	600	-	-	-	-	-	-	3	-	1	-	-	-	4

(1) **Note: Total deals size and amount of debt are accounted based on investor participation in the asset, therefore, probability of duplicate assets value is assumed**

Source: Preqin;Author's own analysis

6.2.3 Analysis of Specific Global Infrastructure Investors and Fund Managers

In accord with previous studies, as noted in Section 6.2 the main global institutional investors in this research recorded a significant preference for investment in forty widespread investments considered to be in the top rank of PEIF within EM. The exposure of global institutional investors to EM has led to changes in their perception, including viewing investing in EIM from a strategic, rather than a tactical asset, perspective (Conway, 2011). Conway (ibid.) therefore argued that PE investors should use a range of alternative funding strategies for their investment decisions, including investing in funds in global EM (for which the selection of the country is crucial) and regional or individual country funds. Furthermore, as discussed previously in Section 6.2.1, the current section represents the second stage of the purposive sampling analysis. It therefore aims to establish a further insights into the primary investors and fund managers discussed above, based on an investigation of their **infrastructure assets focusing on a specific geographical plot** within EM, in order to outline the primary outcomes for the selective global private investors and fund mangers (i.e. SSI-B interviews).

In order to attain this inclusive goal, the collective global investors and fund managers were pooled into further assessment procedures. Firstly, an in-depth analysis was undertaken, focussing on the top twenty geographical infrastructure investments of the most active investors and fund managers into the five identified regions within EM (i.e. Latin America and the Caribbean, Europe, Asia Africa, and the Middle East). This focused on establishing most significant region for their investment, as presented in Table 6.3 at the end of the current sub-section (see Appendix D.3 for a detailed breakdown of the predominant global investors and fund managers of infrastructure investment geographical focus within EM, Q1-2009-Q4-2019, (USD, MN.)).

Table 6.3 consists of a breakdown of the second multi-stage assessment following the use of the candidate exploratory variables for private equity infrastructure in EM, with each key variable divided into further sub-variables. Firstly, Investors Profiles followed the previous breakdown in Section 6.2.2 (Global institutional investors within EM) and were divided according country, type of organisation, and the aggregates numbers and scale of investments ($MN). Secondly, there was a detailed investment breakdown of the following assets: (1) regions relating to infrastructure assets; (2) total size of deals, along with the number of infrastructure investments for each the region ($MN.); and (3) participation, i.e. level of participation and percentage of stakes acquired. Finally, fund profiles were divided according to the aggregate number of funding vehicles (i.e. family fund profiles), along with their target geographical allocation, fund classification (i.e. LFL, RFL, and GFL, as interpreted in the previous Chapter, Section 5.7.1), and fund size ($MN.).

To sustain the emphasis and ensure the research strategy successfully fulfilled the research objective, a number of infrastructure deals were removed from the multi-stage process framework, including those pertaining to second financial transactions (i.e. the debt profile financial transaction phase) and the third financial transaction (i.e. the acquisition/exit financial transaction phase) as their first financial transaction at deals-level assessment (see Chapter Four, Section 4.5). The selective sampling placed a greater emphasis on the geographical allocation of PEIF investment assets (i.e. the second stage of the multi-stage process), as well as the concept of initial infrastructure investment in EM, concentrating on the arrangement of infrastructure assets (IP) in the context of: (1) investors profiles: and (2) vehicle and return structure, i.e. global institutional investors and fund managers entering Emerging Infrastructure Markets.

Overall, the assessment of outcomes revealed that the highest number of aggregate infrastructure assets invested by the most active investors and fund managers in EM (i.e. the top twenty investors and fund managers) comprised 208 deals, as presented in Figure 6.4. This was divided into: 117 assets concentrated in Latin America and the Caribbean region, followed by thirty-three assets distributed across Asia. The third highest infrastructure focus in EM was in Africa, with total of twenty diverse infrastructure deals. However, global investors and fund managers were found to have invested in only twenty European infrastructure assets. Furthermore, the Middle East was found to have attracted the lowest level of investment from global investors and fund managers, with a total of six infrastructure assets, including four in Saudi Arabia, (three in the railroad sub-sector and one asset in the water treatment sub-sector) and two in the renewable energy sector of the United Arab Emirates.

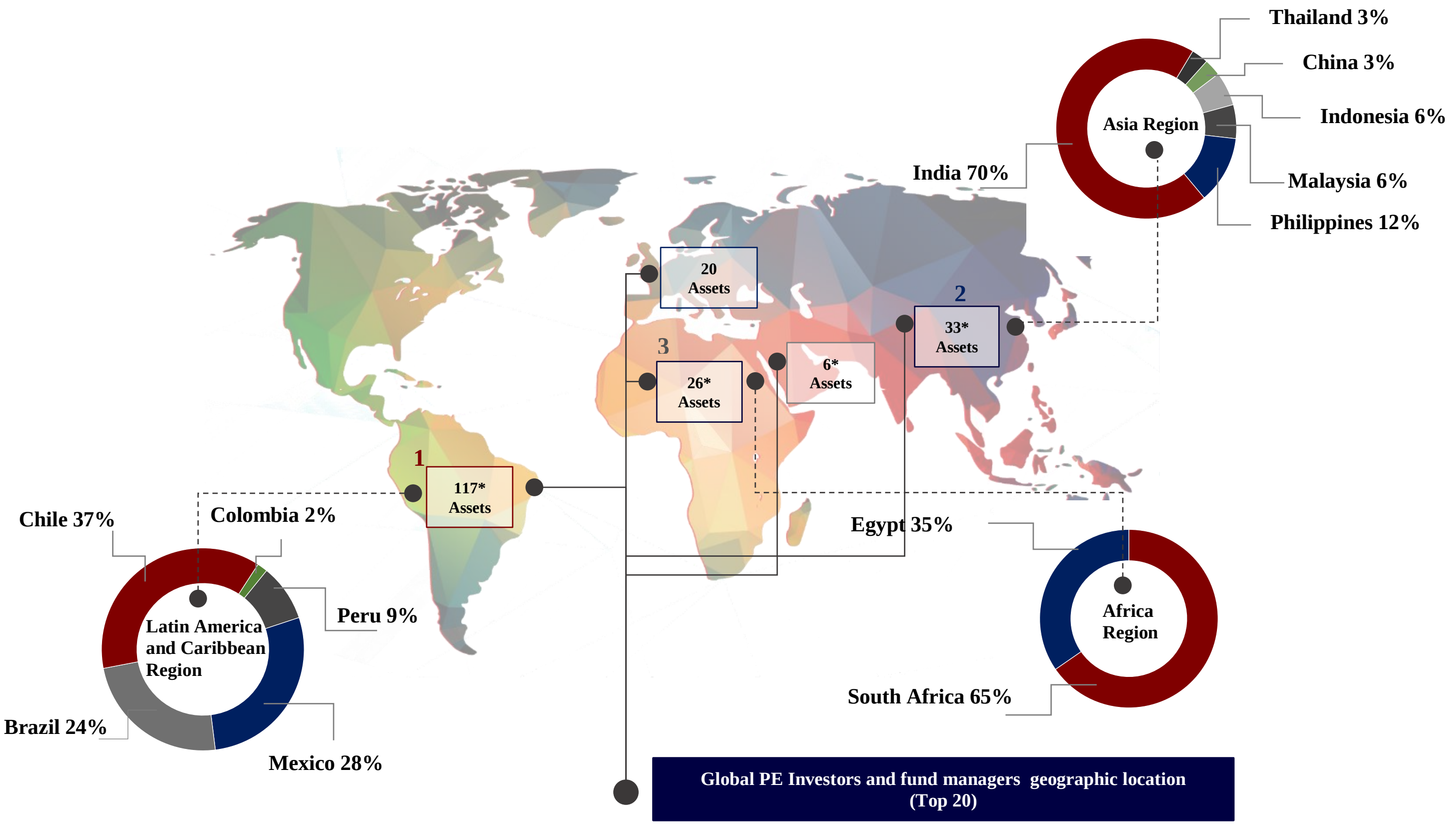
However, it is significant that six of the investors listed in Table 6.4 participated in investing in twelve infrastructure deals within EIM, in the three regions, i.e. Latin America and the Caribbean region (i.e. four assets in Chile and one each in Peru and Mexico), three assets in the Middle East, and three in Africa.

Therefore, the main trends concerning infrastructure investment revealed by the selective sampling of global private investors for the SSI-B interviews (i.e. the second stage of phase two in the current research) concentrated on how fund managers and investors focused their PEIF investment in the following three regions within EIM: (1) Latin America and the Caribbean; (2) Asia; and (3) Africa.

Further analysis of the assessment at country level revealed that Chile attracted the most investment in Latin America and the Caribbean region, with a total of forty-five infrastructure assets (circa 37%), thus revealing infrastructure to be the most attractive market for global investors. This was followed by Mexico, which accounted for thirty-four various assets (Circa 28%), with the third placed being Brazil, which attracted investment from approximately 24% of global investors and fund managers.

In Asia, India was found to be the most popular market for global investors and fund managers to invest in infrastructure assets, represented by twenty-three projects of various kinds (i.e. 70%). Meanwhile, the Philippines attracted the attention of three investors (i.e. one fund manager and two institutional investors), who invested in four assets: (1) renewable energy: (2) conventional power energy; (3) water services utilities; and (4) transport industries. In addition, Malaysia and Indonesia each attracted investment from multi-national investors for two infrastructure assets. Moreover, South Africa recorded a significance PEIF investment, with seven investors and fund managers distributed globally investing in seventeen various infrastructure assets (i.e. 65%). Similarly, Egypt attracted six globally distributed investors and fund managers to invest in nine projects (approximate 35%) within the renewable energy sector.

Figure 6.4-Global Investors and Fund Managers' Infrastructure Investment Geographic Location and Concentration on EIM Regions.



Global PE Investors and fund managers geographic location (Top 20)

Spain	8 Investors	Italy	2 Investors
USA	2 Investors, 1 Fund Managers	UK	2 Fund Managers
		Ireland	1 Investors
France	3 Investors	Norway	1 Investors

*** Total infrastructure assets 208 exclude repetitive 12 deals (6 assets in Latin America and Caribbean region, 3 deals in Africa region and 3 deals in Middle East) due to the partnership with investors and funds managers included in the list.** Q1.2009- Q4.2019

Note: the perspective of selective sampling considered the outlook of the majority investors and fund managers toward PEIF investment in EIM.

Source: Preqin; researcher's own analysis

Table 6.4- The Predominant Geographical Focus of Global Investors and Fund Managers Concerning Infrastructure Investment within EM Source: Preqin; the researcher's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Investors Profile					Investment Detailed Breakdown				Funds profile			
Investors Name	**Investor Location**	**Type of investors**	**Total No. investment**	**Total Deals size (USD MN.)**	**Total No. investment**	**Region**	**Total Deals size (USD MN.)**	**Partnership with others**	**Funds vehicle No.**	**Geographic target**	**Funds vehicle location**	**Funds size (USD MN.)**
[1]Enel green power SpA	**Italy**	**Renewable energy company**	**33**	**4,515.17**	25	Latin America and Caribbean region	3,691.69	2[Yes], 23[No]	1	Mexico	[LFL]	1,055.57
					5	Africa region	1,491.65	4[Yes], 1[No]	-	-	-	-
					3	Europe region	784.25	No	-	-	-	-
[2]Engie	**France**	**Corporate Investor**	**22**	**8,574.46**	11	Latin America and Caribbean region	3,304.08	6[Yes], 5[No]	-	-	-	-
					8	Africa region	3,615.05	Yes	2	Africa [Regional]	[LFL]	66.52 57.46
					1	Europe region	20.82	No	-	-	-	-
					1	Middle East region	1,500	Yes	-	-	-	-
					1	Asia region	900	Yes	-	-	-	-
[3]Actis[(1)]	**UK**	**Fund Manager**	**15**	**7,800**	7	Latin America and Caribbean region	2,627.78	5[Yes], 2[No]	Total [4], [3] invested in EE	Emerging Market	[GFL]	Fund vehicle [1]: 752
					5	Asia region	2,450	5[Yes], 2[No]		Emerging Market		Fund vehicle [2]: 1,148
					3	Africa region	2,502	3[Yes]		Emerging Market		Fund vehicle [3]: 2,750
[4]Aleatica	**Spain**	**Corporate Investor**	**12**	**5,406.1**	12	Latin America and Caribbean region	5,406.1	4[Yes], 8[No]	-	-	-	-
[5]Grupo Isolux Corsán	**Spain**	**Construction engineering company**	**10**	**2,468.61**	6	Asia region	1,043.13	1[Yes],5[No]	Total [3], [1] invested in EE	Global	[GFL]	4,000
					4	Latin America and Caribbean region	1,425.48	1[Yes],3[No]	-	-	-	-
[6]Abengoa	**Spain**	**IT and Infrastructure company**	**10**	**3,901.31**	4	Latin America and Caribbean region	2,246	2[Yes],2[No]	-	-	-	-
					3	Africa region	1,586.31	Yes	-	-	-	-
					1	Middle East region	300	Yes	-	-	-	-
					2	Asia region	69	No	-	-	-	-

Note: (1) Actis and Mainstream Renewable Power jointly invested in a total of seven infrastructure assets divided into: four infrastructure assets in Chile, two assets in Egypt, and one asset in South Africa.
(2)Alstom Transport SA and FCC Construcción [Fomento de Construcciones y Contratas] jointly invested in a total of three infrastructure assets in Saudi Arabia.
(3) Acciona and FCC Construcción [Fomento de Construcciones y Contratas] jointly invested in one infrastructure asset in Mexico.
(4) ACS Group and FCC Construcción [Fomento de Construcciones y Contratas] jointly invested in one infrastructure asset in Peru.

Continue-Table 6.4-The Predominant Geographical Focus of Global Investors and Fund Managers Concerning Infrastructure Investment within EM Source: Preqin; the researcher's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Investors Profile					Investment Detailed Breakdown				Funds profile			
Investors Name	**Investor Location**	**Type of investors**	**Total No. investment**	**Total Deals size (USD MN.)**	**Total No. investment**	**Region**	**Total Deals size (USD MN.)**	**Partnership with others**	**Funds vehicle No.**	**Geographic target**	**Funds vehicle location**	**Funds size (USD MN.)**
[7]Astaldi SpA	**Italy**	**Construction company-Renewable**	**10**	**5,799.4**	5	Latin America and Caribbean region	1,881.54	3[Yes], 2[No]	-	-	-	-
					4	Europe region	3,683.86	2[Yes], 2[No]	-	-	-	-
					1	Asia region	234	Yes	-	-	-	-
[8] Iberdrola SA	**Spain**	**electric utility company-Renewable**	**10**	**1,638.38**	9	Latin America and Caribbean region	1,478.38	5[Yes], 4[No]	-	-	-	-
					1	Europe region	160	Yes	-	-	-	-
[9] Mainstream Renewable Power[1]	**Ireland**	**Infrastructure Firm**	**10**	**6,525.28**	7	Latin America and Caribbean region	4,223.28	3[Yes], 2[No]	Total [4], [2] invested in EM	Emerging Market	[GFL]	Fund vehicle [1]: 752
					3	Africa region	2,502	Yes		Emerging Market		Fund vehicle [2]: 1,148
[10] Acciona[3]	**Spain**	**Infrastructure Firm-Renewable**	**10**	**5,859**	4	Latin America and Caribbean region	4,888.53	3[Yes], 1[No]	-	-	-	-
					2	Europe region	28.41	No	-	-	-	-
					2	Asia region	14.61	No	-	-	-	-
					1	Middle East region	600	Yes	-	-	-	-
					1	Africa region	180	Yes	-	-	-	-
[11] EDF Group	**France**	**Corporate Investor**	**9**	**893.92**	7	Europe region	680.81	6[Yes], 1[No]	-	-	-	-
					1	Asia region	39.9	No	-	-	-	-
					1	Latin America and Caribbean region	189	Yes	-	-	-	-
[12]Alstom Transport SA[2]	**France**	**Corporate Investor**	**9**	**9,456.7**	5	Asia region	1,052.7	2[Yes], 3[No]	-	-	-	-
					3	Middle East region	7,820	Yes	-	-	-	-
					1	Latin America and Caribbean region	584	No	-	-	-	-
[13] SunEdison	**USA**	**Corporate Investor**	**8**	**941.77**	5	Latin America and Caribbean region	631.43	1[Yes], 4[No]	-	-	-	-
					2	Africa region	273.83	Yes	-	-	-	-
					1	Asia region	64.91	No	-	-	-	-

Note: [1] Actis and Mainstream Renewable Power jointly invested in a total of seven infrastructure assets divided into: four infrastructure assets in Chile, two assets in Egypt, and one asset in South Africa.
[2] Alstom Transport SA and FCC Construcción [Fomento de Construcciones y Contratas] jointly invested in a total of three infrastructure assets in Saudi Arabia.
[3] Acciona and FCC Construcción [Fomento de Construcciones y Contratas] jointly invested in one infrastructure asset in Mexico.
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Continue-Table 6.4-The Predominant Geographical Focus of Global Investors and Fund Managers Concerning Infrastructure Investment within EM Preqin; the researcher's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

Investors Profile					Investment Detailed Breakdown				Funds profile			
Investors Name	**Investor Location**	**Type of investors**	**Total No. investment**	**Total Deals size (USD MN.)**	**Total No. investment**	**Region**	**Total Deals size (USD MN.)**	**Partnership with others**	**Funds vehicle No.**	**Geographic target**	**Funds vehicle location**	**Funds size (USD MN.)**
[14] AES Corporation	**USA**	**Electric power distribution company**	**8**	**4,063.31**	6	Latin America and Caribbean region	4,034	3[Yes], 3[No]	-	-	-	-
					2	Asia region	1,229.31	No	-	-	-	-
[15] Macquarie Infrastructure and Real Assets (MIRA)	**UK**	**Fund Manager**	**8**	**2,784**	4	Asia region	2,204.86	3[Yes], 1[No]	Total [21]	[6] target Asia	[GFL]	9,582.65
										[6] target Europe		25,577.58
					3	Latin America and Caribbean region	201.27	2[Yes], 1[No]		[6] target global [diversified countries]		4,129.71
										[1] target Mexico		401.17
					1	Europe region	323.05	Yes		[2] target North America		9,000
[16] Scatec Solar	**Norway**	**Renewable energy company**	**8**	**1,610.06**	3	Africa region	978.54	Yes	1	Africa	[RFL] Listed	N/D
					2	Latin America and Caribbean region	248.9	Yes	-	-	-	-
					2	Asia region	340	Yes	-	-	-	-
					1	Europe region	42.62	No	-	-	-	-
[17] FCC Construcción [Fomento de Construcciones y Contratas] (2,4)	**Spain**	**Construction company**	**7**	**19,428.67**	3	Latin America and Caribbean region	11,136.67	Yes	-	-	-	-
					3	Middle East region	7,820	Yes	-	-	-	-
					1	Africa region	472	Yes	-	-	-	-
[18] Solar Pack	**Spain**	**Renewable energy company**	**7**	**391.4**	6	Latin America and Caribbean region	322.4	2[Yes], 4[No]	-	-	-	-
					1	Asia region	69	No	-	-	-	-
[19] ACS Group(4)	**Spain**	**Construction company**	**7**	**9,235.91**	7	Latin America and Caribbean region	9,235.91	2[Yes], 4[No]	2	Brazil	[GFL] and [LFL]	88.53

Note: (1) Actis and Mainstream Renewable Power jointly invested in a total of seven infrastructure assets divided into: four infrastructure assets in Chile, two assets in Egypt, and one asset in South Africa.
(2) Alstom Transport SA and FCC Construcción [Fomento de Construcciones y Contratas] jointly invested in a total of three infrastructure assets in Saudi Arabia.
(3) Acciona and FCC Construcción [Fomento de Construcciones y Contratas] jointly invested in one infrastructure asset in Mexico.
(4) ACS Group and FCC Construcción [Fomento de Construcciones y Contratas] jointly invested in one infrastructure asset in Peru.

Continue-Table 6.4-The Predominant Geographical Focus of Global Investors and Fund Managers Concerning Infrastructure Investment within EM

Investors Profile					Investment Detailed Breakdown				Funds profile			
Investors Name	Investor Location	Type of investors	Total No. investment	Total Deals size (USD MN.)	Total No. investment	Region	Total Deals size (USD MN.)	Partnership with others	Funds vehicle No.	Geographic target	Funds vehicle location	Funds size (USD MN.)
[20] Arroyo Energy Investors	USA	Fund Manager	7	237.1	7	Latin America and Caribbean region	237.1	No	2	[1] South America	[GFL]	500

Note: (1) Actis and Mainstream Renewable Power jointly invested in a total of seven infrastructure assets divided into: four infrastructure assets in Chile, two assets in Egypt, and one asset in South Africa.
(2) Alstom Transport SA and FCC Construcción [Fomento de Construcciones y Contratas] jointly invested in a total of three infrastructure assets in Saudi Arabia.
(3) Acciona and FCC Construcción [Fomento de Construcciones y Contratas] jointly invested in one infrastructure asset in Mexico.
(4) ACS Group and FCC Construcción [Fomento de Construcciones y Contratas] jointly invested in one infrastructure asset in Peru.

Source: Preqin; the researcher's own analysis (this analysis was constructed from an intensive and detailed process of mining and linking of data derived from the Prequin database to generate the table)

6.2.4 The Description of Specific Global Infrastructure Investors and Fund Managers

As discussed earlier, the interviews with specific investors and fund managers focused on applying multiple data sources to establish a comprehensive assessment of PEIF investment within EM. The exploratory nature of the evaluation resulted in an in-depth discussion and detailed output conducive the fulfilment of Objective Four of this research. In order to achieve this goal, the final stage in the multi-stage purposive sampling assessment (as discussed in Chapter Four, Section 4.9) consisted of grounding the process of the selective global private investors and drawing up the shortlist of interviewees for SSI-B. The current section supports the previous assessment presented in Section 6.2.3, providing a further insight into PEIF global institutional investors and fund managers (i.e. the top twenty active investors) concentrating their infrastructure investment in the three outcomes regions in EIM (i.e. Latin America and the Caribbean region, followed by Asia and Africa).

Furthermore, Section 6.2.4 analyses the configuration of global institution investors focusing their investment in EIM, particularly within the three addressed regions, as presented in Table 6.6. Overall, the analysis depicts the majority of global investors as consisting of: (1) six investors specialising in construction and engineering services; (2) six corporate investors headquartered in France, Spain, and the USA; (3) three fund managers in the UK and the USA and three companies specialising in renewable energy investment in Italy, Spain and Norway.

Furthermore, in the context of the regional analysis, Table 6.5 presents the top ten investors and fund managers concentrating their infrastructure investments into Latin America and the Caribbean region. The median range accounted for between six and ten infrastructure assets in Latin America and the Caribbean region, with the most significant level of investment being provided by: (1) **Enel Green power SpA, (**an Italian company specialising in renewable energy) with twenty-five deals; (2) **Engie (**a corporate investor based in France) investing in eleven deals; and (3) **Aleatica** (an infrastructure firm based in Spain), which invested in ten infrastructure projects in Latin America and the Caribbean region.

It is notable that one French investor (i.e. **Engie)** targeted its second highest level of infrastructure investment in Africa, investing in eight different infrastructure assets located in an individual renewable energy sector divided equally between South Africa and Egypt. Meanwhile the **Actis** Fund Manager, whose headquarters are in the UK, diversified its infrastructure investment funds vehicles between the **three** addressed regions in EIM (i.e. seven deals in Latin America and the Caribbean region, followed by five infrastructure assets in Asia and three assets in Africa). Furthermore, the fund manager deployed the capital of three out of four investment vehicles to support infrastructure investment into countries within EIM.

In addition, a group comprised of **Iberdrola SA, ACS Group, and Solar Pack,** which is based in Spain and acts for construction companies and engineering services specialising in renewable energy investments, concentrated their infrastructure investment in Latin America and the Caribbean region. They were found to undertake a relatively high number of deals within the specified time frame, i.e. nine infrastructure deals for Iberdrola SA, seven assets for the ACS Group, and six infrastructure deals for Solar Pack.

On Other hand, Asia attracted interest from Grupo Isolux Corsán, a construction engineering company headquartered in Spain concentrating on infrastructure investment (i.e. quantified by six various assets) in India.

Table 6.5- Matrix of Top Twenty Global Investors and Fund Managers Infrastructure Investment Geographic Concentration in EIM Regions.

	Investors Name	Investor Location	Type of investors	Total No. investment	Latin America and Caribbean region	Europe region	Asia region	Africa region	Middle East region
1	Enel green power SpA	Italy	Renewable energy company	33	25	3	0	5	0
2	Engie	France	Corporate Investor	22	11	1	1	8	1
3	Aleatica	Spain	Corporate Investor	12	12	0	0	0	0
4	Iberdrola SA	Spain	electric utility company-Renewable	10	9	1	0	0	0
5	Actis(1)	UK	Fund Manager	15	7(1)	0	5	3(1)	0
6	Mainstream Renewable Power(1)	Ireland	Infrastructure Firm	10	7(1)	0	0	3(1)	0
7	ACS Group(4)	Spain	Construction company	7	7(4)	0	0	0	0
8	Arroyo Energy Investors	USA	Fund Manager	7	7	0	0	0	0
9	AES Corporation	USA	Electric power distribution company	8	6	0	2	0	0
10	Solar Pack	Spain	Renewable energy company	7	6	0	1	0	0
11	Astaldi SpA	Italy	Construction company-Renewable	10	5	4	1	0	0
12	SunEdison	USA	Corporate Investor	8	5	0	1	2	0
13	Grupo Isolux Corsán	Spain	Construction engineering company	10	4	0	6	0	0
14	Abengoa	Spain	IT and Infrastructure company	10	4	0	2	3	1
15	Acciona(3)	Spain	Infrastructure Firm-Renewable	10	4(3)	2	2	1	1
16	Macquarie Infrastructure and Real Assets (MIRA)	UK	Fund Manager	8	3	1	4	0	0
17	FCC Construcción [Fomento de Construcciones y Contratas] (2,4)	Spain	Construction company	7	3(3,4)	0	0	1	3(2)
18	Scatec Solar	Norway	Renewable energy company	8	2	1	2	3	0
19	EDF Group	France	Corporate Investor	9	1	7	1	0	0
20	Alstom Transport SA(2)	France	Corporate Investor	9	1	0	5	0	3(2)
Total				**208***	**117***	**20**	**33**	**26***	**6***
The most geographical plot infrastructure investment focus in EM (region ranks for selective sampling):					**1**	**4**	**2**	**3**	**5**

Note:* the total infrastructure assets exclude repetitive 12 deals (6 assets in Latin America and Caribbean region, 3 deals in Africa region and 3 deals in Middle East) due to the partnership with investors and funds managers included in the list.

(1) Actis and Mainstream Renewable Power jointly invested in total 7 infrastructure assets divided to: 4 infrastructure assets in Chile, 2 assets in Egypt, and 1 asset in South Africa

(2) Alstom Transport SA and FCC Construcción [Fomento de Construcciones y Contratas] jointly invested in total 3 infrastructure assets in Saudi Arabia.

(3) Acciona and FCC Construcción [Fomento de Construcciones y Contratas] jointly invested in total 1 infrastructure assets in Mexico.

(4) ACS Group and FCC Construcción [Fomento de Construcciones y Contratas] jointly invested in total 1 infrastructure assets in Peru.

Source: Preqin; Author's own analysis

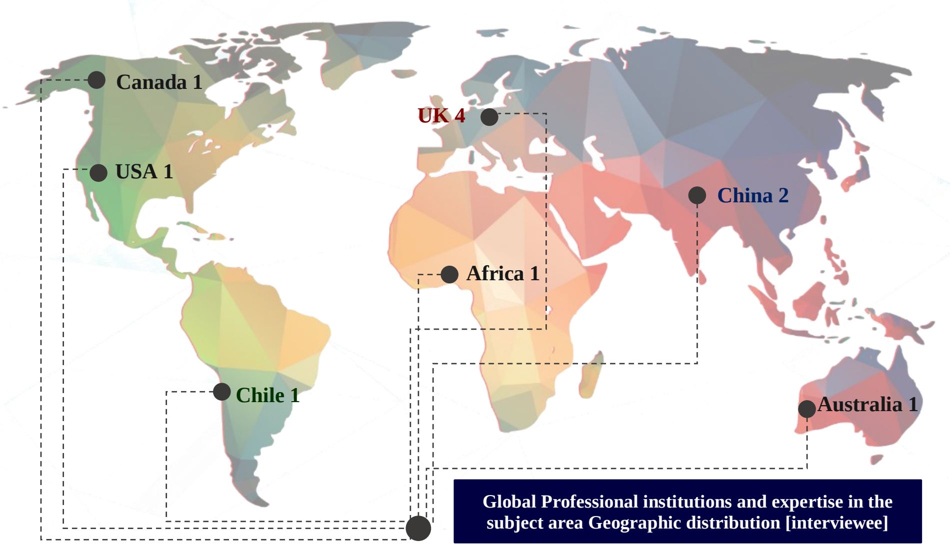
Table 6.5 represents the shortlist of participants included in this analysis (i.e. the **ten** selected global investors and fund managers). This includes the first step of **stage two of phase two** of the infrastructure investment challenges (PEIF) in the EM framework for the current research (i.e. SSI-B interviewees). The aim was to establish the views of the participants concerning PEIF investment within EM (as highlighted earlier) in the context of IP. This included challenges and difficulties and/or investment decision processes, considered to represent the overall global outlook of investors and fund managers towards PEIF investment in EM.

6.3 Description of Professional Institutions [SSI-A Participants-A profile] and Global Institutions Investors [SSI-B Participants-B Profile]

6.3.1 Professional Institutions [SSI-A Participants-A profile]

The chief driver behind the structure of SSI-A was the fact that the aim of this research is to explore global professional institutions' overviews of the progress of PEIF investment in EMs -as highlighted earlier- to provide feedback on their knowledge and experience assessing EMs. The final SSI-A interview list as given in Figure 6.5 illustrates the first stage of the qualitative interviews (i.e. SSI-A) with global professional institutions, key authors and academic experts in the infrastructure investment field, with a total of 11 interviewees over a 3 month period. The interviewees are experts in the infrastructure investment field with experience in EMs and developing countries. These participants (i.e. Participants-A) were divided into four groups; namely: 1) six participants who specialized in global professional institutions and observed the progress of PEIF investment in EMs; 2) Three key authors within the current research; 3) One academic expert responsible for infrastructure investment in the area of EMs; and 4) One group of MDBs, that is the Inter-American Development Bank (IDB).

Figure 6.5-List of SSI-A Global Professional Institutions Interviews within EMs (Profile of Interviewees)



Note: ** these participants obtained their perspective based on Survey formats due to their distance location.

Firm type	Location	Interviewee position and role	Date of interview
[1]Inter-American Development Bank (IDB) (PA 1)	USA	Principal Economic Advisor, Infrastructure & Energy	17/9/2020
[1] Global Infrastructure KPMG International (PA 2)	Canada	Global Chairman (Non-Exec), Infrastructure and Chairman, Global Cities Center of Excellence. KPMG in Canada	8/10/2020
[2] Professional institutions firm (PA3,PA4)	UK	[PA3] Senior Associate, EMEA Private Capital [PA4] vice president, Private Capital	4/9/2020
[1] PWC (PA5)	UK	PWC, International Development, Sustainability & Climate Change	2/10/2020
[1]Advisory Consultant in infrastructure investment in EM (PA6)	UK	an independent adviser to pension funds, institutional investors and international organizations. One of the experts on infrastructure investment and finance for developed and emerging countries	5/10/2020
**[1] Academic Key Author in finance infrastructure (PA7)	Chile	Senior Fellow, Universidad Adolfo Ibáñez Research Fellow at the Hoover Institution, Stanford University. His research are in determinants of industry structure, the economics of regulated industries, and the economics of public private partnerships.	10/10/2020
**[1] Academic Key Author in Infra. investment as an asset class (PA8)	Africa	lecturer in Department of Estate Management, Faculty of Environmental Design & Management, Obafemi Awolowo University,	9/9/2020
**[1] Academic Key Author in property investment (PA9)	Australia	Professor, in Economics, Finance & Property	8/10/2020
[1] Asia Pacific Head of Infra. KPMG International (PA 10)	China	Asia Pacific, Head of Global Infrastructure, KPMG in China	7/10/2020
[1] McKinsey and Company (PA11)	China	MGI Director and Senior Partner, Shanghai (Leads research on China, Asia, and global economic and business trends, helps cities and regions create sustainable growth	15/10/2020

Sources: Author's own analysis

The participants (i.e. Interviewees) come from different backgrounds and markets/regions (e.g. UK, USA and China) with different levels of concentration. For instance, PA10 he is the head of global infrastructure and his concentration in Asia pacific region. Meanwhile, PA6 specialized on infrastructure investment and finance for developed and emerging countries. Furthermore, the interviewees take on various roles with which to evaluate, observe or publish articles in the infrastructure investment industry and EMs development subject area in terms of regional and or groups of countries. In addition a considerable number work to identify infrastructure needs in EM, while others participate to assist governments to provide infrastructure project pipelines. Therefore, their perspective toward infrastructure investment and market development in emerging countries has significant value toward research and contributes to develop the PEIF conceptual framework (See chapter seven).

6.3.2 Global Institutions Investors [SSI-B Participants-B Profile]

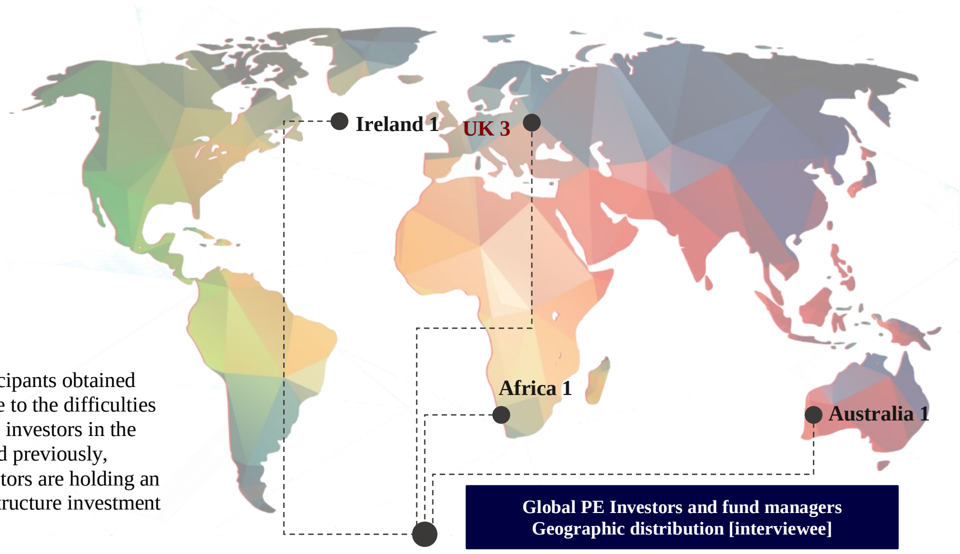
The data collection for SSI-B focused on selective institutional investors. Nevertheless, the process experienced a lack of response, resulting in attracting only two participants, rather than the initial target of ten. In line with the challenges encountered in second empirical work, as highlighted earlier in section 4.9.1 (i.e. Structuring Research Methods for Data Analysis Phase Two [Interviews Questions Descriptions]), this study found that institutional investors and fund managers lacked interest in academic perspectives and were therefore difficult to engage for the current research. It was therefore necessary to find three additional institutional investors currently investing in economic infrastructure assets within EM, as outlined in Figure 6.6. Following the establishment of the empirical framework of the research (see Chapter Four), the implementation experienced a number of difficulties. This was largely due to the impact of the COVID-19 global pandemic in 2020, which resulted in a need to include additional participants in the study, i.e. investors who did not target EMs in their infrastructure investment. This was aimed at strengthening the research by addressing the challenges and barriers preventing investors from investing in infrastructure assets in EIM, as well as adding the general perspective of investors adverse to risk taking to the research outcomes.

It should be noted here that these participants serve at managerial level (i.e. CEO, principle in fund manager, head of investment company, head of capital market in the investment company, and manager director of investor company) (see Figure 6.6).

This generated an insightful, in-depth informative level of data from a high quality and rich context (Theyer, 2010). Therefore, the aggregate participants for stage two of phase two of qualitative interviews (i.e. Participants-B) were six contributors in strategic and managerial level roles from different regions.

Figure 6.6-List of SSI-B Global Institutional Investors and Fund Managers' Interviews within EMs and their Geographic Distribution

Note: ** these participants obtained their perspective due to the difficulties to engage the 15 top investors in the research which listed previously, however these investors are holding an experience in infrastructure investment emerging markets.



Firm type	Location	Interviewee position and role	Date of interview
1 Investor (PB1)	Ireland	Head of Capital Markets, Europe	4/9/2020
1 Investors (PB2)	UK	Principle in Actis fund manager (Private Equity, Renewable Energy, Technology, Investments)	25/9/2020
1 Fund manager (PB3)	UK	Managing Director, Head of Infrastructure at Aviva Investors	20/10/2020
**1 Investors (PB4)	UK	Chief Commercial Officer	5/10/2020
**1 Investor (PB5)	Australia	CIO at 4D Infrastructure and sits on the GLIO Advisory Committee. Sarah is one of the leading global infra managers in Emerging markets	28/9/2020
**1 Investor (PB6)	South Africa	CEO of Africa Investor	25/9/2020

Sources: Author's own analysis

The final stage in academic research is the analytical explanation of collected data. Therefore, the following sections examined the detailed analytical outcomes of global professional institutions overviews following observation and evaluation of PEIF investment in emerging markets, and the perspective of the majority of active investors and fund managers in PEIF investment in EMs over the addressed timeframe (Q1-2009-Q4-2019).

6.4 Infrastructure Investment Challenges (PEIF) in EIMs [Phase Two: SSI-A and SSI-B Data Analysis]

The introductory analysis of the second stage of the empirical work addressed the major outcomes of the global professional institutions and key players and PE investors' perspectives regarding PEIF investment in EM. The current section summarizes the analytical findings by implementing a structured analysis framework interpreted previously in this thesis (4.9.1 Structuring Research Methods for Data Analysis Phase Two [Interviews Questions Descriptions]) Structuring Research Methods for Data Analysis Phase Two [Interviews Questions Descriptions]).

The opening analysis and outcomes discussed are introduced in the following sub-section (Section 6.4.1), which recognizes the main motives and primary drivers for global institutional investors and fund managers targeting their investment strategies (i.e. infrastructure investment portfolio) towards EM. Furthermore, it identifies various reasons for institutional investors and financial institutions involved in PEIF investment focusing on emerging countries markets. Meanwhile, further details are introduced to explore the majority of the challenges and difficulties pertaining to PEIF investment in EIM and the various factors and elements that impact infrastructure investment decisions within EIM, detailed in Section 6.5.

6.4.1 Global Institution's' Investors Target Emerging Market for PEIF Investment

A number of fundamental global drivers have prompted a significant number of institutional investors to invest in infrastructure projects, such as those with; i.e. low risk investments with economic stability, and an anticipated high rate of return. This has contributed to significant numbers of global investors targeting new markets, such as Latin America, Asian and African countries and regions, to allocate a range of infrastructure assets classes (Baba, 2017). This includes identifying the main motives of global institutional investors and fund managers choosing to target infrastructure investment in EM. The interview evidence indicates Four primary motives and drivers employed to target EMs in infrastructure investment namely: 1) higher internal rate of return (IRR) profiles; 2) Diversifications; 3) difficulties in developed markets and less crowding in EIMs; and 4) growth markets that capture opportunities in EM illustrated in Figure 6.7. The implications of each motive driving investment in EIMs is explored in turn.

It is notable in the context of this research that the drivers and motives identified have solid correlations and are interconnected. Global institutional investors and financiers mediating in developed markets encounter difficulties identifying investments that reliably generate high rates of returns due to the competitiveness and high level of development of infrastructure assets. Therefore, seeking out alternative investment and aiming to diversify their investment portfolio and expose other markets (i.e. EIM) offers investors opportunities with relatively similar investments characteristics and additional benefits; i.e. investments yielding a high rate of returns (IRR); different transactions in different jurisdictions, and a better value chain. However, diversified infrastructure investment markets are associated with diversified risks and others forms difficulties, which are inherent to such markets but not experienced in developed markets.

Higher Internal rate of return (IRR) profiles

The primary motivation for entering EMs to invest in infrastructure assets is the expectation of a high rate of return (i.e. different return profiles), according to 64% of responses (see Figure 6.7). Indeed, global institutional investors direct their investment strategies towards EMs with the intention of yielding a double digit IRR. Based on (Particpant-A.11):

...‘ *They* [are] *looking for an equity IRR return that* [is] *somewhere in* [the] *twenties*’...

This is explained in Particpant-A.6 thus, ‘*low risk and low return assets in advanced markets (e.g. Europe region) and the investor invests for 5-6% in the equity side and 2-3% in the debt side and in terms of return its very low in the mature markets, However, when the investor invests in EM, they seek for returns around 15-20% in some countries, or even higher compared to less than 10% in the matured markets*’. Furthermore, the interviewees evidence suggests investing in infrastructure assets in

EIM remains a strong channel for returns long-term. Indeed, global institutional investors attribute higher rates of return to the following: (1) increasing progress and development of infrastructure investment as an asset class in EM; (2) the returns tend to stabilize in some EIMs; and (3) there is low investment return in matured markets (Particpant-A.1,3, 6; and Participant-B. 4 and 6).

Profiles Diversification

A quarter percentage rate in terms of responses captures that both institutional investors and financial institutions have to seek alternatives sources for diversification in their investment strategies. As Particpant-A.1 pointed out:

... “*it’s a matter of diversification, looking into options that have specific characteristics”*...

PE infrastructure investment diversification provides various benefits and is structured according to an investment perspective with a recognizable strategy. Massive amounts of capital are deployed and concentrated on diverse portfolios in various forms of geographical diversity (i.e. different markets exposure), and/or economic sector variations, as illustrated in Figure 6.7. Furthermore, it is notable that institutions and other fund managers apparently have the choice to invest in their home matured markets and secure their levels of risk. However, this choice is limited by investment opportunities and the capacities provided in advanced markets. According to Particpant-A.6, when enlarging and new markets emerge institutional investors typically choose to acquire bigger investments outside their home markets/regions as they are exposed to different types of risks compared to those in new markets.

Difficulties with Developed markets

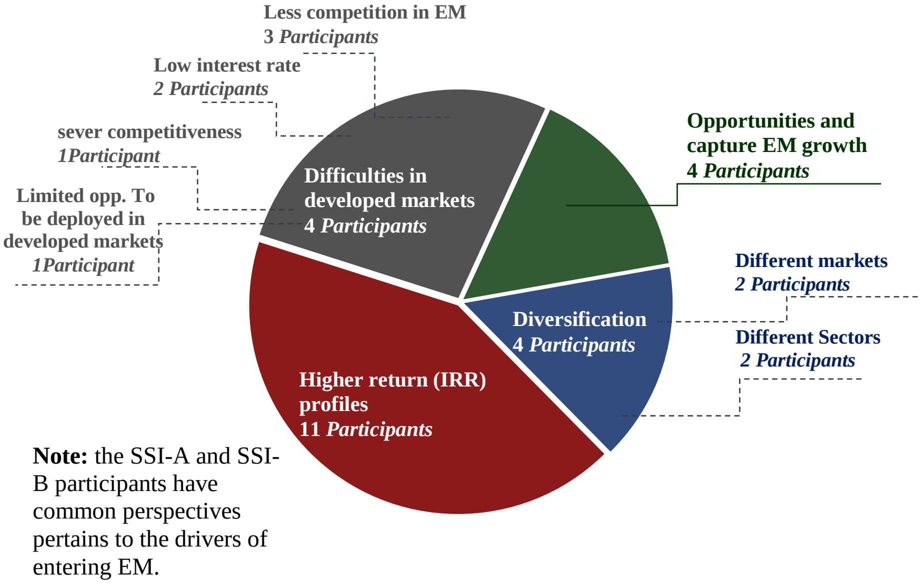
Further to the above discussion, various salient features have been identified pertaining to the difficulties in developed markets, which underpin global institutional investors willingness to adapt their focus and target other markets. Firstly, the growing influence **of competitive conditions** in mature markets reflects investors’ distress and desire to seek out other alternative markets to invest in (i.e. EM). Infrastructure investment in EMs provides positive opportunities for global institutional investors. Such activities have stimulated a considerable number of pioneering global institutional investors and large scale infra-fund managers firms to enter the market and establish investments in infrastructure asset allocation. Indeed, this is evidenced in the outcomes analysis of Preqin analysis data, deal levels are as highlighted in the previous section (Section 6.2.2) and funds level assessment are discussed in chapter five (Section 5.7.1). Secondly, the motivation to invest in infrastructure within EMs has never been stronger, as a large quantity of capital funds have been obtained by institutional investors from Canada, Australia and big infra-funds managers like Macquarie (MIRA), their motivation is the significant amount of capital available for deployment into infrastructure, and the relatively limited opportunities to deploy capital in more developed markets (Particpant-A.10). Finally, the analysis justified the high interest rates in advanced economies, which in turn directed global institutional investors and fund managers to re-adjust their portfolio targeting EMs (Particpants-A.3 and 6).

Growth markets that capture opportunities in EM

Another feature identified by the interviewees pertains to emerging countries that are persistently developing and experiencing market growth, thus, offering significant opportunities for global institutional investors and fund managers to participate in their progress and play a big role in capturing future growth in Emerging Infrastructure Markets (Participants-A. 4 and 5; and Participant-B 2 and 6). As pointed out in Participant-B.2 '*a single opportunity may leads to future growth within the markets*'.

Furthermore, EMs provide multiple opportunities because of the shortage of capabilities, and inexperienced public sectors are frequently unable to delivers public services and consequently fail to meet rising infrastructure demands (Participant-B.4). Indeed, the biggest theme that attracts investors and fund managers to invest in EIM is the emergence and growth of the middle classes (Participant-B.5). The dynamic is changing in EMs due to the shifts in demand criteria and investment in infrastructure assets being considered one of the earliest beneficiaries of the emerging middle classes.

Figure 6.7-Institutions Strategies Towards EMs-Drivers and Motives to Enter EM



Sources: Author's own analysis

6.4.2 Global Investors and Professional Institutions Investment Concentration in EMs

As presented earlier in Section 6.2.3, qualitative analysis outcomes (i.e. Preqin database) demonstrate a significant concentration of Global private investors, financiers institutions and fund managers –in terms of specific regions and type of infrastructure sector- targeting their investment portfolio toward EM geographical areas. The second stage analysis explored the drivers and reasons informing this focus (i.e. Section 6.4.2 (Global investors and Professional Institutions Investment Concentration in EM)). Overall, the interviewees' assessment explored two key classifications of drivers/reasons behind global private investor and fund manager concentrations; common drivers/reasons to concentrate on EMs; and specific drivers/reasons to focus on a specific region/country (see Table 6.6). The common drivers/reasons behind EM investment include **Seven** majors drivers/reasons behind global private investors, who concentrate their investment on EMs.

The fundamental drivers/reasons cited by the majority of the interviewees as informing this focus is the prospect of future opportunities (8 Participants). Indeed, the interviewees advocated the previous outcomes analysis in Section 6.4.1 (Global Institution's' investors target emerging market for PEIF investment) as the principal motive for entering EM growth markets to capture opportunities and increase rates of PEIF investment in EM. An insight into the analysis reveals that different arrays of opportunities in EMs exist, permitting global institutional investors, financial institutions and fund managers to seize it. Meanwhile, a number of the interviewees observed that EIM holds significant prospects for economic growth (i.e. expected future streams of income and recoupment of capital). Indeed, notable opportunities in EMs can be compared to developed markets entering long-term contracted cash flows, which have a significant revenue stream and economic impact (Participant-A.8 and 9 and Participant-B.2 and 3). The Participant-B.6 emphasized that the opportunity presents a gateway to accessing other markets in that region (e.g. in South Africa it gives foreign private investors access to the rest of Africa). Furthermore, EM opportunities are considered the first entry points for new entrants-investors, who would be expected to prefer markets which have the strongest institutions or structure (i.e. the lowest country risks) (Participant-A.7 and 10). On the other hand, the Participant-B.2 addressed the prospect for future opportunities from a different perspective, specifically focusing on fundamental demand for infrastructure services. For instance, in the Africa region, there is an immense need to conventional power energy, as approximately 6,000,000 people do not have access to electricity services.

The second key drivers/reasons to explore are **knowledge of the market** (7 participants). There are a number of further aspects to consider, comprising of: 1) familiarity with regulatory conditions; 2) knowledgeable about economic conditions; 3) better sense of the credibility of local partners and counter parties (e.g. governments); and 4) employing local staff that are aware of market status and speak their language (Participant-A.2, 4, 6, 7, 9, 10, and 11). Indeed, the Participant-A.11 asserted that '*infrastructure is very local. So, more locally driven structures as well as delivery capabilities gets these deals done'*.

In contrast, the analysis depicts a strong nexus between **the severe competition** between investors and fund managers in advanced markets and the **prospect for future opportunities** in EMs. It is not only fund managers and institutional investors that seek out investment opportunities in EMs to yield high rates of return (i.e. acts as pioneers), so as to avoid crowded developed markets, but also in EMs because of the prospect of low returns (Participant-A.4 and Participant-B.2).

Further drivers/reasons were identified by the interviewees focused intensive evaluation processes in EMs infrastructure investment vehicles. Indeed, the evaluation process conducted for EIM specific markets is a complex multifaceted procedure, that takes place over long periods, and involves other parties from different entities (i.e. MDBs, investment banks and other financial institutions) and countries (i.e. various investors and partners from different countries). In addition, a number of the interviewees agreed on there being a solid relationship between evaluation investment processes in EM drivers and the knowledge of market drivers, in the context of familiarity with the 'business environment' (i.e. the general regulatory and stability of macro environment)(Participant-A.4, 7, 6 and 9). Indeed, repeating this process for other new markets drives new investment in the markets (i.e. no background determining country's stability level or absence of connection in the market). This not only costs effort and time, but also creates additional financial expenses (Participant-A.6 and 7). Indeed, Participant-B.2 noted that '*global private investors have sufficient outlets for their investment appetite in that to place-EM- and to go somewhere else would cause them to have to learn things, such as how regulations differ in other countries*.

Furthermore, the aforementioned drivers/reasons (i.e. intensive evaluation process for asset investment in EMs and associated with the local business environment) have a critical impact on investors' institutions and fund managers' investment strategy towards EM. This resulted not only in global private investors limiting their risk to couple of markets, but also in their compiling opportunities for strong risk adjusted returns (Participant-B.3 and 6).

Other drivers/reasons have been cited as behind the concentration of PEIF investment in EM. Indeed, a number of the interviewees indicated that a number of EM countries are under development, and so global private investors and fund managers are motivated to acquire a significant share in the development process to capture the advantages of this growth. Furthermore, the country's progress is associated with the government perspective (i.e. political framework development), and private perspective (i.e. intuitional private sector) in those countries (Participant-B.2 and 3).

Generally, it noteworthy that despite the interviewees pointing out that global private investors and fund managers prefer to focus their investment in a specific area of an EM (i.e. country or region), they do diversify their investment portfolios to manage risks across different sectors (Participant-A.4 and Participant-B.4).

In addition to the previous comprehensive interpretations pertaining to the holistic drivers and reasons for a geographical focus for investment in EMs, it is beneficial to highlight regions/countries that have attracted significant attention from investors. Overall, the interviewees confirmed and justified the qualitative analysis output presented previously (i.e. Section 6.2.3). The three primary regions (i.e. Latin America and the Caribbean; Asia; and Africa) hold a significant degree of magnate global private investors and target fund managers willing to invest and concentrate on these regions.

For example, in the Latin America and Caribbean region, 'there is a wave in the last decade by American private institutional investors to invest in this region' due to the dollar dominating in specific areas in Latin America and the Caribbean (Particpant-A.1)**.** For its part Brazil has increased the role of national developing banks (NDB) in financing infrastructure assets. Colombia has mobilized private financing (i.e. set up a public financial institution), and in Chile, the government has structured a financial agent to provide credit enhancement bonds. Meanwhile, Peru has established a financial scheme in which public sector issued bonds can be traded on the markets (Particpant-A.1 and 7).

Therefore, American based investors have secured their investments from a currency fluctuation risks perspective (Particpant-A.1, 2, and 7 and Particpant-B.1). Furthermore, this has justified the previous outcomes of the Preqin analysis (stage one) in section 6.3.2 (Preqin analysis: global institutional investors and fund manager behaviours in EMs), which reveals a significant number of investors and fund managers are based in the USA, and concentrate their investments in Latin America and the Caribbean region (i.e. sixty-six investors and fund managers).

A further in-depth assessment at country level is necessary gain insight into the most attractive countries for EIM. As highlighted in the previous section (6.2.3 Analysis of specific global infrastructure investors and fund managers: selective sampling), global investors and fund managers invest heavily in Chile, which is the most targeted country for investment in the Latin America and the Caribbean region. The interviewees cited various drivers behind this attractiveness that are in line with the dominance of the dollar in the region - particularly during the examined period 2009-2019, and comprise of: 1) UN demands met; 2)the rule of laws is effective; 3) applied high standards in relation to projects (e.g. similar to GSAS standard for renewable assets in Ireland); 4) low country risks; 5) progressive growth within the economy; 6) high level opportunities to invest in infrastructure assets compared to the heavy rate of contractual neighbors; 7) no significant social unrest; and 8) acquisition of solid PPPs framework contracts, due to the strong implementation of: 1): minimum revenue risks guarantee; and 2) recognition award mechanism (Particpant-A.1 and Particpant-B.1).

In the case of Brazil, the country is an attractive market to invest in and has acquired a strong position at the region level that attracts global private investors and fund managers. In the opinion of Particpant-A.1, Brazil is a huge economy; therefore, offers a breadth of opportunities for private investment in infrastructure, particularly in the transport sector (e.g. airports, toll roads, ports, and railroads), creating a large share portfolio for the country.

Table 6.6-The Drivers/Reasons Behind Concentrating PEIF Investments in EMs

Main drivers/reasons	Sub- drivers/reasons	Total Participants
A: common drivers/reasons to concentrates in EM		
Prospect for future opportunities	1) Gateway to access other markets in that region.	**8**
	2) Prospect for future economic growth in EM.	
	3) Opportunities for fundamental infrastructure needs in EM.	
knowledge in that market	1) Familiarity with regulatory conditions.	**7**
	2) Knowledgeable about economic conditions.	
	3) Have a better sense of the credibility of local partners and counter parties (e.g. governments).	
	4) Employ local staff that are aware of market status and speak their language.	
Evaluation infrastructure investment process for a specific market in EM (Business environment)	Different Business Environment (i.e. different regulations and no local connections)	**6**
	Intensive evaluation process for intended investment in EMs.	
Country Development	1) Political framework development.	**2**
	2) Investors tendency to contribute to the development of countries' private sectors.	
Sever competition	Sever competition between investors and fund managers in AM and EM. Focus on the less crowded markets/region.	**2**
Investment Strategy	1-limit investors risk to couple of markets focus on them.	**2**
	2- Compiling opportunities in EM to have a strong risk adjusted returns.	
B: Specific drivers/reasons to focus on a specific region/country		
Financial development system	Development of financial systems in specific areas in Latin America and the Caribbean region (i.e. Colombia, Brazil, Chile and Peru), all of which have developed financial instruments to facilitate investment: - **Brazil**: increased the role of the national developing banks (NDB) in financing infrastructure assets. - **Colombia**: mobilize private financing (i.e. set up a public financial institution). - **Chile**: a financial agent that has provided credit enhancement to bonds. - **Peru**: a financial scheme in which the public sector issued bonds that could be traded on the markets.	**2**

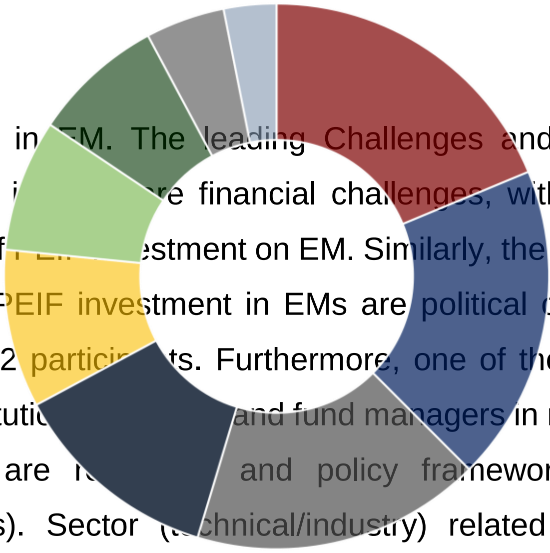
Sources: Author's own analysis

6.5 Infrastructure Investment Challenges (PEIF) in EIMs

EMs are under significant stress to meet infrastructure investment needs, and to overcome the deficit in delivering infrastructure assets. However, infrastructure investment in EM, inherent specific challenges, as well as difficulties and barriers adversely impacted on global institutional investors, fund managers, and financial intermediates and encouraged them to re-consider their investment and reduce the level of their participation in the infrastructure investment market in emerging counties. The second form of analysis of the empirical works addressed the major outcomes of the global professional institutions and explored the majority of the challenges and difficulties pertaining to PEIF investment in EIM, and the various factors and elements that impact infrastructure investment decisions within EIM in-depth. The analysis of the interviews reveals that global private institutional investors were concerned about their PEIF investment in EIM two primary areas; i.e. challenges they are likely to encounter in EM, and specific risks inherent to EM. Therefore, the interpretation was structured into two main parts. The first part investigated the various forms PEIF investment challenges (i.e. challenge profiles). In addition, outlining others silent elements highlighted significant issues and influenced PEIF investment difficulties raising barriers. The second part addressed PEIF investment in terms of EM Risk profiles. It analysed the different types of risk that have a significant impact on investment strategies and processes in EMs. Furthermore, a brief exploration of the nexus between these various forms of challenges and risks was provided in the sub-sequent sub-sector.

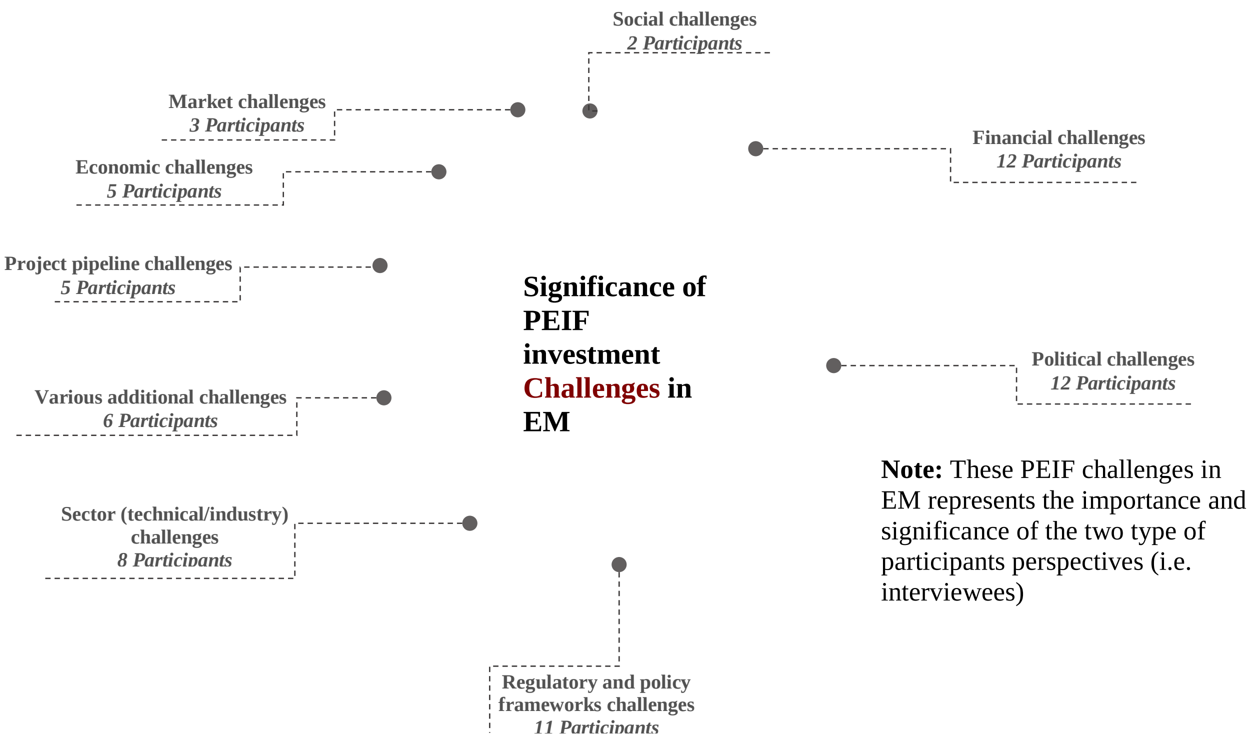
PEIF Investment Challenges profiles in EM

The challenges and difficulties associated with PEIF investment in EM are various and multifaceted, as highlighted previously in the research. Overall, the interviewees observed the external EM environment and industry (e.g. governance, economic instability, and foreign currency) in EM regions to be one of the greatest challenges influencing PEIF investment in EM, followed by the specific difficulties unique to each country. Indeed, nine primary forms of challenges and difficulties pertaining to PEIF investment in EMs were recognized by the interviewees as exhibited in Figure 6.8. Overall, there is a huge variance between the interviewees in terms of identifying the significance and influence of the challenges and difficulties associated with PEIF



investment in EM. The leading Challenges and difficulties associated with PEIF investment in EM are financial challenges, with 12 participants emphasizing the influence of PEIF investment on EM. Similarly, the second most significant challenges impacting PEIF investment in EMs are political challenges (i.e. political instability), noted by 12 participants. Furthermore, one of the greatest challenges identified by global institutional investors and fund managers in relation to infrastructure investment strategies are regulatory and policy frameworks challenges (according to 11 participants). Sector (technical/industry) related challenges were identified at a relatively high level, as identified by 8 participants who indicated their impact on PEIF investment in EM. Meanwhile, various additional challenges were also mentioned by some interviewees (i.e. 6 participants). Surprisingly, project pipeline challenges, economic instability and market challenges were rated with relatively low rates of importance by the interviewees (i.e. 5 participants) for economic difficulties and project pipeline challenges each, and 3 participants for market challenges.

Figure 6.8-Various Form of PEIF Challenges and Difficulties in EMs



Source: Author's own analysis

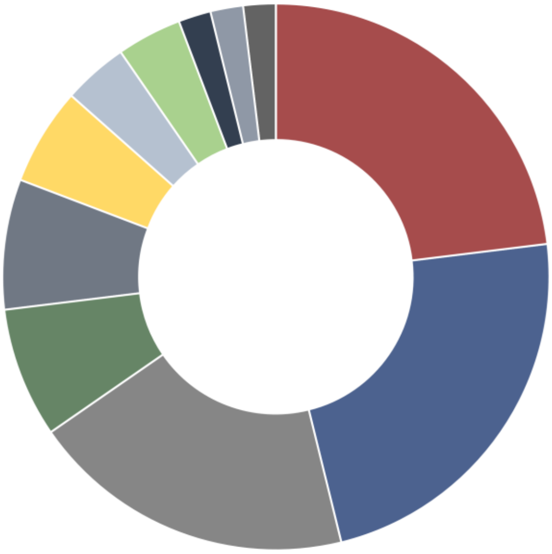
Prior to conducting a comprehensive analysis from the interviewees perspectives regarding PEIF investment risks in EM, it is vital to highlight hidden elements/factors found to influence or contribute to PEIF investment challenges in EIM.

The first factor complicating PEIF investment in EMs is that global institutional investors, fund managers, and/or other financiers institutions have persistently attempted to implement a developed markets frameworks for the investable infrastructure projects in the EM environment. In other words, due to the various forms and level of risk attending infrastructure project investment in Ems, they do not meet developed market criteria (Particpant-A.2, 10.11 and Participant-B.4). Indeed, as Participant-B.4 found '*Generally, for institutional investors it's not the risks in the assets. Because infrastructure projects characteristics would probably look fairly homogenous relative to developing other markets transactions (i.e. similar to the Western European transactions). The big difference is government*'.

Furthermore, another factor was recognized in the Particpant-A.2 relating to cultural amount ownership, which negatively influenced PEIF investment in EM, and resulted in a number of assets following a trajectory that differs from that in the highly regulated developed world.

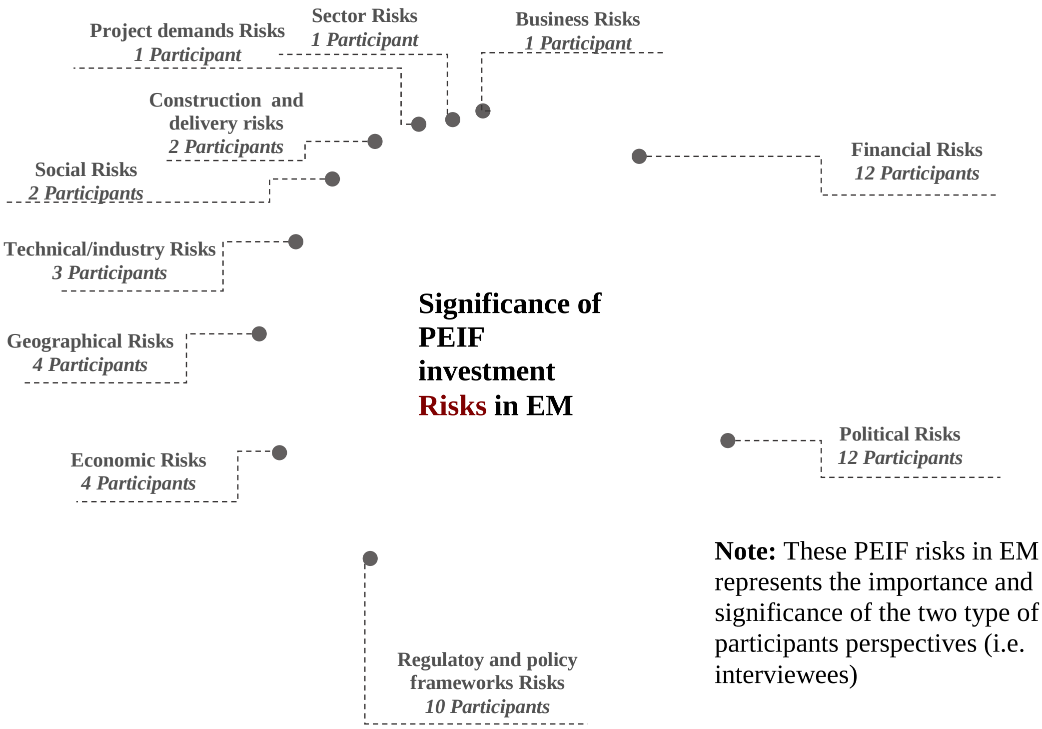
Specific Risk profiles in EM

In the context of risk profiles in general, the interviewees demonstrated that experiences in the macro environment generate significant challenges which impact in PEIF investment in EMs (e.g. governance (i.e. political risks), economic stability, regulations, legal systems, dispute resolution system, foreign currency risks, corruption), followed by project difficulties. The interviewees listed eleven classes wherein key risks and barriers pertaining to PEIF investment in EMs were recognized by interviewees, as exhibited in Figure 6.9. Overall, similar to the challenges profile assessment interpreted previously for the three first key challenges (i.e. political, financial, and regulatory and policy frameworks), political and financial risks were reported as the principal risks affecting PEIF investment in EIMs according to 12 participants. Then 10 participants emphasized the importance of risks associated with the regulatory and policy frameworks and infrastructure investment in EM. However, there was relative discrepancy between the interviewees with respect to recognizing



...vestment in EM. Meanwhile, ...emed to have a low rate of ...rviewees (i.e. 4 participants ... risks was judged of low ...nent in EIM (quantified 3 ...d delivery risks were ranked ...ure assets in EM. Project ... considered to negatively ...ere is a difference in ranking of significance between various form of PEIF challenges and difficulties in EMs, as exhibited previously in the PEIF investment challenges profiles in EM- compared to various forms of PEIF risks and barriers in EMs. The reason for this is explored in detail in the lateral sub-section.

Figure 6.9-Forms of PEIF Risks and Barriers in EMs



Source: Author's own analysis

6.5.1 Global Institutions' Investors Profiles Concerning Challenges/Risks in EIMs

Challenges and difficulties associated with infrastructure investment in EMs are diverse and multifaceted, and as stated previously EMs comprise five different regions. There are a considerable number of shared difficulties in EIM, while others pertain to specific regions/countries only. In addition, prioritization of challenges differs regionally. Therefore, aspects considered during assessment comprise of: 1) each individual region being characterized by being in a specific investment environment; 2) variation in levels of the degree of infrastructure requirements, assessing various sectors and sub-sector demands across each region; 3) degree of internal market development and regulatory frameworks influence on global investors and fund managers' investment decisions and IP. For instance, while social unrest is one of the major obstacles in Latin America and Caribbean and Africa regions, government support and political interfaces are a critical issue in Middle East region. This is evident in OECD (2019) reports that addressed relevant policy priorities specified for particular regions (i.e. Asia, Latin America and the Caribbean and Africa region).

Drawing on the analysis of the interviews, the participants addressed relevant risks/challenges inherent to different geographical EM areas. There are five levels of risks/challenges[31], namely: 1) EM risks/challenges level (i.e. region level); 2) global institutional investors risks/challenges level; 3) country risks/challenges level (macro level risks/challenges), broken down into political, economic, and governance instabilities risks/challenges; 4) sectors risks/challenges level; and 5) projects risks/challenges level. In addition, it should be noted that some of the risks and barriers can be viewed at both levels. For instance, construction risks can be viewed as project level risks; however, this form of risk is also classified under investor level risks (i.e. general management level)(Particpant-A.1).

In contrast, as highlighted earlier, the second phase of the empirical works identifies the most significant challenges, difficulties and risks pertaining to PEIF investment in

[31] Note: the identified various risks/challenges levels is employed during the interpretation and in necessary position refer is needed in this section.

EIM, along with relevant factors and influences impacting on the infrastructure investment decisions. It is highly significant to distinguish between challenges, difficulties and risks. The analysis explored a wide variety of challenges and difficulties associated with PEIF investment within EIM. However, over the course of the period, these challenges and difficulties developed, acting as barriers and being significantly transferred to critical risks (i.e. shifting the risk profile to a considerably higher level). Consequently, these risk profiles have a negative impact on the investment decision process. This is evidenced in the Participant-B.3, which stated that:

“Challenges it might show that risks have happened yet.”

From another stand point, the evaluation depicts the considerable number of challenges and risks which developed in such a way that they are observed as common/integrated perspectives (i.e. viewed as challenges and/or risks based on EMs’ country conditions or investors’ assessment at the same time), as illustrated in the Figure 6.10. There are six common challenges/risks depicted, comprising of: 1) political challenges/risks; 2) economic challenges/risks; 3) regulatory and policy frameworks challenges/risks; 4) financial challenges/risks; 5) social challenges/risks; and 6) sector (technical/industry) challenges/risks. Meanwhile, there are specific elements designated as challenges, namely: 1) market challenges; 2) project pipeline challenges; and 3) various additional challenges (e.g. Coronavirus 2020 pandemic and the knowledge transfer gap). Other specific risks located in risk profiles include: 1) geographical risk; 2) and project demands risks. Moreover, the interpretation of the implication of each specific challenge and risk profiles on the infrastructure investment in EIM is explored in turn. A comprehensive evaluation of EIM’s PEIF investment in terms of common challenges/risks is delivered in the following sub-sections (i.e. from Section 6.5.1.1 to Section 6.5.1.5).

Figure 6.10-Various Forms of PEIF Investment Challenges and Risks within EMs

Source: Author's own analysis

In the context of the specific challenges profile, a considerable number of interviewees pointed out project pipeline challenges (country risks/challenges level), considering them to me the chief challenges likely to adversely impact global investment in infrastructure assets in EM. In particular, lack of investable projects has reduced the appetite of global institutional investors to invest in EIM, and rendered them more willing to explore alternative markets offering high cash flow deals (Particpant-A.2 and 10 and Particpant-B.4, 5 and 6). Indeed, Particpant-B.6 emphasized '*the big problem is with pipeline investable projects in EM, and often now is no one want to finance the visibility studies that EMs' need to complete in order to be ready for infrastructure projects'*.

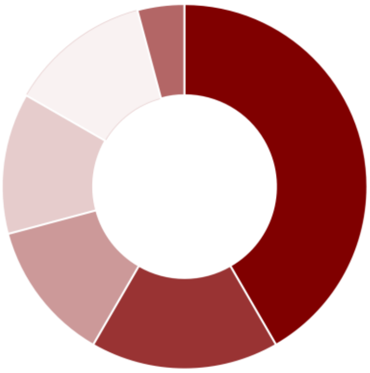
On the other hand, market challenges pose a relatively high degree of challenges affecting PEIF investment in EIM in a number of ways. Firstly, intensive concentration of global private investors in a specific EM, can be a challenge blocking new entrants, due to harsh competition and potential low IRR (i.e. similar to the developed market environment) (Particpant-A.4 and particpant-B.3). Secondly, a number of EM countries identified a high degree of difficulties in terms of markets valuation. Indeed, global private investors identify challenges when structuring investment vehicle. There are various drivers cited in this regard, however, the key driver pertain to the governance transparency (e.g. lack of information to deliver the potential investors)

(Particpant-A.4 and 9). A further detail is explored and delivered in subsequent Sections.

Furthermore, a considerable number of interviewees referenced some additional challenges encountered by global private institutional and fund managers. The latest crisis to negatively affect PEIF investment in EMs and discourage global investors to enter EMs (i.e.) is recent Coronavirus crisis. The 2020-pandemic has had a similar impact to the GFC-2008. Indeed, it has had a huge impact on economic infrastructure assets, specifically in the transport sector (e.g. prompting investors to re-scheduling their debts due to fails in revenue generation streams). In addition, the 2020-pandemic negatively influenced investment cross-border, and highlighted drawbacks in the credit quality in EMs (Particpant-B.1 and 3).

On the other hand, the specific risks profile in EMs have similar degree impact in the PEIF investment in EMs as a specific challenges profile, however, at region and country risks level. The interviewees analysis indicates that there are three specific forms of risks that are likely stress global private investors and fund managers in EM. Firstly, in response to geo critical risks (EMs region risks level), global investors allocate their infrastructure investment assets on a geographical basis according to the strength of different features, such as the solid legal and regulation framework, and reduced governmental involvement (Particpant-A.1 and 5).

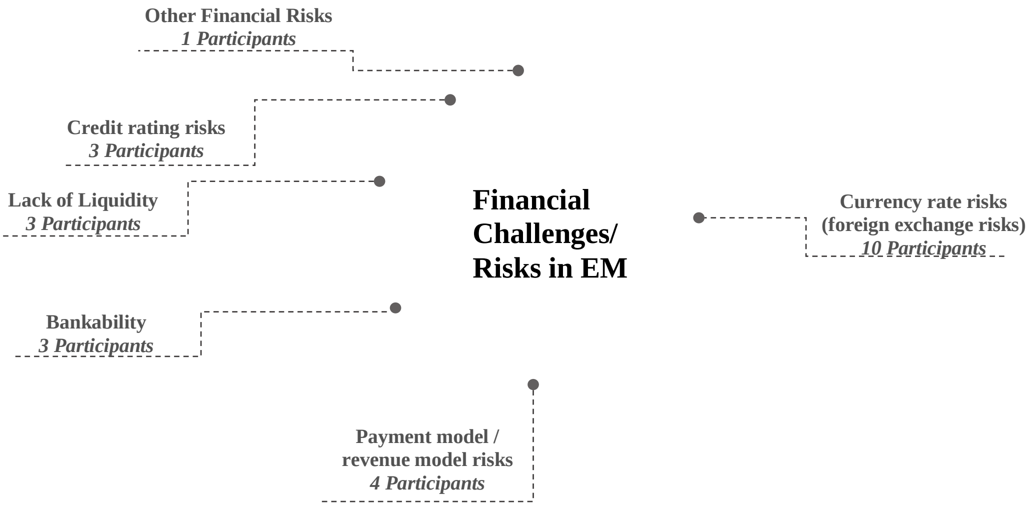
Another risk that investors face when investing in emerging nations is demand risks (i.e. volatility in demands) (projects risks level). A considerable number of EMs areas have strived to address their infrastructure needs, due to economic growth and urbanization development. As stated in the Particpant-A.1'*You don't have economic growth, you don't need infrastructure'*. However, in the context of shifting infrastructure demands, this endangers investment, which is why investors avoid investing in low and instable demand environments (Particpant-A.1, 5 and 10).



6. **lenges/Risks**

As highlig d that financial challenges/risks are key barriers investment in EIMs (i.e. country risks/chal ' financial challenges/risks perceived in EMS that concern global institutional investors: 1) currency rate risks (foreign exchange risks); 2) payment model / revenue model risks; 3) bankability; 4) liquidity; 5) credit rating risks; and 6) other general financial risks, as illustrated in Figure 6.11. The interpretation of the implications of each of the challenges/risks to infrastructure and investment in EIMs is explored in turn below.

Figure 6.11-Various Forms of Financial Challenges/ Risks Perceived in EMs



Source: Author's own analysis

Foreign currency challenges/risks profile

The greatest challenges affect how countries and institutions are structured to lower risk. This relates to various forms of risks; however, foreign currency challenges/risks are considered a key risk, because many of these countries have no tradable currencies (Particpant-A.2, 4, 5, 7 10 and 11 and Participant-B. 1,2,3 and 4). Undoubtedly, the fundamental challenges in EMs are internal and country specific (i.e. country level risks) as they influence foreign exchange currency challenges/risks. Indeed, generally EMs carry a higher level of risk than developed markets (Particpant-A.1 and 10 and Participant-B. 4 and 6). As Participant-B. 3 pointed out global institutions and fund managers invest in non-US dollar currencies, which represents a significant degree of risk, and thus requires intensive assessment over a long duration, due to the significant affect generated by exposure to the specific EM. Indeed, as Particpant-B.2 highlighted '*from an international perspective as well currency is an issue, particularly, when infrastructure investment is dominated by dollars and technically there is no desire to take local currency risks'*.

Payment model / revenue model Challenges/Risks profile

As highlighted in Section 6.4.1 (Global Institution's' investors target emerging market for PEIF investment), global institutional investors target their investments toward EMs, aiming to provide capital aggregate for future benefit, delivering potential returns for investors through capital profits, income flow or both. This depends significantly on the payment/revenue model profile challenges/risks. A number of infrastructure projects are required to re-pay loans for borrowed debt in a foreign currency, before receiving revenue in the local currency. Therefore, the payment model or revenue as challenges/risks in PEIF investment in EMs are considered critical elements of financial challenges/risks. The interviewees (i.e. Participants-A and Participants-B) emphasized that the primary objective of global institutional investors' infrastructure and investment in EM countries is to repay debt obligations and generate revenue (Participant-A. 5 and Participant-B. 1,2, 4 and 5). As highlighted in Participant-B. 5 '*It's useless to dealing/spending billion dollar assets in an EM country where users could not afford to pay for this service'*.

Bankability Challenges/Risks profile

In the context of **bankability**, the bankability of the projects relates to perceived riskiness, which is a function of multiple factors (Particpant-A.11). Commercial/Conventional banks do not lend debt to some areas (i.e. EM) because of the probability of capital scares and the perception that risk is relatively high (Particpant-B.1). Therefore, global institutional investors rely on governments, multilateral banks and other financiers' institutions to play a significant role in mitigating certain challenges/risks and standing behind contracts (Particpant-B.2).

Liquidity Challenges/Risks profile

In line with bankability challenges/risks, long-term and sizable infrastructure project difficulties are encountered in EIMs. This is a consequence of the transformation of traditional debt lenders, namely commercial/conventional banks, in the infrastructure financing industry, and the limited capabilities of MDBs. There has been an increase in illiquidity posing more difficulties for investors in long-term infrastructure assets (Particpant-A.1). The increased lack of liquidity in the local market in some EM areas, escalates the potential re-financing risk for both institutional investors and financial institutions (Particpant-A.4). This confirms Particpant-A.11, which states that a number of EMs are illiquid, due to the massive barriers and constraints on private capital, and because global institutional investors are fundamentally seeking for liquid assets.

Credit rating Challenges/Risks profile

Infrastructure investment in some countries with EMs is also not sufficiently credit worthy to guarantee full confidence in the credit rating of local markets as a basis for long term contracts. Consequently, payment risks have emerged from assets and resulted in ability to pay in some cases. Therefore, there is a high credit risk. For instance, investors have structured their investment finance portfolio at approximately 75% of borrowing as the total cost to lenders and investment banks (MDBs) (Particpant-B.2). In addition, a number of financiers institutions (e.g. MDBs, World Bank, EBRD, and IFC) are apparently reluctant to enter into credit agreements that would allow debt as apparent from the interest rates attached to certain packages. Therefore, it is vital for global institutional investors and fund managers to attain government guarantees to support infrastructure contacts (e.g. Power Purchase Agreements (PPA)) and to seek to invest in EM countries that have taken a series steps towards strengthening the financial sector/market through improved credit ratings (Particpant-B.3). Particpant-B.4 agreed that it is critical to identify how certain developing banks or financial institutions offer guarantees of, or provide credit enhancement. This has resulted in a high credit rating risk reflecting guarantees from institutions or MDBs. Consequently, the pricing of debt would reflect the very strong credit rating making the investment appealing.

Other Financial Challenges/Risks profile

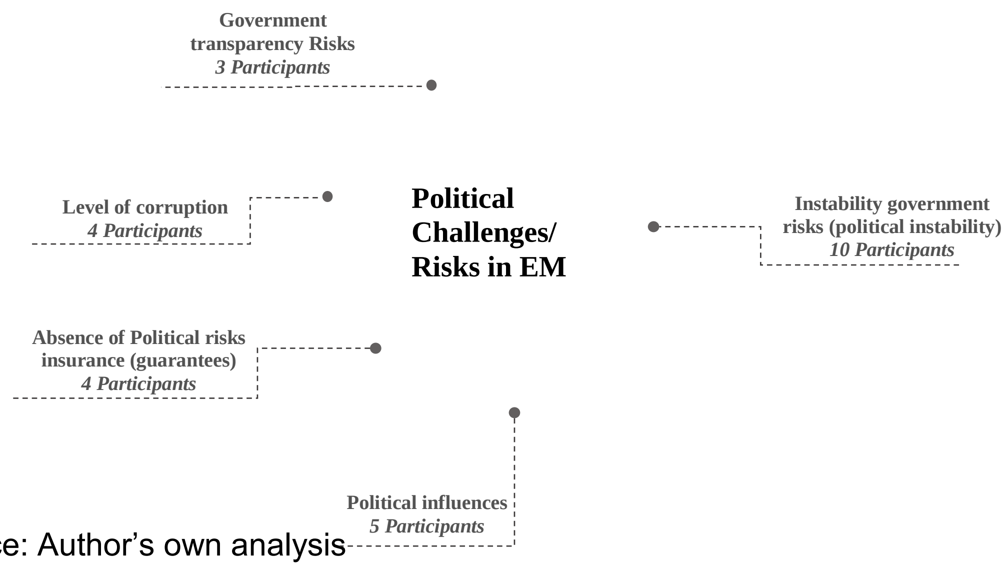
The last two forms of financial challenges/risks that have significantly influenced PEIF investment in EIMs (i.e. country risks/challenges level) are mentioned in Particpant-B.4 and pertain to the level of development in financial markets. Indeed, it is fundamental for global institutional investors to recognize and examine the

de ... ancial market to determine the elements that co ... cisions.

6.5.1.2 EIM Internal- Political Challenges/Risks

As demonstrated in Section 6.5.1, the interview results highlighted difficulties and risks that impact on investment in Emerging Infrastructure Markets (i.e. country risks/challenges level) in the macro environment, specifically political challenges/risks. EIMs have relatively unique political environments that are often in flux (i.e. volatile). A further, in-depth assessment of political challenges/risks is presented in Figure 6.12, which illustrates the significance of risks from the viewpoint of the interviewees and various forms of political challenge that cause potential distress to investors in EMs. There are five principal political challenges/risks perceived in EM that concern global institutional investors: 1) unstable government risks (political instability); 2) political influences; 3) insurance of absence of political risks (guarantees); 4) government transparency risks, and 5) level of corruption. The implications of each of these challenges/risks to infrastructure investment in EIMs is discussed here in turn. However, it should be noted that this assessment highlights the strong connection between these forms of political risk (i.e. political instability, lack of transparency and/or corruption).

Figure 6.12-Various Forms of Political Challenges/ Risks Perceived in EMs



Source: Author's own analysis

Instability of government risks (political instability) challenges/risks profile

The investigation contributes to identifying the significance of political instability, and resulted in the majority of interviewees (i.e. 10 participants) discussing global institutional investors and fund managers emphasis on the implications of potential vulnerability to volatile environmental factors, specifically political instability. Political instability impacts negatively on the investment process, and can lead to lower than expected returns on investment, as well as necessitating increased budgetary commitments (Particpant-A.5, 11).

There are various forms of instability and government risk that have a potentially negative impact on investment in assets. In addition, it should be noted, as highlighted in Section 6.5, that each region is characterized by its own unique characteristics and unstable environment. Therefore, the most critical form of challenges resulting in political instability are 'signature risks'. According to Particpant-B.6, this form of risk is particularly common in Africa, and arises when governments change their minds regarding signing concession contracts with investors without good cause, after carrying out all preparatory procedures (i.e. feasibility studies, and contracts consultation with legal advisories) and after lengthy periods tendering.

Political influences challenges/risks profile

Discussing the role of political influence or power, the participants (i.e. 5 participants) highlighted the importance of political influences on investment in infrastructure assets in EM, ranking these in the second category of political challenges/risks. Indeed, a number of political issues stem from political challenges associated with power (Particpant-A.1 and Particpant-B.5 and 6). Political power is a barrier due to concerns over the government deciding not to pay their bills or to expropriate contracts (Particpant-A.5 and Particpant-B.1). (Contract expropriation is discussed in detail later in the thesis).

Absence of political risk insurance (guarantees) challenges/risks profile

In line with the previous point in Section 6.5.1.1, credit rating challenges/risks, a number of governments are known for their lack of investment support (i.e. government guarantees) and unwillingness to back global institutional investors and/or guarantee investment assets in case of failure. Indeed, a considerable number of interviewees (i.e. participants-B.1, 3, 4 and 5) confirmed that lack of public loan guarantees or public insurance to shield investors against non-payment of debt characterize an unfavourable insecure environment. Debt security instruments reduce the demand on investors' capital budget because they have to take additional measures to secure their investments. In the opinion of (Particpant-B.4), it is crucial for global investors and fund managers investing in EMs to address the available guarantee structure. Various arrangements at the government level can secure investments, such as by offering risk insurance from different entities. For example, MEGA-political risks insurance (PRI), is the World Bank Program delivering political risk insurance as a back-stop to the obligations of states towards infrastructure investment (Particpant-B.1, 3 and 5). However, further details are provided in Section 6.7.2.1 (MDBs participation and roles in PEIF investment in EIMs).

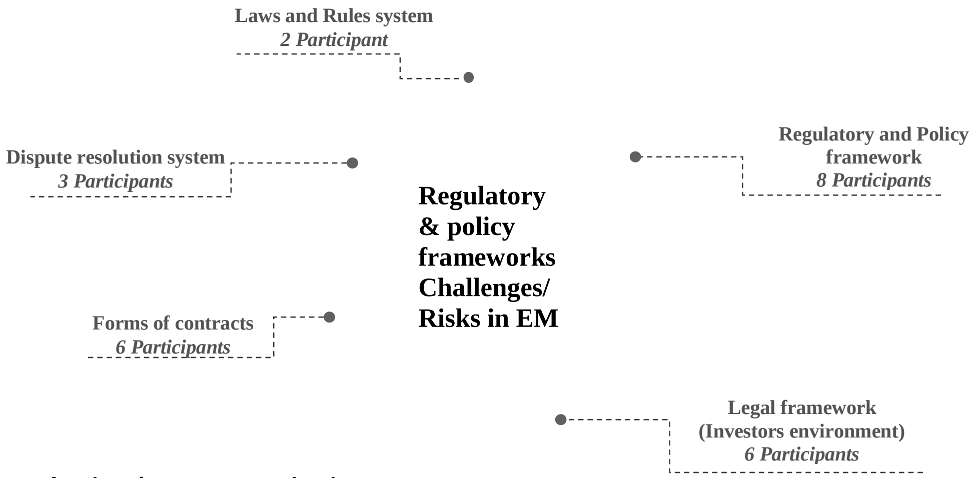
Government transparency and level of corruption challenges/risks profile:
A number of the interviewees agreed that government transparency and corruption are two side of the same coin; they represent the unique characteristics associated with political instability (i.e. countries challenges/risk level) in EMs (Particpant-A.3 and 9 and Particpant-B.5 and 6). Meanwhile, global institutional investors are concerned about the extent of government transparency in EMs. Government transparency can take different forms. However, global institutional investors highlight the importance of level of transparency in terms of investment market and funding's obligations (Particpant-A.3). There is evidence from negative influences, which includes lowering the percentage of government transparency, leading to lower infrastructure investment in EMs (Particpant-A.9). Indeed, the Particpant-B.5 stated that *'we observed a number of markets in EIM with low rates of investment market transparency, we are keeping our eye on those markets, at the present time and we are not considering investing in these markets because it's risky… maybe in the future, who knows'.*

In the context of corruption there are a number of examples of authorities who are in power and less concerned about the development of their countries, as they are instead motivated by vested interests (Particpant-A.9 and 11). Indeed, Particpant-B.5 pointed out *'in certain parts of the EM the corruption is much worse than others, therefore, it's not on the regional level, it's by country to country level'.*

olicy Frameworks Challenges/Risks

T ... nd risks associated with regulatory and p ... npromising global institutional investors' w ... (i.e. country risks/challenges level). The interviewees set out classifications according to various scales of regulatory and policy framework challenges/ risks likely to be encountered by global institutional investors in terms of five forms of risk perceived in EMs in the developing world namely: 1) regulatory and policy framework; 2) legal framework (investors environment); 3) forms of contracts; 4) laws and rules; and 5) dispute resolution system as illustrated by regulatory stability in Figure 6.13. Interpretations of the implications of each challenge or risk to infrastructure investment in EIMs is explored here in turn. Furthermore, the analysis reveals that the various forms of regulatory and policy frameworks sub-sections have strong connection with each (i.e. regulatory, legal systems, and/or contract expropriations).

Figure 6.13-Various Forms of Regulatory & Policy Frameworks Challenges/Risks, as Perceived in EMs



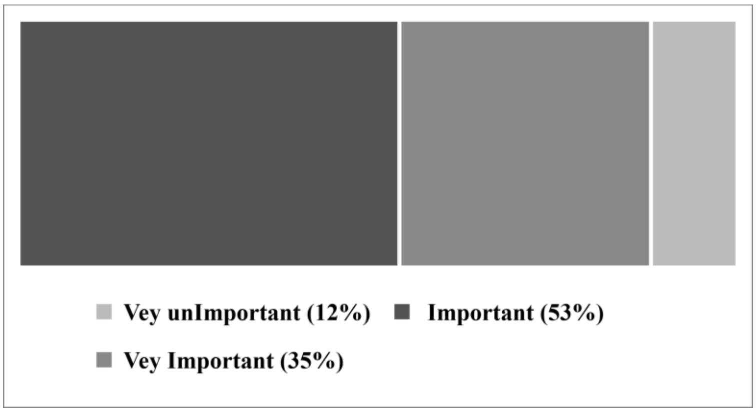
Source: Author's own analysis

Regulatory and Policy framework Challenges/Risks profile

In the main, weak regulatory and policy frameworks curtail infrastructure investment (Particpant-A.1, 3, 5, 6, 10, and 11 and Particpant-B.2 and 3). Indeed, Figure 6.14 revealed that 88% of the participants reaffirmed the importance of regulatory and policy frameworks challenges/risks affecting investment in EMs, compared to 12%

who considered regulatory and policy changes to be insignificant as investment vehicles in EM.

Figure 6.14-Significance of Regulatory and Policy Framework Challenges/Risks Profile



Source: Author’s own analysis

PEIF investment is a long-term investment. Therefore, global institutional investors and fund managers need to be confident about their investments and have reliable support from regulatory and policy frameworks (i.e. high quality regulation) to back up their investments (Particpant-A.1). Therefore, a number of interviewees referenced various measurements and elements pertaining to regulatory and policy framework challenges/risks. Firstly, the degree of flexibility allowed to exit commitment to the asset (i.e. the procedure for selling the infrastructure asset or selling dividends and payments from the project). Secondly, addressing the level and forms of protection of private has in the EM country. Thirdly, analysing deals in which government institutions or other local parties are required to contribute to the asset (e.g. obtaining a minority stakes in the projects) (Particpant-A.1, 5, and 11 and Particpant-B.2 and 3).

However, Participant-B. 3, introduced another form of regulatory framework, regulatory stability risks. In the opinion of the participants, this is separate from regulatory framework considerations, relating to instability in the laws applied in EMs.

Legal framework (Investors environment) Challenges/Risks profile

In line with earlier discussions around the significance of regulatory and policy framework challenges/risks, the analysis reveals that the majority of EMs suffer from a lack of trust and low investor confidence due to adherence to legal frameworks (i.e. investors are not comfortable with legal regime). Therefore, global investors allocate their infrastructure investment assets geographically, according to the strength of solid legal structures (i.e. high level of strength of judiciary) (Participant-A. 1, 5 and 10 and Participant-B. 1, 4 and 6). Indeed, for instance, '*Brazil has one of the strongest judicial systems in the world, because the court is independent form government and upholds regulations and contracts. Therefore, the government cannot attempt to take away the project, change regulation, or change contracts*' (Participant-B.6). However, (Participant-B. 4) addresses the investment environment from a different perspective. The participant pointed out that investor's experiences with the legal framework include the ability to enforce security from secured assets.

Forms of contracts Challenges/Risks profile

EM governments and authorities are characterized by riskier institutional arrangements. Therefore the entire institutional environment within which projects are undertaken is riskier. Consequently, global investors and fund managers are concerned about the level of security associated with investment contracts within EM countries. In particular, there are much greater risks to governments expropriating assets (i.e. determining how to secure a contract to prevent governments from expropriating projects after signing a contract). Furthermore, private sector financiers or equity investors will be far more cautious about investing private capital in certain markets (Participant-A. 1, 4 and 10 and Participant-B. 1 and 4). Therefore, global investors and fund managers typically investigate the strength level of infrastructure investment contracts in the geographical areas and EMs they plan to invest in (e.g. tested by the court) (Participant-B. 6).

Dispute resolution system challenges/risks profile

Alongside the high quality and standard regulatory framework, legal systems are critical for structuring a 'conflict resolution mechanism' or 'dispute resolution system'. In other words, global institutional investors are reluctant to invest in certain EMs because of poor legal systems and an unwillingness to apply a dispute resolution system to address potential conflicts that might emerge around an investment (e.g. conflict around return on investment) (Particpant-A.1, 5 and 10).

Laws and Rules system Challenges/Risks profile

Despite legislation, laws and rule system risks represent a significant portion of global institutional investors' concerns about infrastructure asset investment. However, the related assessment reveals some discrepancies when identifying laws and challenges to rules. Meanwhile (Participant-B. 4) explained the level and role of laws and rules applied in the country is critical to determine when structuring an EM investment strategy. Participant-B. 1 pointed out '*Investing in assets in EM countries… you have to be aware that all local companies and projects have be governed by local laws and according to local accounting standards... it's difficult ... and you have to break some hallows'*.

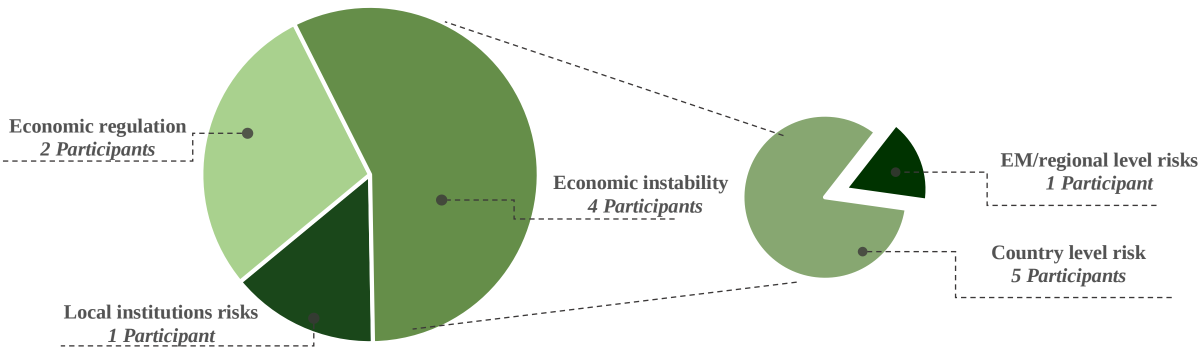
6.5.1.4 EIM Internal- Economic and Social Challenges/Risks

Another important feature that influences PEIF investment in EM geographical areas as recognized by the interviewees is economic challenges/risks. In terms of economic challenges/risks, two primary level of risk have been identified: EM/regional level risks and country level risks (see Figure 6.15). In the context of EM/regional level risks, global investors consider business risks noteworthy for other financiers institutions (i.e. the investment projects at the level of economic deliver benefits). According to Participant-A. 11, business risk relates to project assets that establish economic drivers that reflect the reality of growth-institutions and market growth contexts, and the degree of development associated with economic growth. In contrast, investment vehicles are measured as a component of business risks. A number of governments in EM areas oblige global investors to participate in investment vehicles, acquiring a minority of stakeholders able to guarantee their voices in terms of investment.

On the other hand, country level risks comprise of three forms of challenges/risks: 1) economic instability; 2) local institutions' risks; and 3) economic regulation. As discussed previously, macro-economic instability is a concern of global investors and fund managers due to associated elements negatively affecting infrastructure assets in EM. Indeed, as Participant-A. 10, confirmed, economic instability is only one component of the overall environment 'macro-environment'. Therefore, the key concern for investors and financial institutions is most likely the high level risks surrounding economic instability (i.e. country level risks). In addition, the participants highlighted that they invest in long-term assets (10-15 years); thus, the country must have a considerable level of stability to underpin investment (Participant-A. 1 and 8 and Participant-B. 5).

In terms of economic, risks linked to local institutions can inform economic instability and influence infrastructure investment in particular geographical areas within EMs. In the opinion of Participant-A.8, local investors and institutions might act as barriers preventing global investors from investing in the market. Finally, economic regulation is critical for long-term infrastructure asset investment. The reason for this concern is that inflation is associated with economic regulation. In particular, in the context of unexpected rises in global currency inflation, potential negative impacts adjust the governments' economic regulation based on inflation (i.e. reducing the cost of agreed services) (Participant-A. 1 and 11).

Figure 6.15-Various Forms of Economic Challenges/ Risks Perceived in EMs



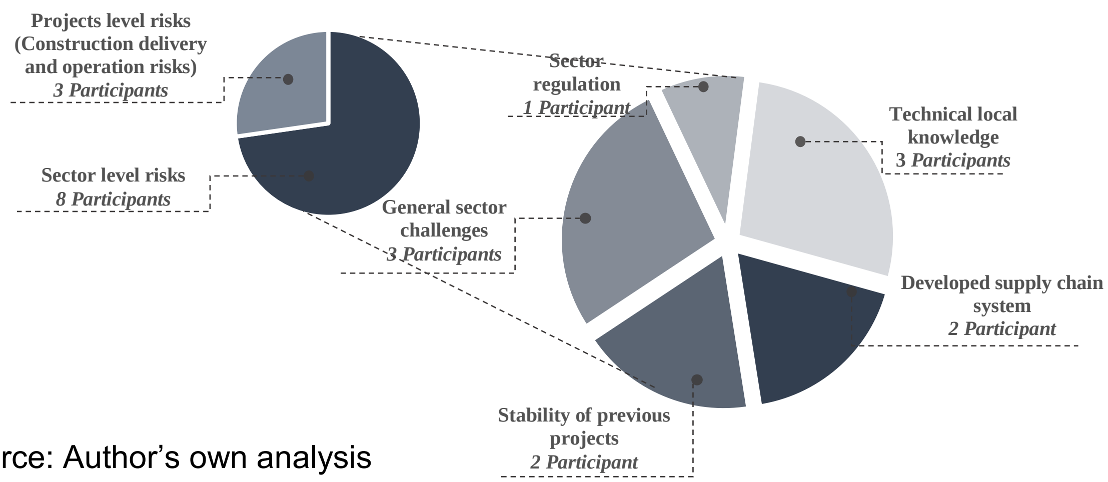
Source: Author's own analysis

There are various forms of challenges/risks and difficulties that global investors and fund managers address through their infrastructure investment vehicles within EM regions. A further class of challenges/risks pose a level of anxiety in global investors in EM geographical areas and involve **Social Challenges/Risk**. A number of interviewees; e.g. Participants-B (i.e. participants investors) emphasized risks associated with social unrest as an important factor to consider when planning for a long-period of investment in EIM because it has strong negative associations with other forms of investment challenges/risks (e.g. currency fails, high potential degree of change governments rules and regulations) and complicates profit forecasting. For instance, Chile experienced social unrest resulting in a government decision to cut the costs of certain services including energy. Similarly, in 2016 in Egypt, unexpected social unrest negatively influenced investment vehicles (i.e. rate of return) for investors (Participant-B. 1 and 2).

6.5.1.5 EIM Internal- Technical/Industry and Sector Challenges/Risks

The interviewees presented several taxonomies of technical/industry and sector challenges/risks that may adversely affect PEIF investment in EMs over the lifespan of infrastructure projects, and under the umbrella of two fundamental risks grounds: 1) Sector level risks; and 2) project level risks, as exhibited in Figure 6.16. These two levels of risk can be broken down into further sub-arrangements challenges/risks. Firstly, sector level risks encompassing five forms of risk that investors may perceive in EIMs: 1) general sector challenges (includes familiarity with the capacity and availability of resources, and access to information); 2) development of supply chain system; 3) sector regulation; 4) technical local knowledge; and 5) stability of previous projects. Secondly, project level risks comprise of construction delivery and operation risks. The interpretation of the implications of each challenge/risk to infrastructure investment in EMs is explored in turn.

Figure 6.16-Various Forms of Technical/Industry and Sector Challenges/ Risks Perceived in EMs



Source: Author’s own analysis

General sector challenges Challenges/Risks profile

In the context of sector level risk assessment, the infrastructure sector introduced particular challenges/risk to global institutional private investors and fund managers. Indeed, global investors' contributions to the provision of infrastructure services in a number of EM geographical allocations are characterized by inadequately serviced asset capacity. Consequently, the interviewees pointed out that institutional investor's encountered two major challenges. Firstly, adequate familiarity with the capacity needed to supply the required service and resources available to the investment industry to support infrastructure assets. Secondly, access to required information pertaining to planned infrastructure asset investment is highly challenging, due to the absence of EM government experience and knowledge with regard to the provision of comprehensive information to private global investors. Indeed, the data that is expected to be received is critical and depends on entire investments. For instance, in the renewable energy sector, the information required to answer common questions includes, but is not limited to:1) identifying the size of the energy sector/market; 2) availability of resources; 3) having sufficient wind/solar power infrastructure; and 4) having a large infrastructure that is sufficient to manage the demands of launching sufficient renewables in addition to various information needed for the project. (Particpant-A.3 and 6 and Particpant-B.2).

Technical local knowledge Challenges/Risks profile

Alongside the aforementioned general sector challenges/risk, technical local knowledge risks can potentially limit the benefits obtained from an investment. However, this form of risk pertains to private investment at management level. In other words, infrastructure as a multifaceted and complex asset requires different technical capabilities, and as discussed earlier, EM countries are diverse in their industry development. Therefore, investors – the contractor and/or operator - need to be sufficiently competent to satisfy requests for different technical capabilities, such as the design and build process (i.e. executing the construction phase) and/or operating aspects of management (i.e. maintenance phase). Thus, investing in different EMs requires individualized sets of skills (i.e. structural changes) and a unique set of materials (Particpant-A.3,7 and 11).

Developed supply chain system challenges/risks profile

Following the discussion above, EIMs are characterized by different market/industry development levels, and distinctive logistics elements and supply chains. In addition, a number of countries in EMs have insufficient manufacturing capabilities (i.e. immature markets), specifically in energy and renewable sectors. Indeed, the interviewees Participants-B (i.e. participants investors) stressed the significance of the supply chain system, indicating that it poses a critical challenge associated with low level upgrade and development that negatively influences both the EM government market and infrastructure investment vehicles (Particpant-B.1 and 3).

Sector regulation challenges/risks profile

In line with the previous discussion regarding regulatory and policy framework challenges/risks profile, regulation at sector level incorporates a number of risks likely to impact on infrastructure services, and potentially contradicting concession agreements (i.e. procurement regime). For instance, different sector regulations are associated with different entities within EMs, and lead to challenges identifying a consistent responsible authority/entity over the course of an infrastructure asset's lifespan (Particpant-A.1).

Stability of previous projects challenges/risks profile

The final type of the technical/industry and sector challenges/risks at sector level is ease of establishing the stability of previous projects. Assessing this form of risk is crucial for investment, and identifying the history of previous projects (i.e. track record), as well as how long stability holds a significant weight that investment depends on it to provide a sense of confidence to global private institutional investors and fund managers regarding their EM investment. Thus, the level of challenges/risks is high for EMs entering the infrastructure investment environment for the first time (i.e. non-previous projects exist in the country). For instance, in Indonesia, 2019 invited its first round of large scale international tenders for investment in renewable energy projects, and negotiations had to be undertaken concerning the different terms of PPA. This resulted in a number of challenges for investors: 1) the investor had to work with the government to reduce the risk; 2) absence of supply chain facilities (i.e. undeveloped industry markets) for parts of renewable energy equipment (e.g. turbines) and the investors had to resolve logistics elements associated with the project. Similarly, South

African markets experienced their first investment in renewable energy in 2011(Particpant-B.2 and 3).

Construction delivery and operation challenges/risks profile

Similar to technical local knowledge construction delivery and operation challenges/risks affect private investment at management level, but not at project level. Private global investors are concerned about the project delivery process and/or the growth of operations management and company transactions. However, as stated previously, countries in EM are varied and their market/industry development levels are diverse. Consequently, this challenge is not only subject to country level variables, but also to those at sector level, because the situation differs from country to country and sector to sector (Particpant-A.1 and Particpant-B.2 and 11).

Overall, the assessment reveals discrepancies among the interviewees when recognizing how challenges/risks impacts on PEIF investment in EM and the influence of global institutional investors entering EM. Meanwhile, Participants-A.6 and Participant-B.4 demonstrated that key challenges/risks in PEIF investment in EM are based on fundamental sector level risks and project level risks present at management level for institutional investors exposed to EM. Others such as the Participant-A. 11, vowed that the key issue in PEIF relates to the geographical allocation of investments. In particular, ‘country risk is only one of many different elements of risk’.

6.5.2 Nexus of PEIF Investment Challenges and Risks in EIMs

Investors face a number of barriers in emerging countries, which affects their decisions to invest in EMs. As discussed previously, factors such as macro-level instability (i.e. political and economic instability, and social unrest), in addition to lack of knowledge and experience of EM governments are chief factors complicating investment in EIMs. Due to macro level instability, the value of assets is weakened as returns on investment are highly subject to chance. This then has implications for political and social unrest in EMs. Empirical evidence suggests higher economic instability results in less investment in EMs.

Undoubtedly, many of these challenges and difficulties have a relatively negative impact and influence one another indirectly. For instance, Particpant-A.5 stated that '*there is a big current risk surrounding political risks. So, project construction in developing EIMs has a lot of fiscal risk. So there is an expectation that political risks come with this'*. Similarly, there are key infrastructure assets that are considered to be strategic affecting national concerns such as ports, airports and some roads, although political concerns and instability are usually reflected in country risk and the price of suffering debt (i.e. financial distress) (Particpant-A.1 and Particpant-B.1).

Furthermore, other forms of strong correlation between the critical triangle challenges/risks (i.e. political instability, financial, and regulatory and policy frameworks challenges/risks) that are inherent in EIM. These challenges and risks are influenced negatively by PEIF investment in EM and contribute a to reduced level of exit flexibility in the asset making it difficult to sell because the infrastructure asset is illiquid (Particpant-A.1 5).

Therefore, as highlighted previously, a number of global institutional investors and fund managers engage in certain procedures to mitigate the political challenges/risks (e.g. Political influence), regulatory and policy frameworks challenges/risks (e.g. contract expropriation) associated with financial challenges/risks (e.g. currency convertibility, credit rating risks) by acquiring an essential resource in the market at government level. For instance, MEGA- political risks insurance (PRI), is the World Bank Program offering political risk insurance as a back-stop to the obligations of the state towards infrastructure investment. Indeed, over the course of the last decade, a considerable number of global investors and fund managers have applied for political risk insurance, particularly in the Africa region, to cover risky contracts subject to: 1) currency convert volatility risks (i.e. foreign currency exchange risks); 2) credit rating risks; and 3) contract exploitation (Participant-B. 1and 3).

Different perspectives in the Particpant-A.2, 10, 11 and Participant-B.4 highlighted the existing connection between PEIF investment, EM challenges and the growing funding gap and infrastructure demands. Alongside the previously discussed factors pertaining to institutional risks, country risk, convertibility risks and other forms of risk affecting infrastructure projects investment in EM do not meet developed market criteria/framework. The disciplines present in advanced markets are not necessarily present or enforceable in the EMDC. Consequently, an infrastructure investment gap exists despite MDBs and other financiers' institutions persistently attempting to fill this gap largely ineffectively (Particpant-A.2). Further views detailing the reasons and drivers for widening infrastructure needs and a funding gap are explored in Section 6.7. Moreover, foreign currency risks are also significant challenges when investing in EM.

In Particpant-A.2 and 10 point out a major challenge is the lack of projects available for investment in the coupled wave (i.e. an investable infrastructure project), the risk profile of the country and the fact that projects are poorly prepared (i.e. legal preparations, proper feasibility studies, proper contracting) to attract private capital and other (i.e. limited appetite for attracting investors to invest in assets). Indeed, as the Particpant-A.10 stated '*it's not so much a shortage of capital, it's a shortage of projects providing capital to invest in countries (i.e. project pipeline)*'.

Undoubtedly, the current lack in project pipelines in EM is a result of lack of experience and knowledge in government EMDC, regarding how to set-up an appropriate infrastructure project structure that global institutional investors and fund managers will be willing to invest in (Participant-A. 2 and10). Therefore, limited government experience and knowledge can be significant PEIF investment challenges.

In addition to the interpretation given in Section 6.5.1.5 (EIM internal-Technical/industry and sector challenges/risks), technical support and industry development have a negative indirect impact increasing the level of financial challenges/risks affecting infrastructure investment, particularly in the context of power/renewable energy assets. As outlined by Participant-B. 1 and 3, a number of countries in EM are affected by a lack of manufacturing capabilities and an absence of supply chain facilities (i.e. undeveloped industry markets), as parts of renewable energy or conventional power energy equipment (e.g. turbines or power plants) can escalate the cost of investment and increase the degree of challenges placed upon imports; these parts '*Cost their Cost*' (Participant-B. 1).

From another standpoint, contract and regulation framework challenges/risks correlate significantly with the ability to use infrastructure assets in an EM (i.e. revenue or payment model challenges/risks). Consequently, if assets do not generate the required return or revenue, there will be a negative impact on investment. Furthermore, this results in a solid association with demographic elements and forecasting infrastructure needs (Participant-B. 2 and 5).

6.5.3 Key Consideration in PEIF Investment in EIMs

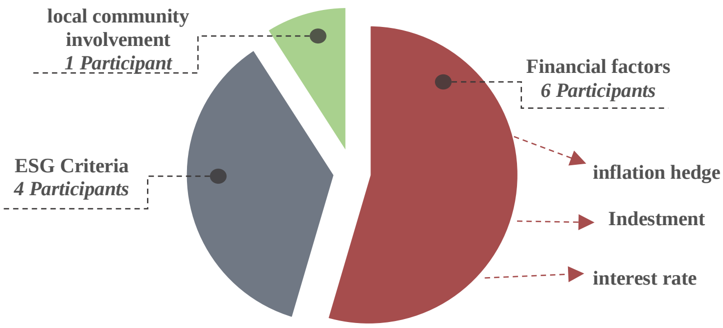
Alongside the external macro environment factors (i.e. economic factors inflation, political factors (e.g. transparency and corruption) and to some extent social factors) EM country performance risks can be associated with the climate and inequities in the business model (i.e. investment in infrastructure assets), as described in detail in Section 6.7.1 (global Institution's' investors challenges/risks in EIMs profiles). Identifying key considerations associated with PEIF investment in EM regularly takes place at specific country level (i.e. an individual country have some specific characteristics), yet it does depend on the investment framework for global private investors. Drawing on the interview analysis, the participants addressed three relevant key concerns for global private investors and fund managers: financial factors (6 participants); ESG criteria (4 participants); and local community involvement factor (1 participant) as illustrated in Figure 6.17.

In terms of financial factors, the participants introduced three factors considered in the PEIF investment portfolio in EM, which concern global private investors and finance institutions, comprising: the stability of inflation hedges (i.e. imperfect hedge resulting in currency hard evaluation), investment security, and interest rate (Particpant-A.3, 8, 9, 10 and 11 and Particpant-B.1).

Another big area which has become incredibly significant in recent years is the whole area of ESG (environmentally sustainable government) criteria. Indeed, a large number of interviewees emphasized that global investors and fund managers considered ESG criteria in their investment portfolio toward EIM, particularly investment in the renewable energy sector (Particpant-A.9, 10 and 11 and Particpant-B.2).

Finally, Particpant-B.2 addressed the fact that communities' and landowners' involvement in some areas in EM regions has a potentially negative impact on investment in assets (e.g. Africa region).

Figure 6.17-Key Considerations for PEIF Investment in EIMs



Source: Author's own analysis

6.6 The Multi-National Criteria for PEIF Investment in EIMs

Section 6.6 explores beyond PEIF investment challenges, difficulties, barriers and constraints in EM, investigating the steps, procedures, various criteria and dimensions, and other measurements that global private investors, financiers institutions and fund managers rely on to evaluate the EMs whose infrastructure assets they plan to invest in. The analytical outcomes are associated with research objective five (i.e. to devise a conceptual framework for global infrastructure investment within EIM, as outlined in Chapter Seven which interprets this in detail).

Overall, the assessment result reveal a huge discrepancy in the approaches to EM evaluation (i.e. investors prioritize criteria in terms of geographical allocation or sector allocation). Global institutional investors and fund managers apply formal in-depth processes to approve any new markets that they plan to invest in, based on multi-national assessment criteria (i.e. investment policy) or the value of previous investments in other sectors within the same EM country. The analysis of the interviews presented in Figure 6.19, demonstrates two primary assessment tools; formal internal evaluation assessment for the investors and fund managers and external EM assessment. Formal internal evaluation relies principally on investment policies statements and determining the level of the value to be pursued. In addition, internal investors' assessment indicates investment fund strategy and policies directed towards infrastructure projects in EM able to meet company investment strategy criteria (Participant-B.4).

Furthermore, the risk profiles of EM countries are determined according to further in-depth evaluation processes. Indeed, according to Particpant-A.4 and Participant-B.4, investors conduct specific assessments to evaluate the risks they expect to face with regard to their investments. The evaluation process begins by establishing objectives and risk appetite (i.e. risk level), and this step is followed by identifying and ranking key risks based on predicted data pertaining to the entire investment. Then an analysis is carried out on the identified risks, which involves an assessment of potential cost and effect (Participant-B.4 and 2). The purpose of this procedure is to identify investor's and their tolerance toward risk and ability to provide a risk mitigation plan to manage investment assets in the selected EM (Participant-A.4). However, in spite of the forecasting risks and challenges in EIM and the in-depth risk assessment process, EMs are subject to unpredictable risks that can emerge across a long-term investment period, which is of great concern to institutional investors and fund managers investing in EMs (e.g. GFC and Coronavirus-2020 crisis)(Participant-B.4 and 2 and Particpant-A.1).

In the context of external EM assessment, the analysis reveals that global private investors and fund managers implement multiple forms of criteria, prioritizing them based on their organization/investment policies (i.e. internal evaluation assessment) and other external dimensions, which surround the investment market. These criteria can be broken down into four hierarchical levels comprising: 1) EM geographical allocation assessment level, 2) country risks assessment level, 3) sector assessment level, and 4) project assessment level (see Figure 6.18). The interpretative process assigned to each level of the external evaluation is explored below.

EM geographical allocation assessment level

The interviewees demonstrated the various criteria that they applied when prioritizing global institutional investors and fund managers' assessments according to organization/investment policies highlighted earlier, and other external dimensions that surround investments in EMs. The evaluation begins by searching for an EM country to determine whether it is and attractive and acceptable investment destination (i.e. geographical allocation) (see Figure 6.19). Indeed, a key issue for global private investors and fund managers is establishing the best place to deploy the investment capital they hold (Particpant-A.1 and 10 and Participant-B.5 and 6). Furthermore, seeking opportunities for valued investment in EM relies on the research provided by independent investment consultants (i.e. key advisors experienced in EM investment) or individuals with those skills in-house. However, decisions and preferences are subject to case-by-case assessment (Particpant-A.1 and Participant-B.6). It is noteworthy that a number of global private investors engage in strategic asset investment, but tend to specialize in both region and sector (Participant-A.1).

Country Risks assessment level

The second level of assessment concerns long in-depth assessments pertaining to country risk evaluation levels. The investors and fund managers examined a number of measurements and dimensions pertaining to the country they intend to invest in (see Figure 6.19). However, it is worth noting that evaluations of the country risk profile are applied as two forms of assessments (i.e. internal and external assessment). In the context of internal investigation, as highlighted previously, it is important to recognize the level of risk the country is experiencing, so as to establish whether global investors and fund managers would be capable of managing and mitigating those risks. In terms of external assessment, private institutional investors and fund managers employ various investigative tools to assess the different factor of risks. Firstly, fundamental evaluations of political stability encompass a number of dimensions: transparency level, instability in government risks, corruption level, political power and influence, and level of political support. A detailed assessment of the country's regulatory and policy environment is also associated with its investment return profile. This form of risk breaks down into a regulatory and policy framework, rule of law, and the country's legal frameworks and experience of the legal framework include the ability to enforce security from secured assets (i.e. have courts supporting the regulatory model), forms of contracts and the ability to exit infrastructure asset expropriation. A further assessment conducted to measure economic risks examines economic instability and economic regulation (Participant-A.1, 5, and 7 and 10 and Participant-B.1, 2, 4, 5 and 6).

It important to mention that, within the same assessment level, a number of interviewees highlighted the significance of financial and funding aspects when discussing the assessment of risks external to the country. Global private institutional investors, fund managers and other financial institutions applied for an in-depth assessment pertaining to financial risks profiles (see Figure 6.19). This is critical for infrastructure investment profiles, particularly in EM. Financial risk assessment is wider and complex and depends on the investment fund strategy (i.e. investors' internal assessment). The breakdown of financial risk profiles that investors, and other financial institutions investigate in the context of EM include the level of development of financial markets; currency risk fluctuations; bankability infrastructure projects that investors are looking for (i.e. secure their return); credit rating risks which have been a critical issue; and the level of the inflation Hedge, because there is potential for inflations risks spikes in EMs, and global private investors and fund managers want be protected from this inflation (Participant-A.5, 6, 7 and 8 and Participant-B.2, 3, 5 and 6). However, Participant-A.6, argued that for long-term investors and fund managers, it is not only the financial risk (e.g. financial transaction risks) that investors are concerned about, but also the financial management risks associated with the asset.

Therefore, as explicated earlier in Section 6.5.2 (Nexus of PEIF investment Challenges and Risks in EIMs), global private investors and fund managers seek to secure their financial environment to invest against political instability by searching for tools that exist in the market and support their infrastructure investment in EIM in the form of MEGA-PRI (the World Bank Program for political risk insurance). Furthermore, the investigation involves searching for thematic support for pooled capital in terms of 'debt source', and the examination of appetites for international investment institutions and other classes of MDBs that contribute to a project (Author's interview, Participant-A.7 and Participant-B.2).

When defining the various forms of a country's risk profile encompassing detailed financial considerations and risks, ESG elements are vital (i.e. environmental, social and government criteria). Investors need to determine whether the country is appropriately structured to deliver the right of form of sustainable ESG criteria (Participant-A.5 and 10 and Participant-B. 5).

In summary, it is not only important as part of the evaluation process to investigate different aspects of country's risks, but the sector itself is a critical aspect demanding further evaluation. Indeed, as Participant-A.10 emphasized with regard to global investors, fund managers, and financial institutions need to look carefully at the country, and then employ a next level analysis to analyse the sectors (i.e. the infrastructure sector within the country) to identify other pipelines within each sector. Indeed, searching for an accessible market supporting new deals is a critical component of the investment profile (Participant-B.5).

Sector/ Market assessment level

The third level of analysis concerns the sector and market evaluation process. The assessment comprises three forms of evaluation; quality of infrastructure projects within the sector; and risk profiles around the sector; and Technical/ Industry risks (see Figure 6.19). Meanwhile the later form of assessment is interpreted in detail in Section 6.6.1.5. In the context of the quality of the infrastructure projects within the sector, a number of dimensions need to be addressed; however, in general, it is necessary to seek out more the quality of the asset rather than the sector (i.e. meet demands and needs). Global investors and fund managers search for the types of services that an asset will support and aspects of key demographics that feed into that asset to establish how the demographic might evolve. For instance, when considering a road project information regarding the number of potential users is essential. Similarly, for a power plant project, it is vital to have data concerning predicted increases in the level of demand for power (Participant-A.1 and Participant-B. 2 and 5).

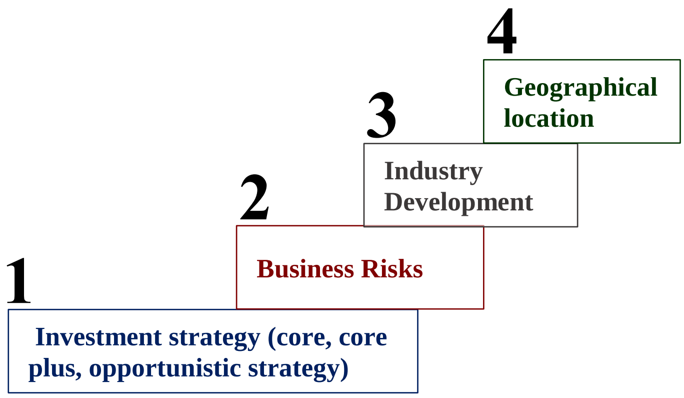
Other elements have been cited in the sector/market level assessment process. Firstly, investigations consider the scale of the market and the size of the opportunity. Then it is important to establish the availability of resources, in terms of existing supporting infrastructure projects and logistical elements, and the adequacy of the existing infrastructure. The next consideration is the type of sector (i.e. in terms of complexity). For instance investing in renewable energy assets differs from investing in railways asset. Finally, the size of the project and what individuals can add to the market to secure their returns (Participant-A.1 and 10 and Participant-B.1, 4, 5 and 6).

Project assessment level

The final level of PEIF investment external assessment pertains to investigations around the infrastructure project itself. Once the global private and fund managers feel comfortable about the aspects outlined above, then they need to identify a project that they might support and evaluate the associated risks (Participant-A.10). Project level assessment relates to the delivery process, the minimum standard for construction and how the IFC regulates performance risk (Participant-A.5 and 11).

Overall, the outcomes of the analysis reaffirmed that the core, core plus, and opportunistic strategies are key elements of the PEIF investment strategy in EIMs that global private investors and fund managers are concerned about (see Figure 6.18). These are followed by business risks, which rank as the second most important elements of EM investment strategy, due to the purpose of the bankability of infrastructure investment agreement with the government and other institutions that guarantee the investment. The interviewees considered industry development in EM to be important in their investment strategy, although not critical to their investment, ranking them third place. Unsurprisingly, of the least concern for global private investors when devising their PEIF investment strategy in EM is geographical allocation. However, Participant-A.6 and Participant-B.3 highlights that *'there is no element that pushes us to invest or not invest in a country'…*and*... 'In terms of reasons to invest there is never one thing, it is a combination of factors that lead us to have confidence in the quality of the deal'*.

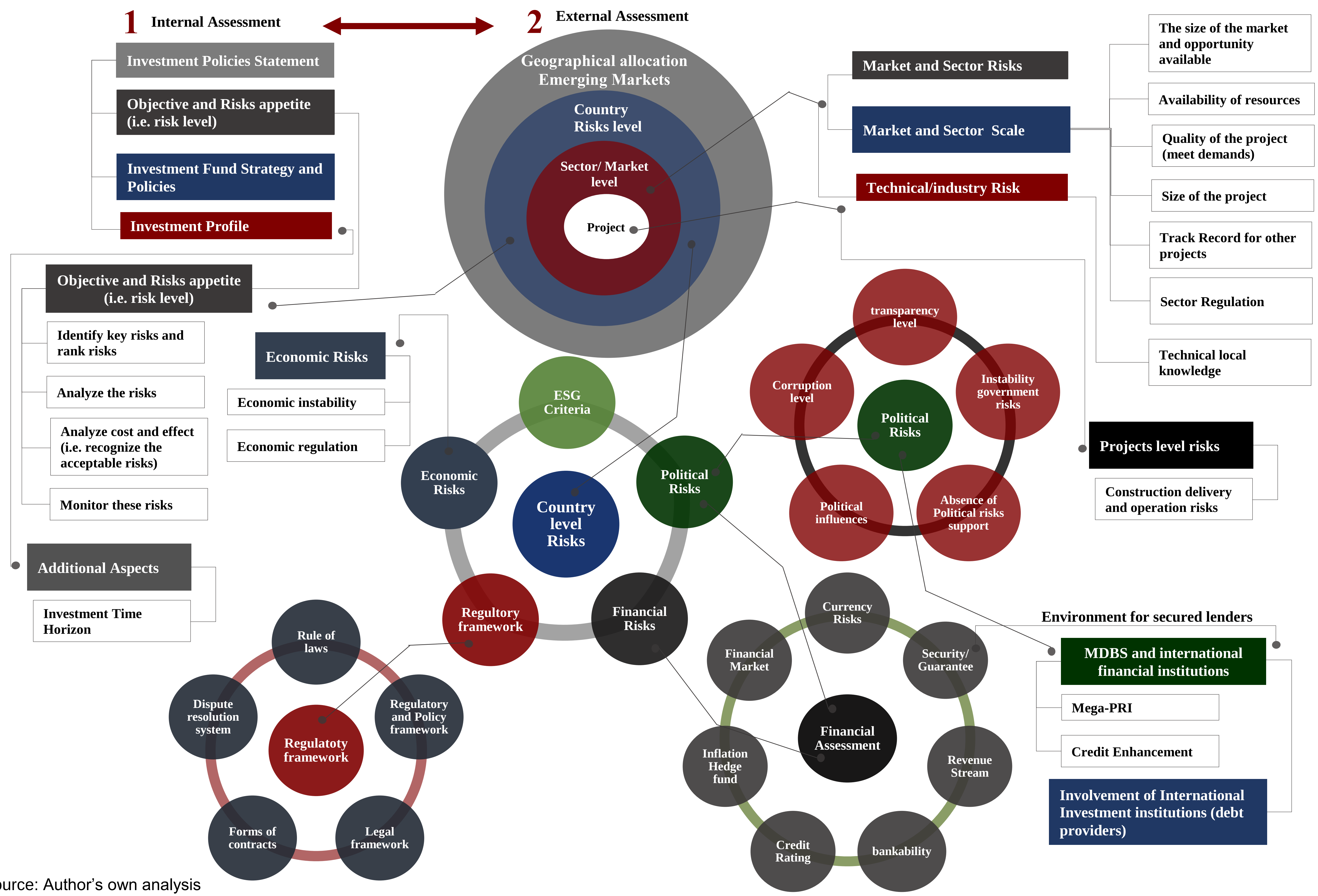
Figure 6.18-Key Element of EIMs Investment Strategy



Source: Author’s own analysis

Generally, EMs represent massive opportunities and a very diverse global approach to investing in infrastructure assets; however, there are difficulties for long-term investors wishing to allocate an appropriate geographical market to provide high rates of return for their investment portfolio (circa 15-20% up to 25% in average) (Participant-A.6). Indeed, a number of global private investors applied strategic assets, but tend to specialize according to the region and sector covered (Participant-A.1).

Figure 6.19-Global Private Investors and Fund Managers Assessment Criteria for PEIF Investment in EMs



Source: Author's own analysis

6.7 Drivers Behind Widening the Infrastructure Investment Gap and Approaches to Boost the PEIF in EMs

As highlighted in the earlier section, the challenges and risks serve as barriers blocking the global institutional investors, fund managers and other financiers organizations from entering EMs. Consequently, over time, these difficulties and challenges have increased infrastructure demands and widened the financing gap. Therefore, there is a pressing need to recognize additional elements contributing to widening infrastructure demands as characterized in EMDC. Thus, the current section comprises a separate part of the second phase of the empirical work and analysis (i.e. the procedures to recognize barriers and difficulties of infrastructure investment in EIM from different perspective). The section is broken down into two primary sub-sections: 1) the reasons for widening the infrastructure demand gap in EMs; and 2) the approaches to boost infrastructure investment in EMs.

6.7.1 Drivers Behind Widening the Infrastructure Needs and Funding Gap in EIMs

EMs offer potential opportunities to enter markets yielding high internal rates of return for global investors and fund managers (see Section 6.4). In addition to the various MDBs, huge numbers of international financial institutions, private investors and fund managers invest worldwide. This is vital for countries with EMs that have extensive financing needs to develop infrastructure and services. However, at present the infrastructure investment gap in EM is widening. Thus, the current sub-section sets out different perspectives regarding the obstacles encountered in EM pertaining to the drivers that inform the current infrastructure investment gap in EM.

The interviewees confirmed the various drivers behind increasing rates of infrastructure demand in EM. However they emphasized two primary drivers: lack of an infrastructure investable project pipeline and various forms of EIM inherent challenges/risks (i.e. the previously interpreted). In terms of lack of investable infrastructure project pipelines three dimensions were cited, comprising of limited information and knowledge available to structure infrastructure assets, lack of proposed attractive rates (i.e. low incentive) and unclear project requirements. These two aspects negatively affected magnate global private investors' and fund managers' decisions to invest in infrastructure assets in EIMs (Participant-A. 3 and 5).

Meanwhile the various forms of EIM inherent challenges interpreted previously impacted significantly on widening the infrastructure investment gap in EM. The outcomes of the analysis depict three major elements with a significant impact, comprising of political, financial, and regulatory frameworks. EMs are typically characterized by a lack of equity and have limited budgetary capacity to execute infrastructure projects. In addition, they are subject to investors' concerns regarding not securing investment or failure to offer adequate protection (i.e. guarantee). This has resulted in global private investors and other financial institutions being overly cautious about investing in private capital in those markets. Meanwhile EMs have a riskier institutional environment (i.e. corruption and low transparency), and can have complex political situations. Furthermore, they lack effective regulatory regimes to facilitate investment (i.e. lack of ability to effective regulation), have less experience selecting the right projects, and there is also a risk of the government expropriating assets. In closing, the absence of PPP framework structure prompts global investors and fund managers to concentrate their investment on specific countries. However, Participant-B.6 argued that in some specific regions with EMs, heavy reliance by governments on PPP strategy, negatively affects investment from global private investors and lowers investment availability, because PPP is not an attractive strategy for long term institutional investors investing in EMs in specific areas (Participant-A.2,3, 4, 7, 9, 10 and 11 and Participant-B.1, 2, 5 and 6).

Notably, these two drivers are connected; particularly in the case of political instability challenges/risks. For instance, while Participant-A.5 pointed out that in some geographical areas in EIM, governments set a condition to allow global investors to invest in EM, they are also required to finance and perform visibility studies for infrastructure project pipelines. This has resulted in an increase in the cost of investment and led investors and fund managers to enter other markets imposing fewer conditions. Participant-B.2 stated that in some cases, governments implement measures to reduce the number of infrastructure projects, and foreclose and withdraw projects without solid reasons for doing so (i.e. implement the earlier mentioned ‘signature risks’).

6.7.2 Various Approaches to Boost PEIF Investment in EIMs

The assessment highlights the various perspectives of the interviewees regarding what is an appropriate approach to boost the infrastructure investment rate in EMs. Furthermore, it should be noted that the current evaluation outcomes are attributed indirectly to attaining partial fulfilment of objective five of this research (i.e. to devise a conceptual framework for global infrastructure investment within EMs), as will be outlined in detail in Chapter Seven.

The interviewees confirmed the foundation upon which they increased PEIF investment in EM starting at the country level, particularly from the government side. Specifically, the interviewees reaffirmed that in order to increase the rate of infrastructure investment in the target countries, EM governments need to work on two primary drivers: the lack of infrastructure investable projects pipelines and the various forms of EIM inherent challenges/risks, as set out in sub-section 6.7.1. Consequently, the participants reveal specific steps required to boost the infrastructure rate in EMs at the country level, as illustrated in Figure 6.20. The process encompasses three principal phases; an infrastructure project preparation phase, investment environment preparation phase, and a final phase relating to launching an infrastructure investment project pipeline in an EM. The majority of the interviewees agreed that in the first phase, emphasis needs to be on recognizing the significance of the role of EM governments, and their responsibility to develop the infrastructure projects pipeline to attract global institutional investors.

Beginning with the infrastructure preparation phase, foundational projects are required based on an infrastructure needs assessment. These projects have to be introduced based on visibility studies determining the services needed (i.e. introduced infrastructure program) (Participant-A.1 and 6). It should be noted here that Participant-A.6 and 8 suggested local investors, regional entities (e.g. European Union or the African Union), and/or global institutions (e.g. MIRA) should offer assistance and perform an advisory role to EIM governments to develop project pipelines. The result of this phase would be to structure a national infrastructure plan for the country to obtain approval from all political parties in the country to prepare to launch the country or regions media platform inviting global investors (Participant-A.1 and 7). This is a crucial phase, due to EM governments having a critical role in projects and being concerned with avoiding future political challenges/risks (i.e. signature risks) (Participant-B.2). In addition to mitigates potential risks from EM government side such as cancelled and/or needless for the project (i.e. users cannot afford to pay service).

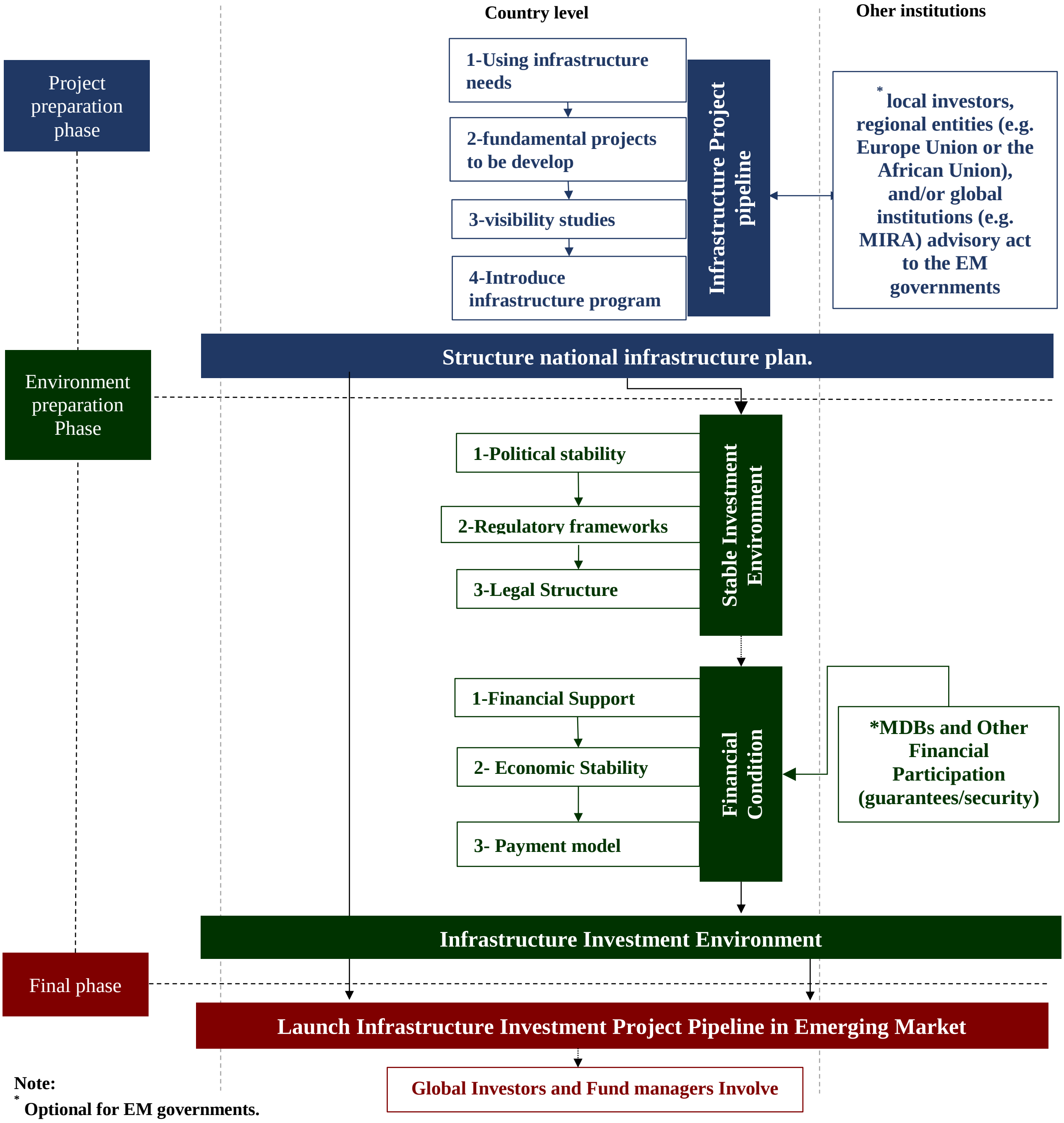
The second phase is to structure a stable investment environment (i.e. environment preparation phase) and is of two parts. The first part pertains to structuring infrastructure investment frameworks and the second part to strengthening the financial platform. When setting up an investment framework, the aim is to solve the identified challenges by structuring policies to overcome different types of difficulty to increase the rate of investment. As a result, the following aspects are vital; establishing a politically stable system highlighting risks associated with political power, and providing transparency and procurement procedures. In addition, minimizing opportunities for interventions and interference (i.e. lower level of corruption, land acquisition, and political charges). In terms of the regulatory environment, the government needs to determine how infrastructure assets are to be regulated. It is also required to apply to increase the rule of law (i.e. strong judicial system), the force of gallery contracts, and allow for changes to the ownership of assets (i.e. easy to full or partial exists). In addition, ensuring a solid regulatory structure, rigorous enforcement of property rights (i.e. expropriations) and a PPP framework. Economic stability is another aspect that can be implemented to strengthen and stabilize the EM environment. Specifically, EM governments need to introduce strong economic growth policies to support infrastructure investment, including developing the markets within the industry and increasing logistics facilities (Participant-A.1,3,6,7 and 9 and Participant-B.1, 2, 4 and 5).

Meanwhile, it is essential to establish a solid financial platform and secure financial environment. This is begun by linking the infrastructure program introduced, aforementioned in the first phase, to the available funding to identify fiscal resources. Participant-A.6 highlights that EIM countries are characterized by insufficient access to the capital from international development institutions, due to the specific conditions the institutions are required to fulfil. Consequently, the government needs to provide a wider degree of financial security (i.e. guarantees) to support and back-up investment (i.e. the return on investment). It should be noted here, Participant-A.6 and 8 and Participant-B.4, that MDBs, international developed institutions, and other financial institutions can participate, by collaborating with EIM governments to provide financial guarantees and investment security (e.g. MEGA-PRI (the World Bank Program for the political risks insurance)[32] (Participant-A.1 and 6 and Participant-B.1 and 4).

The final phase is to launch infrastructure investment project pipelines at the country and regional level via media platforms, to invite global investors and other fund managers to EMs to invest in their infrastructure assets.

[32] A further interpretation of MDBs participation in PEIF investment in EM in the following sub-section

Figure 6.20-Procedures to Boost PEIF Investment in EIMs



Source: Author's own analysis

6.7.2.1 MDBs Participation and Roles in PEIF Investment in EIMs

MDBs and other financial institutions play a significant role in infrastructure investment in EIM. In addition, their participation in the investment process can be observed in the context of the Loan-to-Equity ratio (L/E), and from two perspectives: institutions' viewpoints and markets' viewpoints. From the institutions standpoint, global institutional investors and fund managers need to determine the scale of the capacity for infrastructure finance (i.e. L/E). Specifically, in the context of greenfield assets this is a critical issue. Institutional investors take debt over equity in their investment. In addition, in some contexts, they focus more on debt providers, such as for greenfield projects, which require significant amounts of debt project financing and a reluctance to deploy large amounts of capital from developed markets (Participant-A. 7 and 10).

Furthermore, over the course of the last decade, the MDBs, including the World Bank, the Asian development banks (ADB) and other developing financial institutions have increased their activities in EMs. However, these MDBs and international financial institutions do not have adequate financial capacity to meet the EM financing gap. In addition, the scale of the infrastructure investment is massive and requires the involvement of other partiers. Therefore, rather than the traditional approach (i.e. providing loans to countries and/or global private investors) to projects, MDBs increasingly look at how to participate in financing infrastructure projects and catalyzing infrastructure investment in EMs. This involves not only providing loans, but also securities to reduce the risk for private capital (i.e. as an alternative investment mechanism), thereby attracting more private capital (Participant-A.5,10 and 11). Therefore, a secure financial structure (i.e. guarantee structure) is needed due to its strong association with credit rate risk. In particular, institutional investors seeking to obtain support from MDBs or other financial institutions often offer guarantees or other forms of security (i.e. credit enhancement guarantee) for their infrastructure investment in EIM (Participant-A.1 and Participant-B.4).

From a market point of view, building strong connections across MDBs and other financial institutions within EM markets means institutional investors can attract more capital to EMs through credit enhancement, covering more forms of financial risk, which is critical for all parties (i.e. global institutions investors, MDBs and EMDC) (Participant-A.1 and 7 and Participant-B.4).

From another standpoint, as highlighted earlier in Section 6.5.3, ESG sustainability criteria is considered one of the recently emergent key considerations that has been implemented widely by global institutional investors, fund managers and MDBs as well as other financial institutions. The interviewees emphasized the role of private capital in particular, as well as that MDBs will not participate in infrastructure projects where they believe in negative ESG outcomes or environmental issues such as sustainability (Particpant-A.1 and 10).

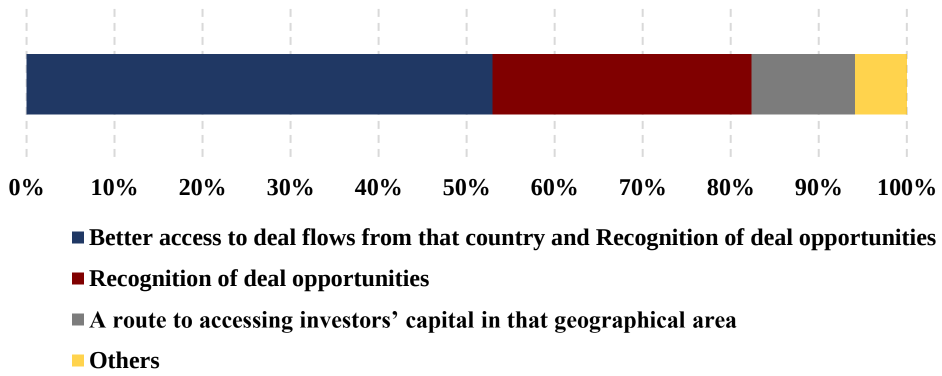
6.8 Infrastructure Investment Opportunities (PEIF) in EIMs

This section completed the analysis of the second stage of the empirical work that addressed the major outcomes for global professional institutions and key players from PE investors perspectives with regard to PEIF investment in EM. In particular, the current section presents a continual assessment interpreting data provided earlier in (Section 6.3.1) with reference to the recognition of the main motives and the primary drivers of global institutional investors and fund managers choosing to target investment strategies (i.e. infrastructure investment portfolio) towards EM. Section 6.8 presents a primary summary for analysing the study findings and identifying opportunities for PEIF investment in EM.

The assessment reveals that in spite of global investors and fund managers experiencing challenges and risks from PEIF investment in EM, they increasingly target EMs. The interviewees suggested a considerable number of opportunities for magnate investors and fund managers in EMs, and better access to deal flows (circa 53%) compared to identification of approaches to opportunities for infrastructure investment (circa 30%) (See Figure 6.21). Indeed, from the global private investors' and fund managers' perspective, they recognize an opportunity if a country has a worthy project, and the sector is appealing to invest in. In addition, once the quality of the project is high, and the risk profile relatively low (e.g. regulatory risk), then financing will be available (Participant-A.1 and 10). In addition the previous drivers and motives interpreted in Section (6.3.1) relate to the high demand for infrastructure assets in the area of EM (e.g. 6 million people are without energy in Africa region), competition is low cost, and there is crowding in developed markets seeking for higher returns, and a friendly investment environment (Participant-B.2, 3 and 6).

Indeed, as highlighted in the Participant-A.1 and 8, EM countries' governments' attempts to demonstrate discipline in association with multilateral organizations, create projects that influence infrastructure assets in the process rectifying their regulatory framework to support investment procedures. However, some EM geographical areas are characterized by inconsistent deal flows (i.e. one good year with diverse infrastructure projection and another 2-3 years with low scale unattractive infrastructure projects) (Participant-B.2).

Figure 6.21-Opportunities for PEIF Investment in EMs



Source: Author's own analysis

6.8.1 PEIF Investment Preference in EIMs

As discussed previously, considerable drivers and factors promote a significant number of global institutional investors, fund managers and financier institutions to invest in infrastructure projects in EM geographical areas (e.g. those with a low risk in terms of economic stability, and a high rate of return). The result is a growing body of evidence acknowledging the increased opportunities and large increases in funding to allocate capital to invest in EIMs (i.e. selecting country as opposed to sector) including a range of infrastructure assets (e.g. scale, sector, and growth opportunities). Despite the existing argument that it is difficult to predict the next target country/region and/or sectors to invest in because the projections are complicated, there are some fundamental issues and drivers that need to be considered; such as economic growth level, aspects of the local development industry, and the impact of demographic growth. However, the interviewees forecasted the majority of the target EM country/region and sectors so as to invest in economic infrastructure assets in the future (i.e. the next 10-15 years). The assessment outcomes classified PEIF investment growth opportunities in EM into two aspects; opportunities in the context of EM country/region, investment target direction and opportunities to scale up on sector investment direction. The interpretation of each aspect of this evaluation is explored in turn.

Opportunity of country/region investment in EIM

When projecting which might be the most targeted EM country/region over the next 10-15 years, the interviewees projected that global institutional investors, fund managers and financier institutions will be most interested in Latin America, the Caribbean and African regions in terms of investment (see Figure 5.22). Followed by the second target destination as Asia and Middle East regions. Suprisingly, the European region is the least attractive as a mechanism for PEIF investment in EM.

When forecasting potential investment at the country level, Latin America, the Caribbean region and Brazil were identified as more attractive to global private investors and fund managers because of a number of aspects, such as political decision making that fosters private investment, the size of the countries and their populations' need for infrastructure. Meanwhile investors and financial institutions plan to increasingly invest in selected jurisdictions characterized by stable government conditions (i.e. Mexico and Chile) due to the comfortable investment environment in Chile and the massive opportunities presented by Mexico. In contrast, Peru is the last country of note in Latin America and the Caribbean because it is relatively small and its economic scale is smaller than the other options (Participant-A.1, 2, 3, 5 and 10).

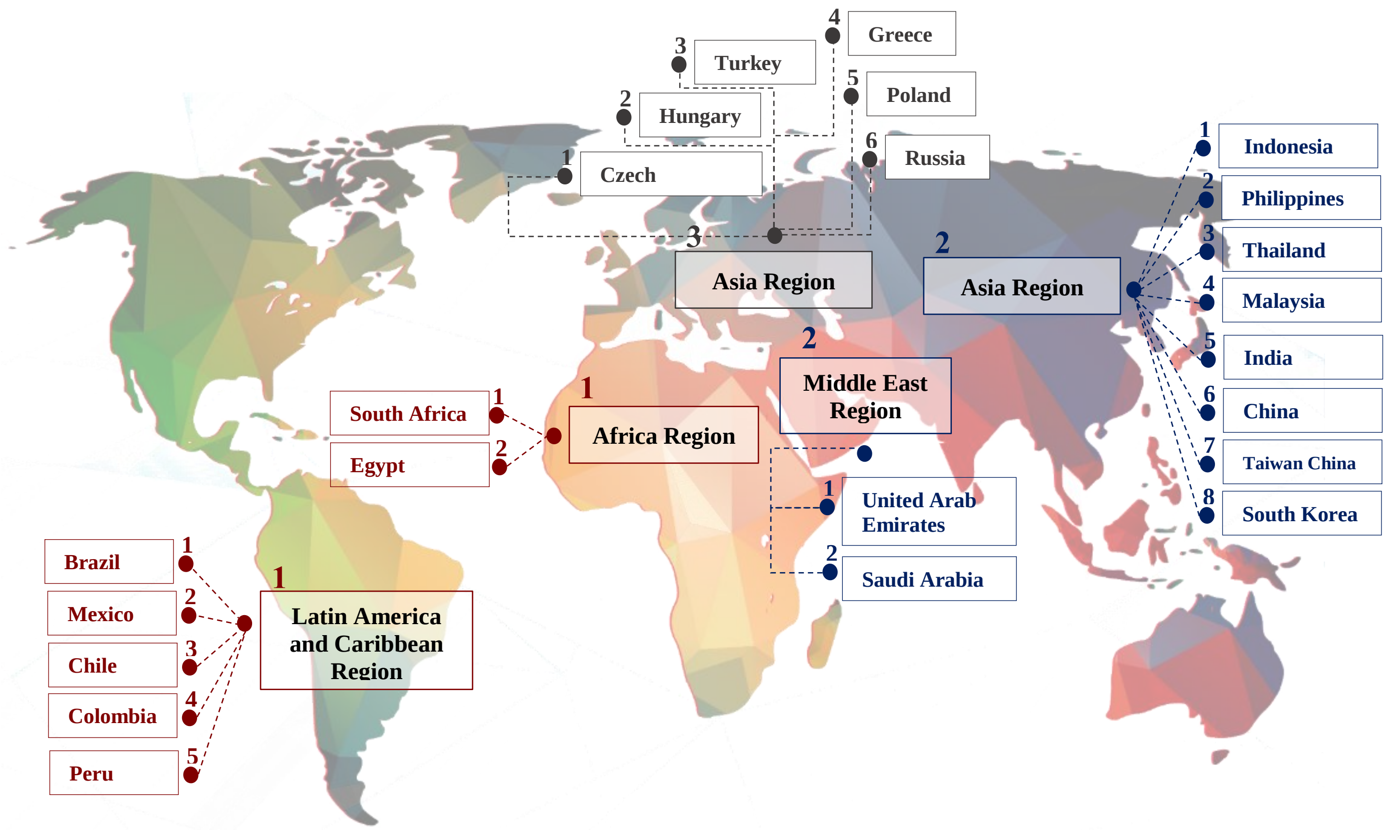
Meanwhile in the African Region, the markets deemed slightly more attractive are those with higher levels of economic development and large populations. Therefore, South Africa and then Egypt offer the most potential in terms of investment opportunities in this region (Participant-A.7, 10 and Participant-B. 1 and 2). However, in the case of South Africa, a number of interviewees highlighted that the market is unregulated, and a number of investors and fund managers have already decided to be the first to enter those markets and play pioneering roles in their development (Participant-B. 2 and 6).

In the context of Asia, EM countries are growing and progressing towards developing their national status, specifically Indonesia, Philippines, Thailand, and Malaysia. Consequently, the investment market in these areas is growing. Specifically, within the ASEN region, global private investors and fund managers are focusing more on Indonesian markets, because in Indonesia there is discussion about the significant scope for investment opportunities. There is also considerable potential for PEIF investment in Malaysian market (Participant-A.5, 7 and 10). Furthermore, India has speculated that the next country to be targeted involves a significant panel of global investors (Participant-A.2, 5 and 7).

However, significant debate exists around India and China as they present low appeal for PEIF investment in the future. This is because of the high level of competition already present in their crowded markets (i.e. they are becoming the next generation of advanced markets). Consequently, the investment returns for investors are consistently reducing (i.e. peer risks), with the result that global private investors and fund managers avoid investing in this area, instead seeking out alternative markets (Participant-B. 2 and 3). Indeed, as Participant-B.1 reaffirmed: *'if the country is booming and has been targeted by others it doesn't mean that you really want to be in there.*'

Surprisingly, the Middle East region is likely to attract global investors and fund managers in the future. Specifically, the United Arab Emirates has been succeeded by Saudi Arabia as the second most popular geographical investment destination (Participant-A. 10).

Figure 6.22-Opportunities for PEIF Investment in EMs in the Next 10-15 Years



Source: Author's own analysis

Opportunity sector investment in EIM

When predicting what might be the most targeted sectors in EMs over the next decade, the interviewees hypothesized that energy sectors (circa 70%) will be preferred by global institutional investors, fund managers and financier institutions (See Figure 6.23). In partcular, investment in the renewable energy sector is expected to be the sector most targeted for investment in EIMs (circa 40%), being trailed by investment in the traditional power energy sector (at approximatly 30%). There are a number of drivers and motives for the increasing investment emphasis on the renewable energy sector from both the EM government perspective and the private investor perspective. From the EIM government perspective: 1) EIM countries have diversified their power base and transferred to green energy according to the SDG-Agenda; 2) structured policy decsions underlining the significance of investment in green infrastructure based on ESG criteria standards; and 3) engaged in significant opportunities to invest in renewable assets becouse of the lack of competitvness in EIM compared to traditional power. On the other hand, and from the private investors standpoint, structuring and executing renewable energy assets is not complex and does not require big generating plants unlike traditional power which required power generating plants and transmission networks to reach the required area (i.e. create a power micro grid) necessitating large distributed investments (Participant-A.1, 2, 5 and 7).

Suprisingly, the transport sector is the second largest target sector in EM, at approximately 20%. Various views were expressed advocating the role of the transport sector in EM, while the Participant-A.1 indicated that *'General transport magnates significant attention from different investors becouse of the size of the projects and the variety of sub-sectors (i.e. toll roads, rails projects, or the airports). In terms of investment, transport is the largest sector, but increasingly, the renewable energy sector increases recent attention on investment.'*

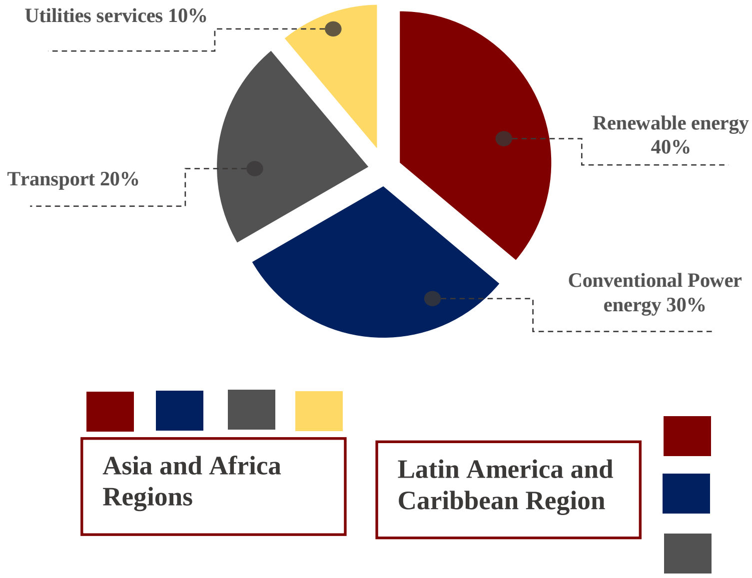
On the other hand, Participant-A.5 explained that transport is a huge sector, involving different sub-sectors. In addition, global private investors and fund managers have to resolve transport problems as part of managing logistics. However, transport projects can add pressure, particularly in urban areas. However, Participant-A.10 argued that the transport sector is critical, because it is where the biggest infrastructure gap is, as global investotrs and fund managers still need to build a transport infrastructure in EMs.

However, it should be noted that there are discrepancies regarding the most targeted sector for investment in EMs. Meanwhile, Participant-B.5 addressed the fact that each sector has specific architecture that relies on the contract and EM regulations. However, it comprises two aspects; general structure investment and volume contract investment. In terms of the general contract investment structure, investors frequently seek to invest in the transport sector. Meanwhile, due to the volume of contract structures, investors and fund managers are seeking to invest in energy (conventional and renewable energy sector) due to the high demand for electricity services, and clean water in the utilities service sector. Participant-A. 2, 7 and 10 highlighted that it is difficult to predict the most targeted sector in EMs overall, as it must be determined at the country level.

Indeed, evaluation outcomes present the assessments provided in the earlier section (i.e. recognition of deals and opportunities in EM) identifying the nexus between EM deals/sectors and opportunities for investment and approached to accessing the EM country (See Figure 6.23). In the context of the African region, the participants revealed a significant preference for investing in South Africa, to fulfill the requirement to initiate transport infrastructure projects and conventional power energy projects (i.e. as highlighted earlier, there are 6 million people in the country without energy who remain reliant on off-grid power generation) (Participant-B. 2 and 3). Indeed, South Africa is targeted for investment in traditional power energy assets, and has established a program entitled the REPP (Renewable energy investment program) with objective to focus on energy investment (Participant-B. 6). On the other hand, in the opinion expressed in Participant-A. 7 and 10 and Participant-B. 3, there is a question around resource scarcity (i.e. basic infrastructure) in a number EMs; e.g. access to water is a massive issue in Africa.

On the other hand, the analytical outcomes reveal that Latin America and the Caribbean region, in particular Brazil, have specific transport requirements if they are to invest in a particular geographical area. Meanwhile in the Asia region, the most significant sectors requiring investment for the future are basic infrastructure (i.e. conventional power energy and utilities services).

Figure 6.23-the Most Opportunity Sector of PEIF Investment in Emerging Markets in the Next 10-15 Years



Source: Author's own analysis

6.9 Conclusion

The outcomes of the empirical work were achieved and set out in this chapter, fulfilling objective four of the research (See Figure 6.1). The first stage of the second phase assessment presented in this chapter focused on recognizing global institutional investors as key players in PEIF in EIMs, targeting key assets and geographical locations when forming infrastructure investment strategies for both greenfield and brownfield projects. The analysis from the Preqin database reveals a total of 263 investors worldwide differentiated their investment and recorded preferences when investing in EMs. However, a further assessment was then applied to identify the top 20 key players that concentrate their PEIF investment on specific regions in EMs across the examined period Q1-2009-Q4-2019. The investigation referred to three regions that global investors and fund managers focus their investment upon: 1) Latin America and Caribbean; 2) Africa; and Asia.

The discussion concerning the challenges and difficulties that influence the decision of global PE institutional investors and fund managers to invest in infrastructure assets within EM have been depicted in the empirical work and highlighted in the literature review. Furthermore, the second phase of the empirical research was developed in a such a way that it captured the perspective of two groups of stakeholders; i.e. the professional institutions' philosophical perspective and the global investors' and fund managers' experience regarding the challenges and barriers preventing global institutional investors and fund managers from investing in infrastructure assets within EM.

Overall, the second stage of the phase two analysis explained the fundamental challenges for EMs is the risk within the country specifically. Indeed, generally EMs carry a higher level of risk than developed markets, namely: 1) political instability; 2) weak government regulations; 3) absence of law; 4) corruption of rules and regulations; 5) economic volatility; 6) low rate of transparency; and 7) fiscal pressure. Therefore, there is a big challenge for those countries wishing to involve institutions structured to lower risk. In addition, these are barriers that curtail investment and heighten risks within EIMs. The findings herein concur with the observations presented by the majority of the academic researchers Branchoux et al. (2018) and Bielenberg et al. (2016) and Bhattacharya et al. (2015; 2016A,) Russ et al. (2018) which suggest that EMs are branded with inherent macro-risks and negatively affected by the need to attract global private investors and fund managers, resulting from a lack of PEIF investment in EM.

However, the analysis emphasized that the most critical challenges/risks facing global institutional investors and fund managers are political challenges/risks and financial challenges/risks, particularly those associated with currency fluctuations. Therefore, existing frameworks in EM provide global institutional investors with an opportunity to feel confident about managing and securing both forms of challenge and risk (i.e. mitigate risks), as the investment return is then secured (i.e. Internal Rate Return (IRR)), resulting in increased appetite to attract investors to invest in emerging infrastructure markets. However, the key considerations about PEIF investment in EM at the country level vary from country to country, although there are notable concerns surrounding ESG criteria due to the stability of inflation hedges.

Furthermore, a different perspective surrounded the second phase of the empirical analysis (i.e. the procedures to recognize barriers and difficulties associated with infrastructure investment in EIM from different perspectives), particularly from the EM governmental perspective. The analytical outcomes identified reasons for expanding the infrastructure demand gap in EM and were represented by a lack of infrastructure investable projects and various forms of EIM inherent challenges/risks. In addition they provided a preliminary analysis of approaches to boost infrastructure investment in EMs.

Exploration of fundamental motives and drivers encouraged global private investors to target their PEIF investment portfolio towards emerging markets, allocating a range of infrastructure assets classes. This evidence affirmed data in previous academic research and professional institutions' reports highlighting the reasons for higher internal rate of return (IRR) profiles; diversification, difficulties in developed markets, less crowding in EIMs, and growth markets that capture opportunities in EM.

Moreover, the analysis of PEIF investment highlighted the drivers and reasons behind global investors' and fund managers' PEIF investments being concentrated in three specific regions (i.e. Latin America and Caribbean, Africa and Asia regions) comprising of prospects for future opportunities; knowledge in key markets, and avoiding repeating the evaluation process of infrastructure investment to structure a novel investment strategy in new areas of EMs.

The chapter revealed that despite global investors and fund managers experiencing challenges and risks in PEIF investment in EM, they increasingly target EMs. The interviewees set out a considerable numbers of opportunities that magnate investors and fund managers recognize when looking for better access to deal flows in EMs. Furthermore, the analysis showed the majority of global institutions investors and fund managers are likely to recognize significant opportunities in EM in the future as a means to invest in conventional power energy sectors, particularly the renewable energy sector.

In summary, the assessment depicts various interviewees' perspectives regarding what comprises an appropriate approach to boosting the infrastructure investment rate in EMs. However, the interviewees confirmed that the foundation when increasing the PEIF investment in EMs should start at the country level, particularly from the government side. Increasing investment rates has a strong association with developing a solid investment infrastructure project pipeline and rectifying challenges, difficulties and barriers that are inherent to EIMs (i.e. lowering risks by implementing policies to overcome political threats to increase the rate of investment).

Therefore, Chapter Six has established an understanding of the motivation and barriers impacting on the decision making process of fund managers concerning infrastructure Investment Policy (IP) in EIMs. The evidence presented was incorporated in the formation of the subsequent primary research strategy employed for Chapter Seven. This included a detailed insight into PEIF investment within EM as the basis for proposing a conceptual framework for PEIF investment in EIMs.

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Chapter Seven: PEIF investment in Emerging Infrastructure Markets framework

7.0 PEIF Investment in Emerging Infrastructure Markets Framework

7.1 Introduction

Chapter Seven focuses on outlining the primary outcomes and themes arising from the two stages of the empirical assessment. The preceding chapters investigated PEIF investment market trends in EIM and set out comprehensive insights into deal profiles (i.e. the most focused industry and country for PE investment) and fund vehicles' approaches and strategies toward EIM investment allocation (Chapter Five). Chapter Six comprised detailed review and insights from the key players engaged in PEIF investment on the perceived opportunities, as well as difficulties and barriers that global institutional investors, fund managers, and finance institutions experience in EIMs.

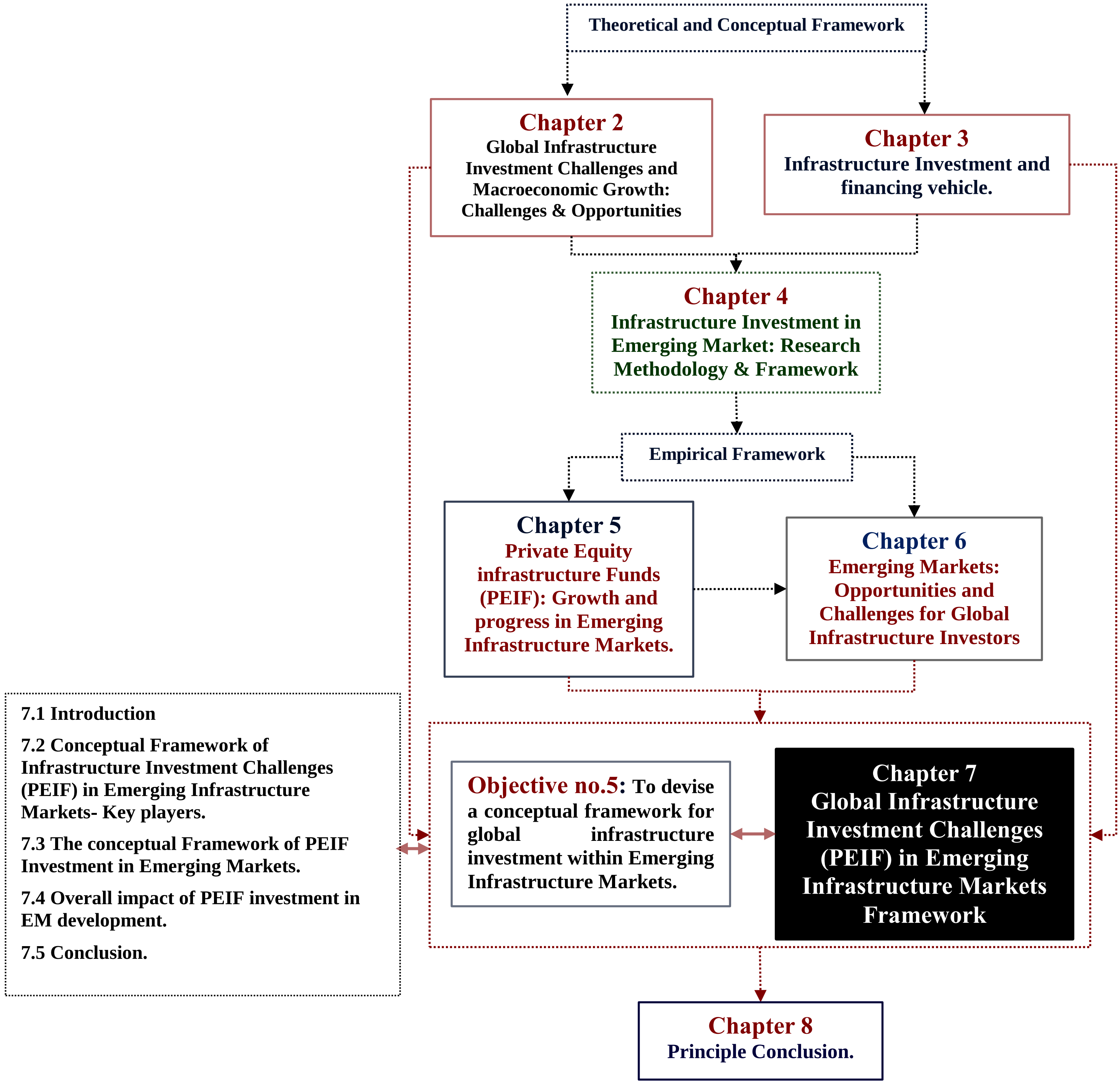
The overall aim of this research is to contribute new insight on PEIF investment within EM. This chapter will contribute to the insight through the development of a conceptual framework for PEIF investment in EIMs in accordance with the fulfilment of research objective five:

> *To devise a conceptual framework for global infrastructure investment within Emerging Infrastructure Markets.*

To accomplish this inclusive objective, the current chapter incorporates qualitative and quantitative assessments and integrates outcomes when identifying deals, funding vehicle levels and is premised on the interviews with infrastructure professionals, academic experts, investors and fund managers (i.e. Chapter Five and Six) with the literature reviews chapters (Chapter Two and Three). Furthermore, the empirical assessments that inform the architecture of the PEIF in EIMs Framework, contribute to the overall aim of the research (See Figure 7.1) providing a significant contribution to the field of infrastructure investment.

The current chapter has been structured to deliver conceptual proposal of PEIF in the EIMs Framework that emerges from the two stages of the empirical works. **Section 7.2** identified the key players and potential participants in the proposed PEIF conceptual framework in EM. **Section 7.3** presents an interpretive examination, detailing the proposed conceptual framework in EM. An overview of the impact of PEIF investment in EM development was introduced in **Sections 7.4** and **7.5** presents the summary, reviewing the key dimensions of the proposed PEIF conceptual framework in EM before outlining the conclusion (i.e. Chapter Eight).

Figure 7. 1-Structural Context of Chapter Seven



7.2 Conceptual Framework of Infrastructure Investment Challenges (PEIF) in Emerging Infrastructure Markets- Key Players

The PEIF investment process is complex and multifaceted, and it is therefore vital to understand the dynamics of the roles of major and potential participants, particularly in the context of EIMs. Furthermore, it is necessary to propose a PEIF investment conceptual framework for EMs alongside recognition of the key players in infrastructure investment in EMs.

However, initially, it is necessary to provide a general overview of the connection between the research key questions and sub-questions across the research findings when proposing a PEIF investment conceptual frameworks (i.e. key players, the conceptual PEIF framework and suggested overall impact of PEIF investment in EM development) (see Figure 7.2)[33]. Figure 7.3 “Key Stakeholders in the PEIF Investment Process within EMs” answers key research question one (Who have been the key PE investors within EIMs?) and sub-question three (How can infrastructure investment be supported and implemented in EIMs?). The answers to the majority of the key research questions concentrate on the proposed PEIF investment conceptual model (see Figure 7.4). These key research questions are as follows:

Key- Q2: What types of infrastructure deals tend to be targeted by global PE institutional investors in EIMs?

Key- Q3: Which regions/countries with EIMs are the majority of global institutional investors choosing to invest in?

Key- Q4: Which are the most targeted infrastructure project styles within EIMs?

In addition, the proposed conceptual framework answers research sub-questions 3-6 as shown in Figure 7.2. Finally, Figure 7.5 (Overall PEIF Investment Framework in EM) answers the following research sub-questions:

sub-question 1: What is the impact of global investment in underpinning development outcomes (economy, investment and infrastructure) in EIMs?

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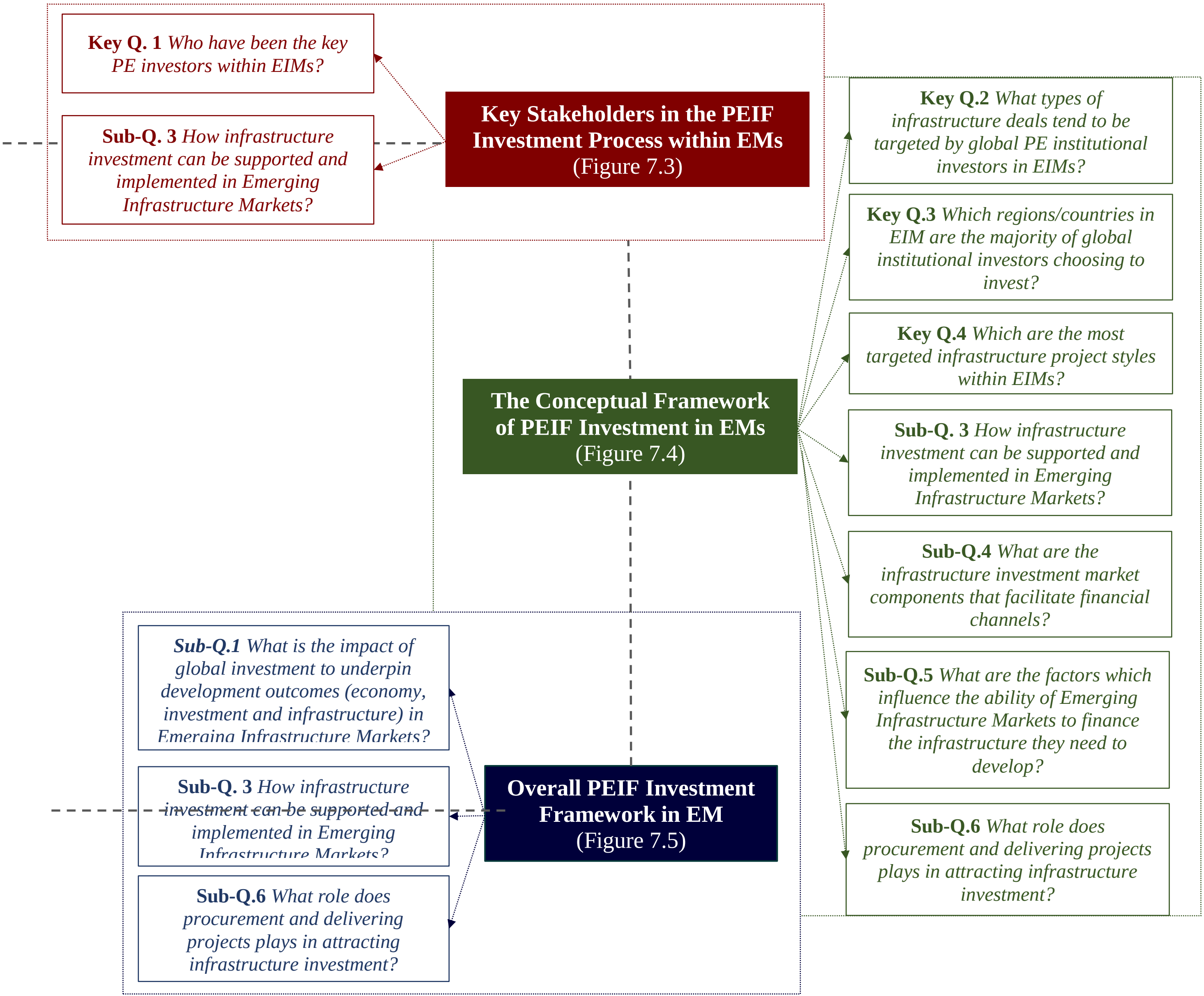
[33] The answers to key research questions and sub-questions are included within the discussion of Key Stakeholders in the PEIF Investment Process within EMs (Figure 7.3), the proposed PEIF investment conceptual framework in EIM (see Figure 7.4) and Figure 7.5 (Overall PEIF Investment Framework in EM)

sub-question 3: How can infrastructure investment be supported and implemented in EIMs?

sub-question 6: What roles do procurement and the delivery of projects play in attracting infrastructure investment?

Figure 7.2 -Key research questions and sub-questions connection to the research findings



Source: Author's own analysis

The first process when developing a PEIF investment framework in EM was initiated by recognising the key roles of major and potential participants in the PEIF investment process and to identify the nexus and synergies between them. In particular, it answered the key question no. 1 (Who have been the key PE investors within EIMs?) and Sub-Q. 3 How infrastructure investment can be supported and implemented in Emerging Infrastructure Markets?. Figure 7.3 identifies the four primary groups involved in the PEIF investment process in EM, comprising: 1) Global investors, 2) EM governments, 3) MDBs and international investment Banks, and 4) Professional advisors and consultant institutions, which will be comprehensively explored their role in the framework in turn.

The first major player was identified as consisting of **global investors**, i.e. private international institutions. This encompassed a variety of worldwide private institutional investors, including local EIM preferences, i.e. global fund managers and international infrastructure firms. However, it is notable that these participants (i.e. international investors) are currently diversifying, including increasing their allocation to EM, due to this providing greater potential investment opportunities in comparison to advanced markets. For example, the empirical outcomes of investment funds vehicle-phase one quantified the average percentage from 5% up to 15% of the aggregate of investment portfolio directed towards EIM. The percentage is forecasted to increase up to 40% over the following thirty years.

The PEIF investment in EM framework highlights the creation of a business layer of consultants and advisors, particularly represented by **Professional advisors' institutions**. There is evidence from the second stage of the empirical assessment that international professional advisors institutions have doubled their roles between global institutional private investors and EM governments (i.e. providing assistance and acting as facilitators). There are a number of levels of services offered by professional advisors (i.e. global and local, as in EM countries). These range between observing and examining market development and the growth of industry, to providing specific consultancies in specific areas, e.g. addressing countries' issues related to investment and forecasting infrastructure projects. Such institutions include international investment advisors and consultants, international financial advisors, and international development companies. These can form an aspect of national governments, including advising on the development of effective infrastructure plans and constructing project pipelines or packaging projects. In addition, professional advisors can enhance the appeal of financial markets for investors (i.e. financial institutions advisories). Furthermore, they can also act as part of the advisory team for international development companies, in line with international advisory investment, offering services such as undertaking an in-depth analysis for infrastructure assets needs in order to develop and support project pipelines.

It notable that, as technical experts support organisations, international professional advisory consultants can work with different level of government, including higher national government and local entities (i.e. the answered for Sub-Q. 3 How infrastructure investment can be supported and implemented in Emerging Infrastructure Markets?).

In the context of global private investors, advisory institutions act as facilitators and provide an insight into growth markets in EIM. This raises the prospect of international professional advisory institutions becoming involved in infrastructure investment in EIMs in certain cases (i.e. specific investment deals and/or a particular geographical allocation). However, it is worth noting that large global investors tend to employ their own in-house advisors, while other investors seek support from these professional institutions for evaluating and structuring their investment portfolio in EIM. Furthermore, the difference between external consultants and in-house staff (e.g. MIRA) consists of external professional consultants who are generally employed for specific circumstances (i.e. niche situations), including when entering a new market in emerging countries that requires an in-depth assessment. In addition, their role can facilitate investment through the following two approaches: 1) seeking out key participants in structured infrastructure investment portfolios in EMs; and 2) linking together all the relevant parties (i.e. global private investors, national governments, and entities) in order to overcome any potential concerns and issues related to infrastructure investment, i.e. obtaining information and analysing any potential risk.

EM governments form the second category of critical players. Their engagement in the infrastructure investment process can be broken down into several primary categories, including: 1) governance framework and enabling environment, along with supporting local businesses and the environment; and 2) the governance framework and enabling environment category, which encompasses various levels of hierarchy, i.e. regional, national, and local. Firstly, the top rank of EM is made up of **regional entities** (i.e. the European Union or the African Union). The empirical assessment revealed such regional entities playing a major role in structuring the regional infrastructure investment strategy, in particular through launching regional media platforms inviting the participation of global investors. In some geographical areas, regional entities offer assistance and perform an advisory role to national governments, in order to develop project pipelines

The second rank of the EM governance framework and enabling environment category is at the national level (i.e. **national government**). The second stage confirmed the foundations increasing PEIF investment in EM as commencing at the national level, particularly from national government. In particular, national governments need to focus on two primary aspects: firstly, the lack of infrastructure investable projects pipelines and secondly, the various forms of inherent EIM challenges/risks (see Chapter Six). Furthermore, a considerable number of EM countries are characterised by a lack of the necessary knowledge, skills and experience. As highlighted previously, international professional advisory institutions are considered some of the key potential participants in the PEIF investment process, in particular due to their association with national governments. As discussed in depth in Section 7.3., they are required to offer provision for infrastructure projects, as well as demonstrating a legitimate approach to their financing, including the significant backup of international professional advisors institutions. However, it is worth noting that the **risk is dynamic** at the national government level. In some cases, the risk does not arise from national government, but rather from local authorities and local government institutions.

Therefore, the **local level (i.e. local authorities and subsidiaries)** is considered a key player in EMs' side-governance framework and enabling environment category. Furthermore, in-depth exploration at the local level reveals that local authorities and subsidiaries contribute to the PEIF process as facilitators and enablers of investment, including by structuring and amending regulations relating to specific infrastructure sectors. In addition, the delivery of infrastructure projects by local authorities can, in some cases, suffer from a lack of skills and experience. Thus, as highlighted earlier, it is vital at this level to employ the relevant technical expertise, in order to support and facilitate the delivery process.

The final key aspect of the governance framework and enabling environment category relates to the development of the **financial sector**. It is significant that this development is vital for the development of infrastructure projects. Due to the fact that the primary role of the financial sector is to allocate capital effectively. This indicates that local financial institutions (i.e. financial markets or financial system) are progressing and performing a major role in the PEIF process. The evidence presented in chapter three, illustrates that financial institutions and banks serve as financial intermediaries supporting long term investment. This has consequently engendered an increase in the progress of financial markets (Murphy, 2015; Hassan et al., 2016).

On the other hand, The category encompassing local business and supporting the environment is comprised of two primary parties: firstly, **local parties** (i.e. **local investors**) and secondly, associated business organisations and local suppliers. This category of investors tends to invest in small infrastructure assets based on their country, alongside partnerships with global investors to invest in mega projects. It is noteworthy that the assessment requires significant participation from local investors with global investors and fund managers in infrastructure investment in EIM. Due to the fact that the EM inherent high investment risk. Thus, many of these players (i.e. global investors) have the capital to undertake projects on their own – but will seek partnerships based structures- or in some cases need local partners in order to enter the market, or in the case of development restrictions such as India.

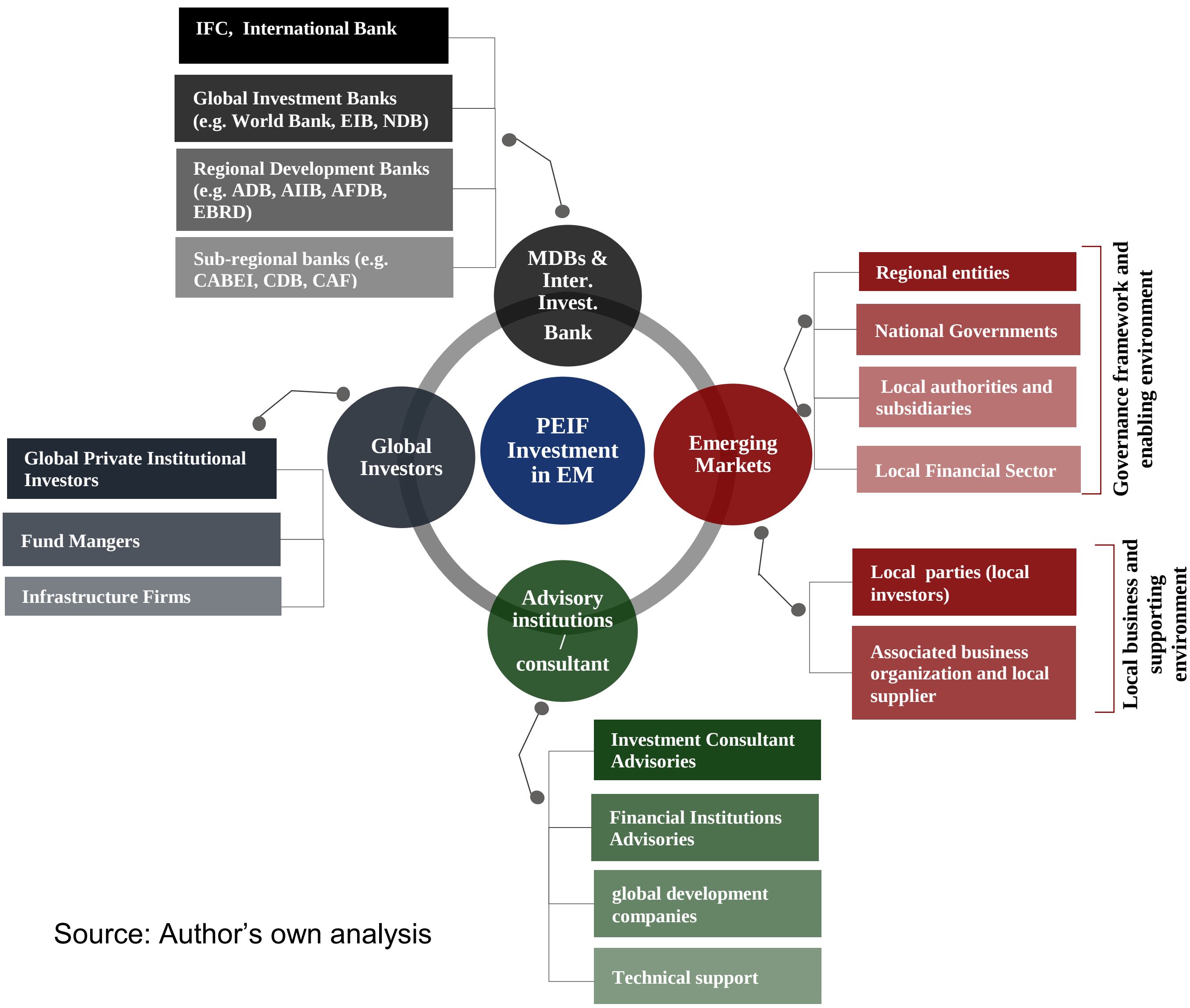
The bottom base of the local business and supporting environment category pertains to the function of associated public services facilities, local business firms (e.g. construction firms) and local suppliers as indirect participants in the PEIF investment mechanism. Indeed, the second empirical assessment, at the SSI-A & B analysis stage, emphasised the significance of market/industry development level, and distinctive logistics elements and supply chains that are affected significantly and play a vital role in the PEIF investment process; this is supported by the view of Aydas et al. (2020) regarding national logistics infrastructure components that significantly influence EIM investment market performance. In particular, in some geographical area in EMs have insufficient manufacturing capabilities (i.e. immature markets), specifically in energy and renewable sectors. The second stage empirical assessment outcomes stressed the significance of the supply chain system, indicating that it poses a critical challenge associated with low level upgrade and development that negatively influences on the infrastructure investment vehicles.

However, **MDBs and international investment banks** also involve a considerable number of potential participants in PEIF investment in EMs. As highlighted in Chapter Three, Multilateral and Regional Development Banks (MRDB) play a crucial role in bridging and delivering financing, along with the provision of cost effective capital for PEIF investment. Due to the considerable expense of investment into infrastructure assets for EIMs, global private investors tend to seek to explore various methods of acquiring capital in a cost effective manner (i.e. borrowing from MDBs), in order to ensure their investment portfolio returns a profit.

Furthermore, the empirical assessment signified that not only do MDBs and international investment banks participate in the PEIF investment process through the provision of financial resources; they can also act as guaranteed entities to secure investment deals for the investors and fund managers to counter political instability in the EMDC (e.g. the world bank program Mega-PRI) . Various forms of MDBs are engaged in investment procedures at different levels: global levels such as the World Bank, EIB, NDB; regional level represented by ADB, AIIB, AFDB, EBRD; and subregional banks (e.g. CABEI, CDB, CAF) (Duvall et al., 2015A; Arezki et al., 2017; UNCTAD, 2017; OECD, 2018D and Bhattacharya et al., 2018).

In addition, some MDBs can contribute to filling the infrastructure funding gap and have the potential to be integrated into the 2030 development agenda, i.e. SDGs. It is significant that MDBs challenge global private investors and EIMs countries to allocate financial resources to EM, with their investment being consistent with the SDGs agenda. This was evidenced in the second-stage of the empirical analysis, which examined how the SDG-Agenda is expected to transfer to the use of green energy, in particular by concentrating opportunities in the renewable energy sector most targeted for investment in EMs.

Figure 7.3 -Key Stakeholders in the PEIF Investment Process within EMs



Source: Author’s own analysis

7.3 The Conceptual Framework of PEIF Investment in EMs

The current section presents the proposed PEIF investment conceptual framework in EM. This contributes to the attainment of research aim and objective five and result from a combination of the incorporation of academic literature reviews and professional reports, and empirical analysis of infrastructure deals levels and funds vehicles levels (i.e. the first stage of the empirical works), and the qualitative research strands comprising interviews with global investors and professional institutions (i.e. Second Stage empirical works). This section will introduce a comprehensive paradigm for global private institutional investors, financial institutions, mediators, and EM governments.

The overall aim when structuring this conceptual frameworks is to provide insight into the complexities of multifaceted PEIF investment in infrastructure, particularly in EM. The conceptual PEIF infrastructure investment framework in EM (hereinafter 'the framework') has been developed in a manner that captures the perspective of **three major keys players** (i.e. global investors, EM governments, and financial intermediates (e.g. MDBs and international investment banks) regarding their different positions and standings and the various challenges and barriers that they have encountered (i.e. answered the key question no. 1 (Who have been the key PE investors within EIMs?)). In addition, the framework highlights the inter-connection and collaborative dependencies as well as addressing common concerns between triangulated players (i.e. introducing common challenges and risks). Therefore, it is significant to capture different views and frame them into a single framework to boost infrastructure investment geared toward reducing demand and bridging the infrastructure investment gap. The primary goal of the framework is to inform and guide the continued development and scaling up of infrastructure investment within EMs.

Figure 7.4 presents a comprehensive PEIF investment conceptual framework setting out the roles of the three aforementioned participants and their internal and external procedures for creating a more effective investment landscape for EM infrastructure. The PEIF investment framework also incorporates further detailed analyses divided into **Four different levels**: 1) Global Challenges; 2) Country challenges (macro risks);

3) Sector challenges (micro risks); and 4) Project challenges. It is worth highlighting that EM government and global private investors **have their own assessment performance** pertaining to infrastructure investment. The interpretation of the implications of each internal, external assessments, and different levels of challenges/risks to infrastructure and investment in EIMs are explored within the context of key players in PEIF investment within EMs.

Prior to a comprehensive interpretation of the PEIF investment framework with EIMs, it should be noted that, in the context of global private investors and fund managers, this stage of the process focused on when they had made the decision to invest in EMs (i.e. a diversified investment portfolio, including the EM geographical area). Thus, the current conceptual PEIF framework is based on the decision of global investors to invest in EMs rather than any preliminary steps to explore opportunities in other markets, i.e. selecting the geographical allocation for potential investment in emerging countries, developing countries, or the rest of the world.

1- Global private investors and fund managers

Beginning with the **standpoint of global private investors and fund managers**, based on the data from the empirical analysis in Chapter Six (Section 6.6, Figure 6.19-Global Private Investors and Fund Managers Assessment Criteria for PEIF Investment in EM), it appears they conduct in-depth assessments to address all aspects pertaining to targeting their investment portfolio toward the EM geographical area in depth. Indeed, a significant finding from this research demonstrates two primary assessment tools; a formal internal evaluation assessment for investors and an external EM assessment. The assessment of global private investors perspective associated to respond to Key Q.3 (Which regions/countries in EIM are the majority of global institutional investors choosing to invest?). In the opinion of Gompers et al. (2016) the infrastructure investment assessment process is considered an interactive procedure as some actions occur simultaneously rather than sequentially. Formal **internal evaluation** relies principally on investment policy statements, and determining the level of value to be pursued. In addition, internal investors' assessment indicates investment fund strategy and policies as directed towards infrastructure projects in EM and capacity to meet company investment strategy criteria. This finding is supported by Conway (2011) and Sheth (2011) who asserted that global investors and fund managers have a range of alternative funds strategies they can employ when making **investment decisions**, namely an approach that involves investing in funds in EMs, in which the selection of a particular **EM country is crucial**; or one that involves investing in a region’s or individual country’s funds. Moreover, this is characterized by an ability to deliver an extensive range of benefits, to yield lower rates of risk, as well as improved risk adjustment.

It should be noted that the initiative for internal investment decisions tend to be dynamic, being dependant on the type of investors and fund managers (i.e. sector specific investors or diversified sector investors (i.e. answered key research Key Q.2 What types of infrastructure deals tend to be targeted by global PE institutional investors in EIMs? And Key Q.4 Which are the most targeted infrastructure project styles within EIMs?). In addition, the internal assessment decision process lacks any specific approach, being at times oriented toward the country level (i.e. country led), and at other times based on projects that are opportunity led (i.e. a specific project). In the context of EM, these investors generally evaluate a number of aspects, including the potential for economic growth. One such example is Brazil, which is projected to experience rapid growth, so offering a considerable opportunity for global investors. Other investors tend to focus on sector specific investment, such as the recent concentration on investing in renewable energy assets, thus, being driven by the opportunity to invest in specific projects.

From an **Objective and Risks appetite (i.e. risk level)** perspective, as interpreted in chapter six (Section 6.8), the risk profiles of EM countries are determined according to further in-depth evaluation processes. In addition, the conceptual PEIF investment Framework within EIM signifies global private investors’ and fund managers’ concerns into macro and micro risks levels, and project risks levels, which are connected significantly to EM government behaviours. Therefore, interpretations of these country’s levels of risk are explored below (Challenges, difficulties, barriers and EIM risks part). However, it should be noted that the developed framework is flexible and adaptable, due to global investors and fund managers tending to demonstrate different risk return profiles or expectations toward investment in EMs.

In closing, **Investment Portfolio** views toward EM are subject to global institutional investors' investment strategy, which vary significantly across EM countries. The results support the view of Della Croce and Yearmo (2013), which note that infrastructure asset allocation is impacted by various elements and factors (e.g. market trends, investment policy, EM macro risks, investors risks appetite, government structure (e.g. stability and governance around planning and regulation), and quality of the assets).

It is worth highlighting that the conceptual framework currently proposed has some limitations in terms of **global investors**. Firstly, the framework provides a holistic overview of the role of global investors in terms of the PEIF investment process in EM, and addresses the main challenges, concerns and barriers affecting infrastructure investments in EIM decision making, and in structuring the investment portfolio. Therefore, the comprehensive investment decision process has been excluded from the proposed framework (i.e. starting from the point of they have decided to invest in EMs).Secondly, infrastructure **investment vehicles** are diversified and varied, as interpreted in research by Della Croce and Paula (2015) and OECD (2015) (i.e. Taxonomy of instruments and vehicles for infrastructure financing). Furthermore, private global institutional investors and fund managers have developed their own investment funds and financing strategy (i.e. investment policy). Therefore, this framework contains a flexible and adaptive strategy for diverse global investors and fund managers. This is due to the evolving nature of investment strategies, while investors' mandates tend to be bespoke and diverse from their peers. Additionally, there is ongoing debate between academic researchers and professionals regarding the most suitable vehicle for global PE investors to employ in order to gain exposure to EM infrastructures (Tyson, 2014; Bernstein et al., 2017; Fang et al., 2018).

2- EM governments

Similar to the global private participants, EM governments play major role in the PEIF investment process, serving as a foundation for facilitating investment (i.e. respond to Sub-Q. 3 How infrastructure investment can be supported and implemented in Emerging Infrastructure Markets?). The research findings are consistent with the work of Marcelo et al. (2016) and Bielenberg et al. (2020) (i.e. government decision making for infrastructure framework), which confirmed that governments need to conduct a number of specific phases/stages to attract global private investors and fund managers and customise a friendly investment environment to secure value for their projects (i.e. address infrastructure needs and prioritise them into an 'investable' projects pipelines). According to Bielenberg et al. (2020) the framework comprises four steps: 1) develop infrastructure projects with tangible benefits; 2) enhance the coordination of infrastructure investment with supported local networks; 3) engage all local parties (i.e. local stakeholders and authorities); and 4) provide support for investors. Consequently, the conceptual PEIF investment Framework within EIM provides further insight as the EM government role comprises two phases: Phase One relates to the provision of the project pipeline and is interpreted below. Phase Two indicates the creation of an infrastructure investment friendly environment, which is considered at country risk level and divided into three levels; macro and micro risks levels (challenges), and project risks levels (Challenges), which correlate to the global private investors and fund managers concerns about assessing EMs and structuring their investment vehicle profile. Therefore, the interpretation of these country's level of risk is explored below (challenges, difficulties, barriers and EIM risks part) in reference to reputation.

Project pipeline

The research findings recognized that EM experienced an increase in demand for infrastructure services, widening the infrastructure funding gap. Therefore, it is critical for EM governments to apply in-depth assessment processes when **forecasting** the needs for infrastructure assets using data demand and analysis (as highlighted in chapter 6, see Figure 6.20-Procedures to Boost PEIF Investment in EIMs). Followed by **prioritizing** these capital public assets to assure they are adequately identified and hold the highest projected value (Poole et al., 2014; Duvall et al., 2015B; Marcelo et.

al, 2016). In particular, the first stage guarantees that infrastructure projects generate measurable benefits (i.e. infrastructure project pipelines phase). In addition, the analysis supports the opinions of Shahzada et al. (2018) and Branchoux et al. (2018), which suggest that it is vital for policy makers and governments to consider all aspects of challenges (i.e. socio-economic development and climate change, which is interpreted as lateral), to establish both short- and long-term strategies and policies. This phase is at the root of the PEIF investment process, due to the high probability of negative issues arising impacted by global investors and investment assets, and comprising a lack of projects magnate global investors and fund managers, miscalculating the requirement for infrastructure assets (i.e. failure to predict an infrastructure project) after a considerable period has elapsed (i.e. after sign the contract), with associated potential for political corruption risks (i.e. interfere and power risks).

Furthermore, EM government development levels are varied and needs for infrastructure are various (e.g. Brazil has transport sector investment needs whereas South Africa requires investment in the energy sectors). In addition, a considerable number of EM countries are characterized by lack of the necessary knowledge, skills and experience to forecast demand for infrastructure assets and prepare national infrastructure programmes to introduce and launch these for global private sectors and fund managers. Therefore, as highlighted earlier (Section 7.2), international professional advisers institutions are considered among the key potential participants in the PEIF investment process, and play an important role in accessing a more rigorous structured approach through their association with EM governments, prior to launching infrastructure projects (i.e. Sub-Q.4 What are the infrastructure investment market components that facilitate financial channels?).

3- Challenges, difficulties, barriers and EIM risks

The research findings concentrate on identifying the various challenges, difficulties, barriers, and other considerations that affect PEIF investment within EM geographical areas . They draw on the literature review (Chapter Two and Three), and consider the persistent growth in current **global challenges** and factors contributing to increased delivery of complex and multifaceted infrastructure assets (World Bank, 2012). Indeed, a number of dimensions have a significant impact on infrastructure investment, such as global financial market regulations. For example, Basel III regulations and Solvency II rules have negatively influenced infrastructure investment, imposing additional risks on infrastructure assets over the life-cycle for banks (Hellowell and Vecchi, 2012; Persaud, 2015).

Furthermore, there is pressure being placed on EM governments to emphasise investment in infrastructure assets to demonstrate they are competent to provide environmental benefits (i.e. ESG criteria to meet SDGs Agenda) and guarantee social-economic value (Calderon and Servén, 2010 and Estache et al., 2015; Clark et al., 2018; Sun and Cui, 2018B). This results in a requirement for additional infrastructure investment. Indeed, socio-economic growth is driving the expansion of infrastructure provision across EM countries. There is evidence of the significance of socio-economic development relative to infrastructure investment (World Bank, 2012; McDonald, 2017)). Similarly, the empirical analysis reaffirmed and emphasised that global investors and fund managers consider ESG criteria in their investment portfolio when addressing EIM, particularly addressing the role of investment in the renewable energy sector (Section 5.3.3 Renewable Energy Sector Deals level in EIM and Section 6.5.3 Key consideration in PEIF investment in EIMs).

As highlighted previously, the PEIF investment framework within EIM identified **Three different internal EM challenges and/or risk levels comprising of**: 1) Country Challenges (macro risks); 2) Sector Challenges (micro risks); and 3) Project Challenges (as highlighted in chapter 6, See Figure 6.8-Various Form of PEIF Challenges and Difficulties in EMs). These common challenges have a strong nexus between the two major parties; global private investors and EM governments. In addition, recognizing various EM challenges and/or risks contributes to answered research Sub-Q. 3 (How infrastructure investment can be supported and implemented in Emerging Infrastructure Markets?) and Sub-Q.4 (What are the infrastructure investment market components that facilitate financial channels?). Therefore, this interpretation can be broken down to address the two perspectives affecting these various challenges as explored below.

3.1 Global Institutional Investors and fund managers Perspective: Internal EM Countries Risks Assessment

A number of challenges and barriers persist to the upscaling of global private investors and fund managers in EM infrastructure. Identifying the challenges and barriers Country Challenges (macro risks) level responds to research sub-Q.5 (What are the factors which influence the ability of Emerging Infrastructure Markets to finance the infrastructure they need to develop?) and Sub-Q.6 (What role does procurement and delivering projects plays in attracting infrastructure investment?). Therefore, comprehensive assessment of the various dimensions linked to investment in EMs are required. These dimensions are explored below.

Country Challenges (macro risks) level

Considerations such as macro-level instability are primary factors (i.e. challenges/risks) that make investing in EIMs difficult. Indeed, there are huge concerns raised by global institutional investors who experience diverse forms of political and financial challenges/risk. **Political instability** assessments encompass a number of dimensions: transparency level, instability associated with government risk, corruption level, political power and influence, and level of political support. Similarly, the significance of financial and funding aspects has a significant influence on infrastructure investment profiles in EM. **Financial risk** is especially complex and more widely related to investment fund strategies in EM countries/regions. EM financial risk includes factors such as the level of development of financial markets; currency risk fluctuations; and the bankability of infrastructure projects that investors are looking for (i.e. secure their return); credit rating risks are critical; as is the level of any inflation Hedge. The fundings support the view of Blanc-Brude and Tran (2019), who suggest that financial risks (i.e. illiquidity, credit risks, and revenue streams) have a significant influence on infrastructure investment in EIM. Moreover, the results support the views expressed elsewhere in scholarly research and professional reports regarding the fact that political and financial challenges lead to an increased risk when investing in emerging countries (Inderst and Stewart, 2014; Percoco, 2014; and Osei-Kyei and Chan, 2017; KPMG, 2020).

Another form of challenge/risk which significantly influences global investors and fund managers' investment decisions is the **regulatory and policy environment**. Rule of law, and the country's legal frameworks including the ability to enforce security from secured assets (i.e. have courts supporting the regulatory framework), forms of contracts, and the ability to exit infrastructure asset expropriation. In addition, there are also specific challenges, including a lack of effective government; high levels of inconsistency in policy making, and the number of risks in the overall environment (Tiryaki and dos Santos, 2017; KPMG, 2020; OECD, 2020). All these aspects are positioned as critical concerns that impact on global investors' potential to invest in EM. Indeed, this analysis underpins the recent empirical research conducted by Wang et al. (2019) that demonstrates the indicators of government efficiency and the quality of regulatory as one of the reasons behind the failure to attract private investors and fund managers.

Another critical factor hindering investment is the inherent volatility that affects economic conditions (Gubbi et al., 2010; Gaur et al., 2014). The findings of the analysis demonstrated that a further consideration for global investors relates to how the situation and **economic environment** changes in the context of EIMs. In addition, concerns surrounding economic instability and economic regulation are critical for global investor's investment portfolio decisions. Empirical evidence suggests the higher the economic instability, the lower the investment in EIMs (Percoco, 2014; Rahman et al., 2015; Osei-Kyei and Chan, 2017; Boffo and Patalano, 2020).

Therefore, due to macro level instability, action has been taken to discourage investment in infrastructure in EM, and the value of assets has been weakened relative to returns on investment, which has become completely a matter of chance. Indeed, additional concerns for many global investors and fund managers concern the best way to approach to EMs or to fully evaluate and select investment opportunities that conform to the risk-return threshold (Buckley et al., 2010; Anderson and Sutherland, 2015; KPMG, 2020).

Sector Challenges (micro-risks) level

Macro-challenges/risks not only influence infrastructure investments, although the empirical assessment provides evidence that sector risks are considered a primary concern that plays a significant role in EM infrastructure investment assessment procedures. Indeed, searching for an accessible market supporting a new deal is a critical component of the investment profile. Therefore, a number of elements have been cited at sector/market level that concern global private investors and fund managers in the second phase of their empirical assessment, and encompass: Availability of resources: the size of the market and opportunity available; size of the project; sector regulation; quality of the project (meet demands); market development and logistics elements; and track record for other projects.

For instance, the quality of the project (meet demands) is considered a major issues for global investors and fund managers, because it is highly correlated with revenue stream (Estache and Strong, 2016). Meanwhile, challenges associated with Market Development and Logistics elements support the view of UNCTAD (2019A) and World Bank (2020) that shipping in some areas of the world is expensive and some ports in the EIM geographical area are the lowest of any EM region (e.g. Africa region). Consequently, this negatively affects overall investment and specific project returns.

Project Challenges (micro-risks) level

The final level of PEIF investment in the conceptual framework pertains to the concerns of global institutional investors and fund managers surrounding a specific project. In particular, specific project challenges involve two aspects; the delivery process (i.e. construction process), and maintenance (i.e. operation process). Indeed, a variety of empirical studies (Schwartz et al., 2014; Estache and Strong, 2016; Whitehelm, 2018) and the output of the empirical study confirmed this. In terms of the **construction process**, major risks can delay execution and commencement and increase the total cost of projects. For example, construction cost overruns, due to the increase in material and labour, the capabilities of contractors (i.e. experience and knowledge); and environmental issues and land risk (Estache and Strong, 2016; Whitehelm, 2018).

Meanwhile, the **operation and maintenance process** for infrastructure projects also presents a number of risks, as represented by technology risks, and revenue risks (Estache and Strong, 2016). While Whitehelm (2018) emphasised that operations can be expensive (opex), particularly in greenfield projects, as supply chain management had a significant impact on operational cost.

3.2 EM government Perspective: Infrastructure Investment environment

Alongside the provision of the projects pipeline, EM governments, and the authorities and entities that are involved in PEIF investment are responsible for creating a friendly investment environment and facilitating the investment process in a number of ways. Indeed, a stable and secure investment environment is a significant prerequisite for attracting global investors (OECD, 2020). Therefore, drawing upon theoretical analysis as confirmed by empirical assessment output, a number of significant elements were identified as essential to secure and stabilize investment environments. These comprise infrastructure investment frameworks and strengthened financial platforms (Poole et al., 2014; OECD, 2015C and 2020). In the context of **infrastructure investment frameworks**, these encompass at the macro level (i.e. **government level**): a stable political environment; stable economic situation and regulations; stable regulatory and policy framework environment; and clear and transparent procedures for procurements, and tendering processes, as well as a stable financial environment (i.e. security of investments). At the micro level (i.e. sectors and projects levels), stabilised sector governance and regulation is a critical issue for the PEIF investment conceptual framework in EM. Similarly, EM government countries across various entities are expected to facilitate construction mechanisms and support the execution process by structuring and regulating planning and construction procedures for global investors and construction companies. Indeed, it is vital for global private investors and fund managers to structure EM government procedures and identify their role in the infrastructure investment mechanism clearly (OECD, 2015C, 2020). As exhibited in Figure 7.4, these aspects are of great concern to global institutional investors, who are reluctant to deploy their financial capital for infrastructure projects when they doubt there will be adequate returns and benefits.

Moreover, in terms of **strengthening the financial platform** in EM, as highlighted previously (See 3.1 global Institutional Investors and fund managers Perspective:

Internal EM Countries Risks Assessment in the current section), political and financial challenges/risks are strong correlated; therefore, EM governments need to secure infrastructure investment and **provide guarantees** for global investors to counter the negative impact of political instability. This finding underpins the opinions of Whitehelm (2018) and Hussain et al. (2019) that governments have the opportunity to partially mitigate investment risk by providing guarantees (e.g. liquidity backstop). Further governments support in collaboration with International investment banks, financial intermediaries and MDBs is also explored laterally.

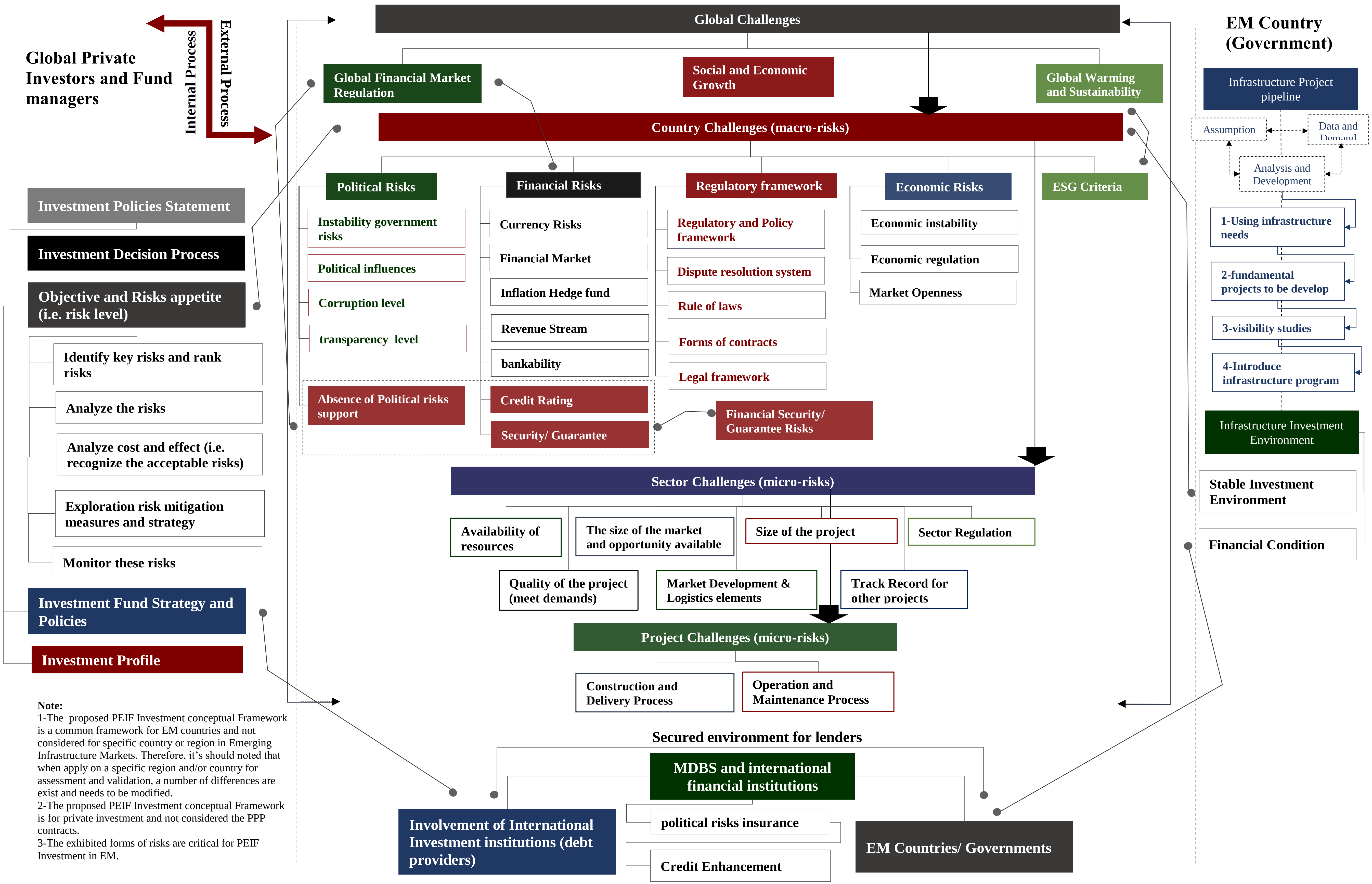
In addition, a considerable number of EM countries have been characterised by lack of knowledge, as well as the essential experience and skills to regulate the infrastructure investment environment across different entities and authorities to ensure compatibility with the national infrastructure programme. As highlighted previously (Section 7.2), international advisors are considered among the potential participants in the PEIF investment process (e.g. the World Bank has IFC subsidies, which offer access to advisors that EM governments can associate with). These advisors might play an important role as a result of their association with EM governments, as they apply a more rigorous structured approach to the environment before launching infrastructure projects and requesting private capital to enter particular markets.

4- <u>MDBs and International financial institutions</u>

The conceptual PEIF investment Framework within EIM signifies the role of Multilateral Development Banks (MDBs) and international investment banks in the infrastructure investment process in EIM, based on the massive amounts of professional research and empirical works that highlights that significance role of MDBs and international investment banks in (1) bridging the funding gap in cross-border infrastructure projects, by funding large infrastructure and other development projects; (2) influencing sustainable and environmental infrastructure policy and regulation, by supplying loans connected to policy redress by public sector/governments; (3) influencing procurement procedures; (4) reducing government and market failure; and (5) providing risk-free guarantees for private sector investors (Ray, 2015; UNCTAD, 2017; Nelson, 2018; Bhattacharya et al., 2018; OECD, 2018D). Meanwhile, the most critical role of MDBs in the context of EMDC is to manage their financial contributions by removing key obstacles to the application and financing of sustainable infrastructure projects (Bhattacharya et al., 2016A/B). Indeed, the evidence presented in the quantitative empirical analysis, concerning the examined period (Q1-2009-Q4-2019) revealed a noticeable emphasis on sustainability when structuring infrastructure deals and a significant contribution when providing loans for other deals in EM. For instance, in 2018, a greenfield project in Egypt related to the Tahrir Petrochemicals Complex, was valued at USD 10,900 million, with a total transactional debt of USD 4,650 million (representing 42.6% of the total investment) from four debt providers: 1) Africa Finance Corporation (an investment bank); 2) the US Export-Import Bank and the Export-Import Bank of Korea; 3) a Korean Insurance Corporation; and 4) the Italian Export Credit Agency, which acted as custodian. Similarly, another asset of significant financial value secured debt from the International Bank for Reconstruction and Development (IBRD); the Medupi Power Plant, acquired loans valued at USD 3,050 million and was invested in by Eskom Holdings SOC Ltd. (a local electric utility company).

On the other hand, the outcomes of the qualitative empirical analysis depict three major elements with a significant negative potential impact, political instability (e.g. Political influence), regulatory and policy frameworks (e.g. contract expropriation) associated with financial risks (e.g. currency convertibility, credit rating risks). These are subject to investors' concerns regarding failure to secure investment or offer adequate protection (i.e. guarantee). This has resulted in global private investors and other financial institutions being overly cautious when investing private capital in EMs. Consequently, it is vital to seek out additional tools present in the market that could mitigate risks and support their infrastructure investment in EIM in the different forms. Various arrangements at the government level can secure investments, such as by offering insurance related to risk received from different entities. For example, MIGA-PRI (Multilateral Investment Guarantee Agency-political risks insurance), is a World Bank Program delivering political risk insurance as a back-stop to shore up the obligations of states towards infrastructure investment. Indeed, the **MIGA-PRI**, is the most recognized, providing coverage against a number of elements; political, social unrest, expropriation, and exchange, transfer restrictions (Estache and Strong, 2016).

Figure 7.4 -Proposed Conceptual PEIF Investment Framework in EM



Source: Author's own analysis

7.4 Overall Impact of PEIF Investment in EM's Development

As highlighted earlier, the PEIF investment process is a complex and multifaceted mechanism, specifically in EM, which involves a variety of key players (majors and potentials). In addition, this fits with the previous discussion concerning the comprehensive assessment of the PEIF investment conceptual framework in EM. Consequently, it is vital to provide an overview of the potential impact of the PEIF investment conceptual framework within EM. Accordingly answered research Sub-Q.1 (What is the impact of global investment to underpin development outcomes (economy, investment and infrastructure) in Emerging Infrastructure Markets?) and Sub-Q.6 (What role does procurement and delivering projects plays in attracting infrastructure investment?). Figure 7.5 introduced the last segment of PEIF investment conceptual framework in EM, providing an outline of the overall influence of PEIF investment in EM development.

The paradigm begins by introducing EM governments to attractive infrastructure project pipelines. When drawing on the theoretical perspective and outcomes from empirical analysis, it is possible to structure a solid **national infrastructure programme** that is agreed and supported by all local parties, and able to generate positives outcomes. A growing body of evidence has begun to highlight the existence of various measurements that result in benefits. Indeed, Marcelo et al. (2016) and Bielenberg et al. (2020) agreed to selection criteria for infrastructure projects from an EM government perspective. This is critical as a means to capture the significant costs and anticipated influence of the project. Similarly, this will assist in developing the prioritised progress objectives for the overall sector and the country. Consequently, this offers the bankability infrastructure assets raising the appetites of global private institutional investors and fund managers to target EM as part of their investment vehicle portfolio.

Simultaneously, the **infrastructure investment environment** is a critical element in overall PEIF investment frameworks, as is the fact that governments improved regulations and policies regarding global private investors in EIM could attract them. Indeed, as highlighted previously, the evidence in the empirical analysis concerns EM countries' governments' attempts to demonstrate discipline in association with multilateral organisations, and to create projects that influence infrastructure assets, in the process rectifying their regulatory framework to support investment procedures (Qureshi, 2017). In addition, numerous factors with significant potential influence have been introduced, such as the involvement of MDBs in the financing of infrastructure projects in EMDCs or guarantees for investors, as well as the reduction of barriers to foreign capital flows (Griffith-Jones and Leistner, 2018; Bhattacharya et al., 2018). Consequently, a significant quantity of global private capital is available to deploy to these markets and entice global investors to invest in these infrastructure projects.

Accordingly, the enhancement and simulation results significantly impact EM development, as apparent from three measurements: EM country infrastructure assets' development; growth of the investment market; and the development and growth of the country's economy, as presented in Figure 7.5.

In the context of **Infrastructure Development,** infrastructure can affect output in aggregate terms in two key conceptual forms. Firstly, by considering the contribution of the sector and any additional input with regard to the process of production pertaining to other sectors, and also indirectly, with regard to the productivity of the sector in terms of transaction reduction (Murdiyarso, 2015). This lowers costs and permits greater efficiency in terms of production inputs. Infrastructure can also be considered in terms of factors that complement and enhance economic growth (Bouwmeester and Scholtens, 2017). Indeed, a recent study by OECD (2020) reaffirmed that, executing basic infrastructure projects (i.e. provision and investing) delivers significant additional opportunities to unlock further investments projects.

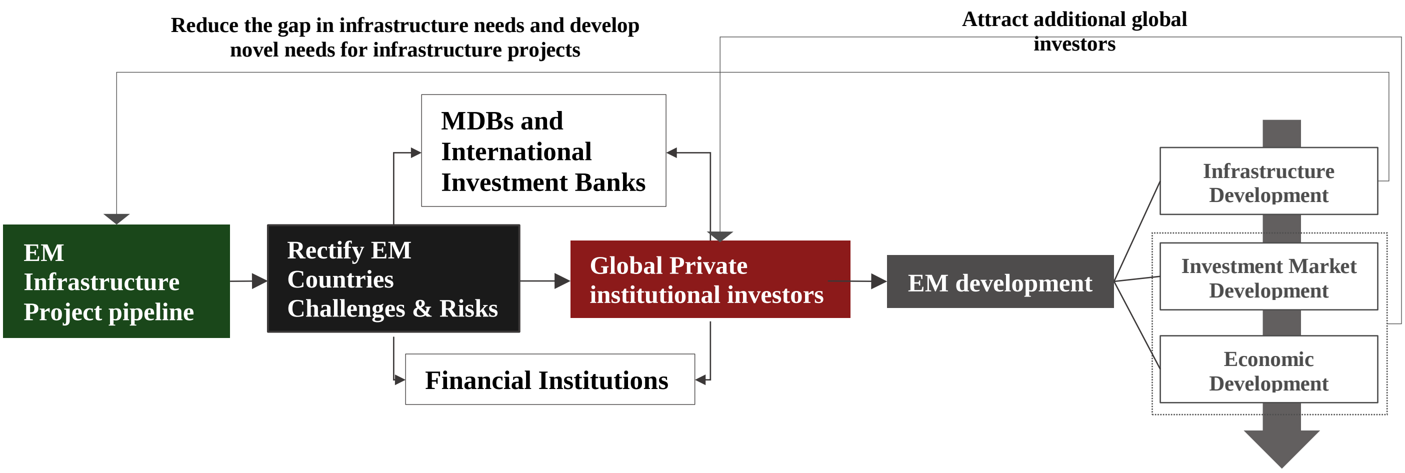
A significant body of evidence highlights that economic infrastructure investment promotes the development and increased efficiency and profitability of infrastructure industry (Ansar et al., 2016); this in turn attracts global private investors and fund managers to deploy capital in those markets, ultimately having a significant influence on overall **investment market development**. Particularly, in the context of capital market developments, Laeven (2014) and Ray (2015), observed that the development impacts positively on the infrastructure investment process, namely: (1) enhanced access to long interval loans (i.e. up to 85% of project costs); and (2) running maturity risk and interest rates associated with long-periods of investment in infrastructure.

Consequently, positively impacting on eventual economic growth (Momoh and Ezike, 2018).

Indeed, access to infrastructure has a significant influence on both levels of private investment and the overall **growth of the economy** (Leviäkangas et al., 2016; McDonald, 2017; Henckel and McKibbin, 2017). Moreover, **development and progress in the economy** represents an opportunity for both the local private sector (i.e. business development) and global private investors (i.e. attract more investors to enter the market in the future). This view is supported by a recent report from the OECD (2020), which suggests EMs have a high potential for economic development and growth.

In closing, two positive outcomes were generated using the PEIF investment framework. Firstly, in relation to **infrastructure development**, infrastructure demands provided the necessary public services in EM (i.e. economic infrastructure projects) reducing the funding gap and infrastructure needs, and identifying the new requirements of infrastructure services according to the development of particular occurrences. Secondly, development in investment markets and economic growth sets the platform and paves the way for new entrants, and attracts other investors to enter the market and participate in additional infrastructure projects.

Figure 7.5 -Overall PEIF Investment Framework in EM



Source: Author’s own analysis

7.5 Conclusion

The findings from the current research (i.e. theoretically and empirically assessment outputs) contribute significantly to realising the aim and final research objective (i.e. the development of a conceptual PEIF investment framework within EM). PEIF investment framework clearly met by the literature review and research key and sub-questions. The key components of the proposed conceptual framework comprise three main parts: key players and potential actors in the infrastructure investment mechanism; the two primary perspectives towards infrastructure investment explored in depth (i.e. detailed assessment for global investors choosing to invest in EM, and EM government procedures designed to increase infrastructure investment rates), and finally the overall benefits and returns for EM countries.

In the context of recognizing the key roles of major and potential participants in the PEIF investment process (i.e. respond to the research Key question no.1,and sub-question no.3), four primary groups are involved in the PEIF investment procedure in EM, and comprise: 1) Global investors, 2) EM governments, 3) MDBs and International Investment Banks, and 4) Professional advisors' institutions. The nexus between them depends on various elements and measurements, such as EM geographical allocation, the infrastructure investment environment (i.e. form and risks levels), the infrastructure project description (i.e. scale and type of sector investment).

Meanwhile, the PEIF investment conceptual framework in EM was developed in a such a way that it captures the perspective of three majors keys players (i.e. global investors, EM governments, and financial intermediates (e.g. MDBs and international investment banks) regarding their different positions standings and the various challenges and barriers they encounter. In addition, the framework highlights the connections and addresses common concerns that arise between triangulated players (i.e. introduces common challenges and risks). This underpin to answer Key research questions no.2, 3, and 4, and sub-questions no. 3, 4, 5, and 6. The research finding supports the impression provided by KPMG (2020), both in terms of political, economic, and financial risks (i.e. funding and financing risks), also requiring in-depth assessment (sophisticated analytical) for both parties (i.e. EM governments and global private investors) to secure investment and achieve goals.

The final component of the PEIF investment conceptual framework in EM relates to the overall overview of the potential impact of PEIF investment as a conceptual framework in EM (i.e. answered research sub-questions 1, 3, and 6). Despite this, strengthening the PEIF investment agenda in EM is broad in scope and subject to EM country considerations. However, two crucial elements stand out; i.e. developing and delivering a solid infrastructure project pipeline, and enhancing the infrastructure investment environment (i.e. rectifying regulatory frameworks and reducing instability risks). Accordingly, the results impact significantly on EM country's development relative to three measurements: EM country infrastructure assets development; growth in the investment market; and the development and growth of the country's economy.

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Chapter Eight: Conclusions

8.0 Conclusions

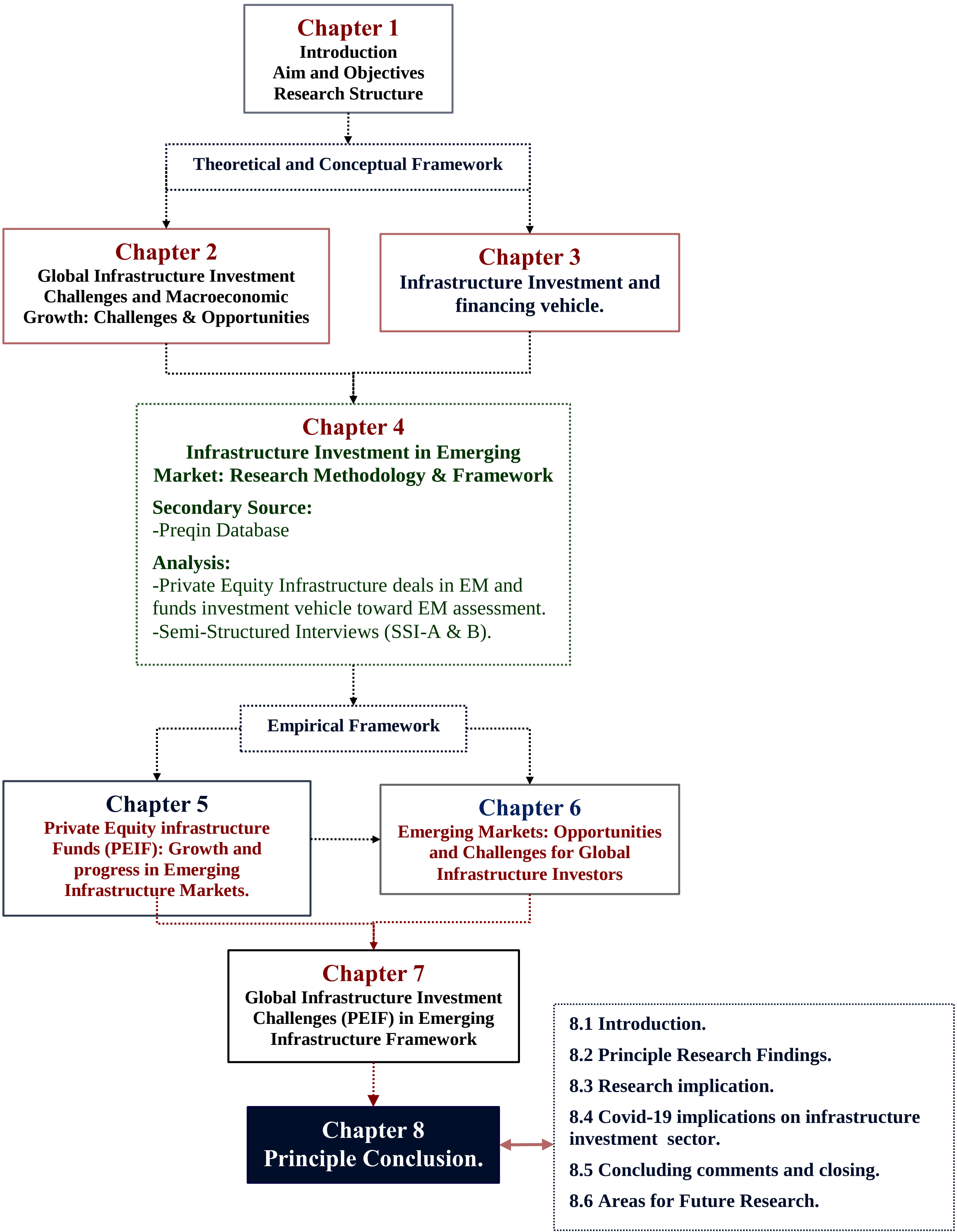
8.1 Introduction

The final phase of the study (Chapter Eight) summarises the research findings concerning the implications of challenges and the difficulties of PEIF investment within EM. The chapter is designed to mirror the overall research aims and objectives (Figure 8.1). The conclusions reflect an array of research phases, including introductory and background research (Chapter One), a critical review of the all aspects of the literature (Chapters Two and Three), the methodological framework design (Chapter Four), the empirical analysis (Chapter Five and Six), and the conceptual frameworks emanating from the theoretical and empirical overviews (Chapter Seven).

A key contribution of the assessment is to afford a fresh insight into the area of private equity infrastructure funds investment in EMs, acknowledging global challenges and inherent internal barriers that impact on infrastructure investment in EIMs. The timeliness of the study is significant when examining the issue of investment deals, including deal profiling in EMs and country's preferences, and types of asset involved. In addition, the reserach examined infrastructure investment vehicles, including the strategy applied to define PE infrastructure investment in EM. The research highlights international challenges and factors currently influencing PE investment flows into infrastructure projects within Emerging Infrastructure Markets, the drivers behind the increased scale of infrastructure needs and the financing gap in EMs, and approaches to boosting the level of infrastructure investment to bridge the infrastructure investment gap.

The chapter begins by presenting the principal research findings (Section **8.2**) and highlights the extent of PEIF investment in EM, including identifying challenges, difficulties and barriers, and their implications in EMs. Section **8.3** presents knowledge contributions detailed in the existing study by outlining the implications emanating from the research for developing and improving the scale of infrastructure investment within EM. Section **8.4** highlights COVID-19 potentially impact on the infrastructure investment sector in the future. Section **8.5** presents concluding comments and closing thoughts, followed by recommendations for areas of potential future research in Section **8.6**.

Figure 8.1-Structural Context of Chapter Eight



8.2 Principal Research Findings

The study presents infrastructure investment as a key driver of regional growth, offering a number of positive outcomes in terms of both societal advancement and economic productivity (Section 1.1). However, a number of key issues are recognised as surrounding infrastructure investment from a global perspective, in addition to the salient features and challenges that impact global investors' motivation to engage in direct infrastructure investment in EM. Insight into critical global drivers and challenges facing infrastructure investment afforded a useful foundation for this research and contributed to the achievement of research objective one (Figure 2.1).

Sub-Q.1 *What is the impact of global investment to underpin development outcomes (economy, investment and infrastructure) in Emerging Infrastructure Markets?*

The findings presented in the literature review drew together voluminous infrastructure investment challenges. In addition to the continual growth of global forces (i.e. global warming and climate change, demographic shifts, and socio-economic development) (Section 2.5). The research explored the considerable scale of the issues facing global infrastructure investment, identifying the persistent growth in existing global challenges, including the additional delivery of multifaceted and complex infrastructure assets, particularly in EIMs (Section 2.6).

Sub-Q.2 *Why the infrastructure gap is persisting? Regardless of availability of different options of financial resources?*

The research answered sub-question Two and identified adverse impact and extenuation of the infrastructure investment gap as having arisen from insufficient identification sustained underinvestment in infrastructure assets. (Section 2.4). Thus, the level of required global investment involving infrastructure, such as power, transportation, telecoms systems and water (reportedly around $2.5 trillion annually) currently falls short of the estimated amount (reportedly around $3.3 trillion annually) required to support economic growth over the next twenty years, with EIMs' shares resulting in an annual increase in infrastructure spending of approximately USD 1.8-2.3 trillion by 2030 (Section 2.6.3). The discussion highlights the challenges surrounding economic and political instability, and the level of risk associated with infrastructure deals, and the difficulties and complexities inherent in uncertain regulation frameworks and legal environments within EIMs, including the risk of requisition (Section 2.6.5).

Sub-Q.3 *How infrastructure investment can be supported and implemented in Emerging Infrastructure Markets?*

Developing another perspective that significantly influences infrastructure investment, namely the portfolio assets associated with EMs. The research demonstrated the emergence of a wide-range of investment vehicles and financial instruments (Section 3.4), contributing to the achievement of the first objective in the current research (Figure 3.1). The discussion highlights PE infrastructure investment as being the most recognisable vehicle, capable of accessing core economic infrastructures, particularly in the context of EMs (i.e. answered research sub-question Three). Therefore, the assessment delivered the fundamental concept and development of unlisted private equity infrastructure funds (UPEIF) and the drivers behind approaches to this form of investment in EIMs (Section 3.7). However, despite the infrastructure investment having been observed as risky in EM, global institutional investors tended to seek infrastructure investment in EIMs a way from the developed markets. (i.e. diversified investment portfolio include EM geographical area).

Sub-Q.4 *What are the infrastructure investment market components that facilitate financial channels?*

The research identified several factors that have hindered and limited global infrastructure and institutional investors from investing in EIMs. Moreover, capital intensive assets are associated with high transaction costs often with distinctive financing arrangements and, procedures needed to ensure their status ‘bankable’ assets. The J-curve is deeper in EIM, with investors required to tolerate this for several years as part of captive investment funds, and infrastructure being characterised by long-period loans and financing, and difficulties turning portfolios into cash flows. Due to the fact that PE funds illustrate negative returns during the preliminary years of investment, when costs related to start-up and fees occur, as well as planning for an investment strategy plans (i.e. the J-curve effect) and depicting the pattern of return PE investors can anticipate across the life-span of PE funds (i.e. from expectation to completion).

In addition, these factors augment the platform's level of risk, and increase the infrastructure investment gap in EIM, as compared to that in other economies. The research analysis identified additional investment and financing challenges in EIMs comprising the absence of a framework to ensure sustainable financial funding to address the infrastructure requirements of countries. EM are characterized by vulnerability to market fluctuations, and lack of effective infrastructure, and several other challenges that meet funding requirements integrated and linked to laws, regulations and policies developed in EM countries (Section 3.5).

In terms of research objective three, the analysis revealed EMs are currently experiencing a significant wave in transformative growth that has prompted progress in PEIF investment across the period addressed. The growth of PEIF investment in EIM over the period analyzed, namely Q1-2009 to Q4-2019, across 23 emerging countries, has been unprecedented, with the aggregate number of infrastructure investment deals in EMs comprising 2,519 infrastructure assets, with a cumulative deal cost of USD 632,116.51 million (Figure 5.2). In addition, 853 infrastructure investment fund vehicles, managed by 405 fund managers, with a cumulative fund size of USD 682,364.83 million, targeting EM, or countries/regions in EIM, from Q1-2006 to Q4-2019 (Figure 5. 16).

In the context of PEIF investment deal flows in EM, the assessment was conducted to answer the following key research question:

Key-Q.2 *What types of infrastructure deals tend to be targeted by global PE institutional investors in EMs?*

Across evaluates the PEIF investment distribution of deal flows and levels in EMs (infrastructure deals profile) in four strands: total deal sizes, sectoral classifications, project stage, and regional assessments, over the period in question; namely Q1-2009 to Q4-2019 (Section 5.2). In the context of the sectoral analysis, the evidence indicated that global investors and fund managers appeared to prefer the transport sector infrastructure industry (54% of the total amount of investment in EM) compared to the energy industry (renewable energy and conventional energy sectors) (42% of the total amount of investment in EM) (Section 5.3). Meanwhile, the strategic position of greenfield assets amid the PEIF investment universe represented the bulk of the investment capital, compared with brownfield assets, accounting for 70% of total deals (Section 5.5).

Moreover, an in-depth assessment of the investment actions and geographical focus of various investors and fund managers in EIM was conducted to answer the following key research question:

Key-Q.3 *Which regions/countries in EM are the majority of global institutional investors choosing to invest?*

The assessment of the level of PEIF investment deals in EIM revealed the magnitude of the infrastructure deals in the Asian, Latin American and Caribbean regions over the period examined notably across all EIM regions, specifically by 52% of the total infrastructure investment deals for the Asian region, and 24% of the total infrastructure investment deals for the Latin American and Caribbean region), followed by three regions at 24% (i.e. European, Middle Eastern, and African regions) (Figure 5.9) (Section 5.4).

Further analysis discussed the general dissemination of PEIF investments within EM geographical regions, and the assessment conducted to answer the following:

Key-Q.4 *Which are the most targeted infrastructure project styles within EMs?*

Alongside the earlier infrastructure deal analysis, infrastructure asset deals were financially secured through three approaches: equity financing, debt tools and underpinned by various MDBs. Furthermore, the investigation explored the distribution of PEIF investment seeking opportunities in EIM (fund vehicle profile) according to four key pillars addressed during the period (Q1-2006 to Q-4-2019): total infrastructure fund exposure (or consideration of investment in EM) (Section 5.6); the funds' geographical target allocation (Section 5.7); the funds' industry focus (Section 5.8); the funds' focus, in terms of primary infrastructure strategies (Section 5.9); and the fund's focus, in terms of the project stage (Section 5.10).

Overall, the assessment revealed the development of infrastructure investment markets had been fuelled by a powerful need to engage global institutional investors and fund managers in EIM. The implication of growth in PEIF investment reflects the large number of opportunities that exist within infrastructure investment markets in EM.

The research evaluates the challenges and difficulties experienced by global institutional investors and fund managers, concerning the amount and scale of PEIF investment in EIM. The outcomes of empirical work were achieved and set out to fulfil objective four of the research (Figure 6.1), and applied to the key research questions answered:

Key-Q.1 *Who have been the key PE investors within EMs?*

The assessment focused on recognising global institutional investors as key players in PEIF in EIMs, targeting key assets and geographical locations when forming infrastructure investment strategies for both greenfield and brownfield projects. The analysis from the Preqin database reveals a total of 263 investors worldwide differentiated their investment and recorded preferences when investing in EMs (i.e. the greatest share belongs to the USA, with 66 investors, 141 investors from varying majorities in Europe comprising 44 investors in Spain, 28 located in France, and 13 headquartered in Italy (Asian investors, and investors from Japan and Singapore accounted for 23 investors and infrastructure firms). However, further assessment was applied to identify the top 20 key players that have concentrated their PEIF investment on specific regions in EMs across the period examined Q1-2009-Q4-2019. The investigation referred to three regions that global investors and fund managers focused their investment upon: 1) Latin America and Caribbean, 2) Africa, and 3) Asia regions (Section 6.6).

***Sub-Q.5** What are the factors which influence the ability of Emerging Infrastructure Markets to finance the infrastructure they need to develop?*

Furthermore, the empirical research was developed to capture the perspectives of two groups of stakeholders; i.e. the professional institutions' philosophical perspective and the global investors' and fund managers' experience regarding the challenges and barriers that prevent global institutional investors and fund managers from investing in infrastructure assets within EM. The analysis explained that the fundamental challenges for EMs are the risk affecting the country specifically (i.e. answered sub-question Five). EMs are inherently at a higher level of risk of, namely: 1) political instability (i.e. corruption of rules and regulations); 2) financial risks (i.e. fiscal pressure); 3) weak government regulations and absence of law; 4) economic volatility; 5) and a low rate of transparency (Section 6.8).

***Sub-Q.6** What role does procurement and delivering projects plays in attracting infrastructure investment?*

In line with the various forms of challenges and risks, the assessment identified two critical aspects: 1) multi-national criteria for global private institutional investors and funds' managers and concerns during the evaluation investment toward EM (i.e. structuring their investment policy and strategy) (Section 6.8); and 2) internal EM governments approaches to boosting the scale of infrastructure investment (Section 6.7.2). These primary insights from key stakeholders contributed partially to achieving research Objective Five and served to inform the conceptual PEIF investment framework to EM countries (Figure 7.1).

The combined findings (i.e. theoretically and empirically assessment outputs) provided the evidence base to enable the accomplishment of the final research objective (i.e. conceptual PEIF investment framework within EM). The key components of the proposed conceptual framework comprise three main parts: identification of key players and potential actors in the infrastructure investment mechanism (Section 7.2); detailed assessment for global investors to invest in EM, and EM government procedures to increase infrastructure investment rates, including the two primary perspectives targeting infrastructure investment (Section 7.3), and finally the overall benefits and returns for the EM country (Section 7.4).

8.3 Research Implication

This current research has developed an in-depth account of the implications of deeply entrenched global investment in infrastructure assets within EM geographical areas. This has generated a number of significant contributions, as discussed below.

Support the upscaling of infrastructure investment in EM

A key implication of the current research concerns the creation of a PEIF investment framework to support the upscaling of infrastructure investment within EMs, employed to inform and guide the continued development infrastructure investment. Furthermore, the framework contributes to establishing a basis of comprehensive knowledge for all actors considering investing in infrastructure assets within EIM. These novel players and actors offer a number of benefits concerning the scale of actual infrastructure needs. Despite the fact that global PEIF institutional investors are leaders in the field of infrastructure investment industry (i.e. key EM players and risk takers), these global institutional investors have been viewed as monopolising EMs. Therefore, the framework has set out platforms to pave the way for **new entrants and** other potential players (i.e. investors) **to enter the market** and enhance their knowledge of investing in EMs.

Furthermore, EM governments are currently facing considerable financial shortfalls and market deficits. Global infrastructure investment in EM can therefore offer a significant opportunity to inject additional sources of finance for infrastructure assets, in particular through the engagement of global private investors and fund managers. It is essential to emphasise that global private participation has recently been viewed as a potential mechanism for the provision of infrastructure services to boost the global agenda and bridge the gap in the demand for infrastructure.

Infrastructure Investment in EM: Challenges, Barriers, and Difficulties

The above discussion highlights the need for the PEIF investment framework to provide an in-depth insight into EIM, including its inherent challenges, i.e. political risks with long term implications. In addition, the framework informs the investment community of the complexities, challenges, barriers, and difficulties to be considered when investing in infrastructure assets in EMs. Thus, the framework contributes transparency to investment procedures through the identification of the challenges and obstacles for investors impacting on PEIF and negatively influencing their geographical and sectoral asset allocation in EIM.

Furthermore, the PEIF investment framework focuses on potential investors, facilitating their investment by showcasing the relevant vehicles and platforms. Moreover, promoting understanding of infrastructure investment approaches (as well as the need for high volume capital over the long-life span of an individual asset class in EM) assists institutional investors to consider a risk-return analysis. This generally focuses on the efficiency of an investment vehicle portfolio and the significance of asset allocation within EM geographical areas, i.e. critical determinants informing infrastructure investment diversification. However, it should be noted that the structured framework also facilitates indirect investment, due to recognising the differing challenges facing indirect investment strategies and investment vehicles.

A Potential Blueprint for PEIF Investment in EM

This framework offers a method of ensuring a comprehensive understanding of PEIF investment for government officials and policies makers in EM, as well as experts in the investment industry and participants, i.e. global investors The also adds clear value to all issues pertaining to infrastructure investment within EMIs. Therefore, it considers a variety of relevant aspects, including the players and relationships with the relevant activities. In addition, this framework will be beneficial for EM policy makers and local governments, enabling them to inform their development as enablers/facilitators of investment, particularly as they are not generally specialists or to possess any expertise in this area. Thus, this framework will provide them with an insight into various concepts, as well as an understanding of the most effective procedures to attract global investors and engage them in investing in infrastructure assets in EM. In addition, it offers added value for those not currently investing in EM, but who may have an interest in moving into this area, including assisting them in recognising the various aspects of EM complexity.

EMs: a Potential Avenue or Vehicle for Investors' ESG mandates

A critical implication of this current research concerns the identification of a number of global private investors utilising EM as one of their ESG mandates. The research outcomes reveal EM as offering various opportunities for global private investors to consider ESG compliant mandates. In particular, private global investors seek to participate in EM development, including tackling climate change and increasing social government, eventually leading to upscaling investment within EM through ESG protocols and frameworks. Furthermore, issues related to ESG in the investment decision process and analysis strategy are currently increasing their allocation within EM. Therefore, these investors will tend to explore this opportunity due to the fact that global investors are now under increasing pressure to employ the ESG framework as part of their investment strategy. Moreover, a number of further drivers have been cited as being behind global private investors employing ESG in their EM infrastructure investment, including seeking a potential approach to enhance risk adjusted returns (i.e. apply sustainable criteria and for long-term return investment). Consequently, this research explored the potential for EM to form a benchmark and a novel avenue through which to employ the ESG agenda in investment strategies related to EM.

SDGs Spectrum: Future Prospects for Investment in sustainable infrastructure within EMs

Alongside the research implications discussed above, investors have, from global perspective, been recently under considerable pressure to consider environmental challenges, including recognising various approaches to investing in sustainable infrastructure assets, and how this can be linked to the SDGs agenda, particularly in relation to EM. The research highlighted that green infrastructure has been identified as a critical basis for providing sustainable development, so underpinning the achievement of the SDGs agenda. This is based on three key players: firstly, EM governments, secondly, policy makers, and thirdly, private global investors and MDBs. These are required to participate in this process and overcome the difficulties hindering this approach.

When it comes to the standpoint of EM governments, the research highlighted that EM policy makers are currently experiencing significant challenges concerning the issue of sustainability, in particular in order to fulfil the SDGs agenda, which sets the required provision for infrastructure investment pipelines and regulatory frameworks. However, from the perspective of global private investors, the current challenge focuses on exploring opportunities in EM without transgressing the environmental dimension (i.e. developing infrastructure capable of complying with all sustainability requirements), while at the same time promoting access to growth and returns. MDBs thus have a significant role to play in increasing the sustainable scale of infrastructure investment in EM integrated with SDGs-2030. This can allow infrastructure development to comply with the SDGs agenda and generate the environmental benefits of upscaling EM infrastructure.

8.4 Covid-19 implications on infrastructure investment sector

The Covid-19 pandemic started as a health crisis (SARS-CoV-2 virus) in late 2019 and swiftly caused an economic crisis, influencing global, national, and regional economies, with widespread implications for the infrastructure sector, which in turn then impacted on the investment and financial sectors. The negative implications of the Covid-19 crisis have affected both soft and hard infrastructures, resulting in underinvestment rates in the health and technology infrastructure sectors compared to other capital-intensive industries (PWC, 2020; OECD,2021).

The **health sector** is recognized as having been the most negatively impacted, due to the high demands on the health system and the lack of a suitably robust infrastructure to face the emerging pandemic at the global level. Therefore, health sectors are currently in the spotlight, with governments strongly urging global investors to invest in health platforms and support health services (World Banks, 2021)

In the context of hard infrastructure, the sector experiencing the most significant damage was the **transport sector**. This may be attributed to a number of different factors including technology (i.e. working from home) and national restrictions on international flights (i.e. travel has been banned in certain countries) due to national lockdowns measures and social distancing (PWC, 2020; Tardivo et al., 2021). However, the pattern of homeworking is likely to continue after the Covid-19 crisis, because of the increased flexibility accorded to workers and the resultant lower financial cost for firms and companies (i.e. renting offices). Consequently, the **telecommunication infrastructure sector** also experienced high demand during the pandemic. Governments, businesses, and individuals became more dependent on digital platforms for different activities such as financial transactions, education, and logistics (World Bank, 2021). Therefore, global investors and fund managers directed their investment toward technology. However, the telecommunication sector has suffered from fragility and a lack of capacity to facilitate the increasing demands to utilize technology platforms (e.g. Wi-Fi connections) (PWC, 2020; OECD, 2021).

In general, the post Covid-19 period will undoubtedly witness a rise in infrastructure needs and demands. This will impact on investment opportunities and potential, and/or certain sub-sectors, particularly in EIMs. It should be noted that there is a significant lack of empirical studies (i.e. reliable data) addressing the impact of Covid-19 on the infrastructure investment universe comprehensively, particularly in reference to EMs.

8.5 Concluding Comments and Closing Thoughts

The uniqueness of the research emerged from concentrating on addressing the key challenges pertaining to global infrastructure investment and the impacts this has on the allocation of capital to EIMs. It outlined the scale and magnitude of the infrastructure investment challenges, along with the drivers and factors behind the expanding infrastructure funding gap. In addition to the continual growth of global forces, the research showed EMs face additional complexity in terms of encouraging global PEIF institutional investors to invest in infrastructure assets, global challenges and the factors currently influencing PE investment flows into infrastructure projects within Emerging Infrastructure Markets.

The primary expectation of this research is that the infrastructure investment gap is widening, due to deficits in critical infrastructure projects arising from underinvestment in infrastructure assets in EIM, inherent internal challenges, as well as difficulties and barriers affecting EIMs. EMs are currently experiencing developments that have prompted progress in PEIF investment across the period addressed. A number of fundamental global drivers have prompted a significant number of institutional investors to invest in infrastructure projects, such as those with a higher internal rate of return (IRR) profiles, greater diversification, difficulties within developed markets and less crowding in EIMs, and growth markets that capture opportunities in EMs.

Therefore, the PEIF investment conceptual framework in EM was developed to deliver a holistic overview of the PEIF investment framework within EM, and to capture the engagement of key players (majors and potentials) and their different perspectives; global investors (i.e. different concerns, challenges, and difficulties they encounter in infrastructure investment); EM government identifying key deficiencies (i.e. lack of project pipelines, weak regulatory framework, political instability, and financial frameworks). In addition, it is possible to boost infrastructure investment that is geared toward reducing demand and bridging the infrastructure investment gap. Thereby, delivering the greatest potential impact from PEIF investment in EM countries.

8.6 Areas for Future Research

The research explored aspects relating to the primary challenges, difficulties and barriers associated with global infrastructure investment and their influences in EIMs. Nevertheless, the dynamic characteristics of the infrastructure investment industry, particularly in EIMs, the need for further in-depth assessment to analyse how global investors approach infrastructure investment in EMs (i.e. initial investment, stakes/project acquisitions, participation in secured loans or injecting a project financially to develop it).

The study identified key global players (i.e. PEIF institutional investors and fund managers) in the infrastructure investment industry in EM, addressing the overall internal and external EM assessment in the conceptual framework, and delivering a more comprehensive examination of global private institutional investors' and fund managers' decision making processes to invest in infrastructure in EM strengthening the proposed PEIF investment conceptual framework in EM. This included a further in-depth study to evaluate global investors' investment strategy, and the approach among EMs to infrastructure investment compared within the context of sectoral and geographical allocations. On the other hand, there was further insight to investigate the relationship between the identified dimensions and the measurements that the research addressed, influencing PEIF investment in EMs (i.e. validating the conceptual frameworks).

A further qualitative method implemented to evaluate regional investors' and fund managers' participation in infrastructure investment within EM and to identify the difficulties and challenges they encounter, will enable a solid assessment from a different perspective.

The current research exhibited a detailed account for various economic sectors' classifications (i.e. transport, renewable energy, conventional power energy, and utilities services sectors) across different regions (Asia, Europe, Africa, Latin America and the Caribbean, and Middle East regions). However, a detailed analysis of PE Infrastructure investment performance persistence in EMs compared with advanced markets would provide a more thorough understanding.

The research offered an in-depth assessment of the various alternative financial methods affecting infrastructure deals flows. However, further in-depth assessment of financial tools and instruments evaluating the financial markets in EIM regions or countries and identifying their role within the infrastructure investment process will enable additional insight into financial market developments in EM.

The research highlights global warming as one of the international challenges affecting infrastructure investment in EIM, highlighting renewable energy sector deals level in

EM; however, there is limited empirical evidence available. Therefore, further evaluation of global warming's influence on infrastructure investments (i.e. de-carbonization infrastructure projects) in EIMs and their impact on the economy will progress. In addition, further investigation would usefully examine green infrastructure and sustainability projects in EMs, as well as the financial affordances available for these assets (i.e. green bonds) to highlight innovative contemporary financial instruments.

8.7 References

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Appendix B.1: General description of EM infrastructure deals

A brief general description of the EM infrastructure deals, which were assessed in terms of 1) asset phases and 2) investor profiles (i.e. investor countries and regions, investor type, and source of funds).

Assets phases

Generally, every asset deal can be divided into **three financial transactions phases: Firstly, initial investment,** which represents the **first phase of investment** in the assets or the contract. This initial phase comprises various structures: 1) Awarding of the concession contract phase, 2) acquisition of 100% interest — or 100% stake — in the project, and 3) investment in the project. Furthermore, the initial investment phase includes the following specific measurements: 1) financial profile (i.e. total deal size ($MN) and deal size equity ($ MN)); 2) asset profile (i.e. project stage, industry, and country); 3) investor profile (i.e. number and type of investors, investor countries, level of participation and percentage of stakes, and type of concessions). **Secondly, Debt profile financial transaction phase**. This phase generally focuses on identifying the debt required for the project development or acquiring an additional amount for the investment. Secured debt data can be divided into: 1) name of debt providers; 2) type of debt providers; and 3) total transaction debt ($ MN) and/or debt amount provided ($MN). However, it should be noted that some of the assets identified by the Preqin database for this paper used secured debt for the project as the initial phase (i.e. no information was provided regarding the award period).[34] **Thirdly, Acquisition/Exit financial transaction phase**. There are two forms of acquisition: 1) stakes acquisition (SA) and 2) project acquisition (PA). SA represents the stakes percentages acquired by investors in the project. That is, some fund managers sell a specific amount of their stakes in a project to other fund managers or local/global investors (known as a partial exit), whereas others sell their stakes in the project to other fund managers or investors local/global, which is known a full exit. In certain cases, the investor gradually exits (i.e. sells a small amount of their stakes periodically to other local/regional investors). The other form of acquisition is PA, which occurs when some regional or local investors acquire an individual deal or a number of projects in one deal. Both PA and

[34] In this research, the debt amount provided ($MN) was used to indicate the deal size ($MN) (i.e. another type of first phase), due to the lack of information available for the assets.

SA can be conducted **through acquisition of its holding company which in turn the deal asset** (i.e. project) or deal stakes will transfer to the buyer. These acquisition forms also share a number of dimensions. These are: 1) deal size ($MN) of the stakes or the asset(s); 2) the name of the buyer/seller (firms); and 3) total percentage of stake acquired. with acquisitions phase (SA or PA), the project stage of the asset is transferred into a different form (i.e. from greenfield to brownfield, or greenfield/brownfield to secondary stage).

Appendix B.2: general description of the EM infrastructure investment fund vehicle

The overview of infrastructure investment fund vehicle is based on three pillars: infrastructure assets (i.e., industry, geographic area, and project stage), investment fund mechanism (i.e., infrastructure funds investment criterion, strategy, approaches, and forms), and fund managers' and investors' involvement and participation.

Infrastructure funds investment approaches

First, similar to PE infrastructure funds investment – at the deals level, there are diverse approaches to PE infrastructure investment – at the fund vehicle level, there is not only investment in execution of infrastructure assets, but also in **acquisitions** of existing undervalued assets (e.g., existing plants) and late-stage projects offering 'value-added' opportunities in operational improvement and construction management. In addition, the investment can be through forming long-term partnerships with experienced asset operators and developers for existing investment pipeline and future deal flow (Preqin, n.d.). Similarly, the investment fund vehicle method presented **acquire stakes** in infrastructure assets and aim to sell the outcome to another firm.

Infrastructure funds investment strategy and criterion

Infrastructure fund investment vehicles come in different varieties in terms of investors participation, geography, sectors, and project stage participation percentage. In the context of **investors participation**, A number of fund vehicles set a ceiling for investors participation, with a minimum investment from an individual investor of USD 10 MN. Another fund strategy exhibited **is allocation of the maximum percentage of investment to a single infrastructure** asset. The range of application of this strategy varies; the majority of funds limit their investment in underlying assets so that it does not exceed 15% of the fund, while others set a maximum amount of 60% in a single infrastructure subsector. Moreover, a considerable number of infrastructure funds seek to **diversify their portfolio of funds** (i.e., sector focus) as their investment strategy. For instance, the fund might be split 30% to energy and utilities, 30% to transportation, 10% to communications, and 20% to renewable energy, with the remaining 10% to miscellaneous investments.

Furthermore, limiting the investment percentage is not bounded by project industry only, but also by the **geographical allocation** of the infrastructure asset. Meanwhile, other funds set the terms of geographic distribution, where approximately 35% of the capital is invested in North America, 25% in Europe, 30% in Asia, and 10% in Rest of World.

Infrastructure fund investment forms

There are two forms of infrastructure fund investment portfolios: multiple infrastructure investment funds, and series infrastructure investment funds managed by an individual fund manager. The **multiple infrastructure investment funds** vehicle structured based on specific target fund size, primary fund strategy, target geographic area, sector focus, and rate of return/risk percentage for the individual infrastructure investment fund portfolio. In addition, there is no correlation or relationship between the fund's investment portfolio with the fund's other portfolios (i.e., different fund strategy and different fund size). On the other hand, **series infrastructure investment fund** portfolios, characterised with continuous strategies (i.e., the fund managers manage two to three funds' portfolios with the same investment fund strategy (i.e., opportunities, or funds of funds) and with the same geographical and sector focus. The differences between these two forms of infrastructure investment fund are related to their year of establishment (i.e. ,period of time). In other words, the fund managers can establish two fund portfolio case studies within the same year (in the case of multiple infrastructure investment funds), while the other vehicle structure requires a gap or period of time before establishing the following series of infrastructure investment funds portfolio.

Appendix C.1: Total deal levels in emerging markets (2009-2019)

The results of unlisted infrastructure deal levels within Emerging Infrastructure Markets downloaded from the Preqin data stream: 3,882 Results. Post organizing and re-structuring the financial transactions for the asset deals, the total number of deals that were invested in in Emerging Infrastructure Markets was 3,384 Deals. These deals were split into known value and unknown value deals. The total number of known value deals 2,519 with a total cost of USD 632,116.51 MN., and the number of the unknown value deals eliminated from the analysis was 865. Table C.1 presents the unlisted infrastructure investment in infrastructure in Emerging Infrastructure Markets broken down annually:

Table C.1.1: Overview of total deal levels in emerging markets (2009-2019)

	Total Deals within EM	conventional deals	renewable energy deals	Total Unknown conventional deals	Total Unknown renewable energy deals	Total known conventional deals	Total known conventional deals values ($ Mn.)	Total known renewable energy deals	Total known renewable energy deals values ($ Mn.)	Total known Deals	Total Known values Deals ($ Mn.)
2009	222 Deals	138 deals	84 deals	27 deals	41 deals	111 deals	21,990.53	43 deals	7,639.80	154 Deals	29,630.33
2010	250 Deals	150 deals	100 deals	18 deals	37 deals	132 deals	55,979.39	63 deals	5,648	195 Deals	61,627
2011	263 Deals	154 deals	109 deals	19 deals	36 deals	135 deals	32,738.98	73 deals	8,003	208 Deals	40,742.09
2012	264 Deals	145 deals	119 deals	16 deals	49 deals	129 deals	24,804.73	70 deals	12,488.8	199 Deals	37,293.53
2013	381 Deals	197 deals	184 deals	17 deals	67 deals	180 deals	31,500.17	117 deals	17,482	297 Deals	48,981.67
2014	441 Deals	215 deals	226 deals	20 deals	102 deals	195 deals	47,297	124 deals	13,208.74	319 Deals	60,505
2015	478 Deals	256 deals	222deals	14 deals	102 deals	242 deals	89,550.65	120 deals	21,029.55	362 Deals	110,580.20
2016	400 Deals	224 deals	176 deals	25 deals	70 deals	199 deals	63,523.23	106 deals	10,325.25	305 Deals	73,848.48
2017	259 Deals	88 deals	171 deals	33 deals	30 deals	55 deals	31,515.86	141 deals	25,157.28	196 Deals	56,673.14
2018	223 Deals	101 deals	122 deals	20 deals	39 deals	81 deals	44,911.31	83 deals	6,024.39	164 Deals	50,935.70
2019	203 Deals	89 deals	114 deals	29 deals	54 deals	60 deals	45,047.53	60 deals	16,251.84	120 Deals	61,299.37
Total:	**3384 Deals**	**1767 Deals**	**1624 Deals**	**238 Deals**	**627 Deals**	**1519 Deals**	**488,859.38**	**1000 Deals**	**143,258.65**	**2519 Deals**	**632,116.51**
Note: Conventional assets represents transport assets, energy power assets and services utilities assets											

Source: Author calculation (Preqin data)

Appendix C.2: the largest deal levels in EMs

Table C.2.1: Summery of the largest deal levels in **Transport sector** within EIM, Q1-2009-Q4-2019

Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Asset Country	Investors/ Buyers (Firms)	Investor Country	Trans-action year
*A1 Stryków I - Pyrzowice Toll Road	Toll Roads	2,005.13	-	Poland	Ferrovial SA Cintra Infrastructures SE Budimex Group	Spain Spain Poland	2009
*Haramain High Speed Rail (Phase 1) PPP	Railroads	1,810.67		Saudi Arabia	Arup Bouygues Group Unidentified Investor/s China Railway Construction Corporation (CRCC) Al Arrab Contracting	UK France ? China Saudi Arabia	
A2 Motorway Segment II	Toll Roads	1,766.74	1,559.54	Poland	Meridiam Strabag International KWM Investment Kulczyk Investments	France Austria Luxembourg Poland	
*Narketapally-Addanki-Medarametla Road Upgradation Project	Roads	24,535.64		India	N.A.M Expressway Limited	India	2010
Gebze-Orhangazi-Izmir motorway PPP	Roads	6,500	3,250	Turkey	Nurol Holding, Astaldi SpA Özaltın Holding Yüksel holding company Makyol Construction Industry Tourism and Trading Co. Inc. Göçay [Gocay Co. Inc.]	Turkey Italy Turkey Turkey Turkey Turkey	
TRIL Roads	Roads	2,000		India	Actis Tata Realty and Infrastructure	UK India	
*Western High Speed Diameter PPP Project	Roads	2,450.71		Russia	Astaldi SpA IC Holding	Italy Turkey	2011
*King Abdulaziz International Airport	Airports	2,300	2,300	Saudi Arabia	Saudi Binladin Group Ltd	Saudi Arabia	
Medinah Airport PPP	Airports	1,400		Saudi Arabia	Al Rajhi Capital Company Saudi Oger Ltd TAV Airports Holding	Saudi Arabia Saudi Arabia Turkey	
Guri Pocheon Highway	Toll Roads	1397.4	1,191.9	South Korea	South Korean investors KDB Infrastructure Investments Asset Management	South Korea South Korea	
*Guarulhos International Airport	Airports	3,949.12		Brazil	PETROS Construtora OAS Ltda FUNCEF Airports Company South Africa (ACSA)	Brazil Brazil Brazil South Africa	2012
Bengaluru Metro Phase II	Railroads	1,308.89	1,308.89	India	Unidentified Investor/s	?	
*Third Bosphorus Bridg	Bridges	2,500		Turkey	Astaldi SpA IC Holding	Italy Turkey	
Cairo Metro Line 3 - Phase 3	Railroads	1,047.12		Egypt	Unidentified Investor/s	?	

Source: Author’s own analysis (Preqin data)

Continue-Table C.2.1: Summery of the largest deal levels in **Transport sector** within EIM, Q1-2009-Q4-2019

Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Asset Country	Investors/ Buyers (Firms)	Investor Country	Trans-action year
*Riyadh Metro Orange Line	Railroads	7,820		Saudi Arabia	Alstom Transport	France	2013
					Samsung C&T Corporation	South Korea	
*Riyadh Metro Yellow Line	Railroads				Strukton Groep n.v.	Netherlands	
					FCC Construcción	Spain	
*Riyadh Metro Purple Line	Railroads				Setec Consultants	France	
BR-040 Highway PPP	Roads	2,000		Brazil	Invepar	Brazil	
Chile Metro - Line 3	Railroads	1,720		Chile	Bouygues Group	France	
					VINCI Concessions SAS	France	
Chile Metro - Line 6	Railroads	1,030		Chile	Bouygues Group	France	
					VINCI Concessions SAS	France	
Lima Metro Line 2	Railroads	6,500	1,155	Peru	Salini Impregilo	Italy	2014
					Peruvian construction firm Cosapi	Peru	
					FCC Construcción [Fomento de Construcciones y Contratas]	Spain	
					Ansaldo Hitachi	Japan	
					ACS Group	Spain	
Sao Paulo Metro Line 18	Railroads	1,900		Colombia	Mario Alberto Huertas Cotes	Colombia	
					MECO Constructora Meco SA Sucursal Colombia	Colombia	
BR-153 Highway Project	Roads	1,920		Brazil	Galvão Engenharia S/A	Brazil	
Moscow-Saint Petersburg Motorway	Toll Roads	1,779.2	1,361.37	Russia	VTB Group	France	
					VINCI Concessions, VTB	Russia	
*Fagne-Maharashtra/Gujarat Border Road Upgradation Package III Project	Roads	26,211.77		India	IL&FS Investment Managers	India	2015
*Guna-Biaora Road Upgradation Project	Roads	14,114.02		India	Dilip Buildcon Ltd.	India	
Jakarta-Bandung High-Speed Railway	Railroads	5,500	4,125	Indonesia	China Railway International	China	
					PT Jasa Marga	Indonesia	
					PT Wijaya Karya	Indonesia	
					PT Kereta Api	Indonesia	
					PT Perkebunan Nusantara XIII	Indonesia	
Istanbul Grand Airport	Airports	5,045.98	5,045.98	Turkey	Mapa Insaat Ve Ticaret Anonim Sirketi	Turkey	
					Limak Holding AS	Turkey	
					Cengiz Insaat Sanayi ve Ticaret	Turkey	
Mexico City New International Airport (NAICM)	Airports	4,200	3,000	Mexico	Acciona	Spain	
					FCC Construcción	Spain	
					Empresas ICA SAB de CV	Mexico	
					Prodemex	Mexico	
					La Peninsula	Mexico	
					Grupo Carso	Mexico	
					Grupo Hermes	Mexico	
					Constructora y Edificadora GIA A SA de CV	Mexico	
Manila Bay International Airport	Airports	10,000		Philippines	San Miguel Corporation	Philippines	2016
					Mettro Pacific Investments Corporation	Philippines	

Continue-Table C.2.1: Summery of the largest deal levels in **Transport sector** within EIM, Q1-2009-Q4-2019

Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Asset Country	Investors/ Buyers (Firms)	Investor Country	Trans-action year
*Zhejiang High Speed Railway	Railroads	6,592.09		China	Fosun International	China	Cont. 2016
*Khabarovsk Bypass	Toll Roads	6,293.65		Russia	VIS Group	Russia	
Wuzhong-Zhongwei Rail PPP	Railroads	2,070		China	China Railway Construction Corporation (CRCC)	China	
Suide – Yanchuan Motorway PPP	Roads	1960		China	China Railway Group Limited	China	
Hangzhou-Shaoxing-Taizhou Railway	Railroads	6,388.82	3,998.35	China	Ping An Insurance Group	China	2017
					Zhejiang United Mechanical & Electric	China	
					Wangfeng Auto Holding Group Co Ltd	China	
					Fosun International	China	
					Hongrun Construction Group Co. Ltd	China	
Solapur-Bijapur Tollway Project	Toll Roads	3,327.67		India	IJM Group	Malaysia	
Al Maktoum International Airport Expansion	Airports	3,000	3,000	United Arab Emirates	Unidentified Investor/s	?	
*Sattanathapuram-Nagapattinam Road Project	Roads	2,786.91	1337.68	India	Welspun Enterprises Ltd	India	2018
Ninoy Aquino International Airport PPP Project	Airports	2,007.85		Philippines	Ayala Corporation	Philippines	
					Alliance Global Group	Philippines	
					a Canadian Investor	Canada	
					Metro Pacific Investments Corporation	Philippines	
					JG Summit Holdings	Philippines	
					Aboitiz Power Corporation	Philippines	
					Filinvest Development Corporation	Philippines	
Northern Marmara Motorway Project	Roads	2,674	2,674	Turkey	Unidentified Investor/s	?	
					Limak Holding AS	Turkey	
					Kalyon group	Turkey	
					Kolin - Insaat & Turizm Sanayi ve Ticaret A.S.	Turkey	
					Cengiz Insaat Sanayi ve Ticaret	Turkey	
Aunta-Simaria Bridge Project	Bridges	1,628.4	781.66	India	Welspun Enterprises Ltd	India	
Ramsanpalle-Mangloor Road Project	Roads	1,464.93	584.08	India	KNR Constructions	India	
*Thailand High-Speed Rail Linked 3 Airport Project	Railroads	7,402.31		Thailand	CH. Karnchang Public Company Limited	Thailand	2019
					Charoen Pokphand Group Co. Ltd	Thailand	
					Bangkok Expressway and Metro (BEM)	Thailand	
					China Railway Construction Corporation (CRCC)	China	
					Italian-Thai Development	Thailand	
*Naqing Expressway Project	Roads	5,060		China	Naqing Project Company	China	

Source: Author's own analysis (Preqin data)

Continue-Table C.2.1: Summery of the largest deal levels in **Transport sector** within EIM, Q1-2009-Q4-2019

Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Asset Country	Investors/ Buyers (Firms)	Investor Country	Trans-action year
*Cairo Monorail Project	Rolling Stock	4500	*Cairo Monorail Project	Egypt	Bombardier	Canada	Cont. 2019
					Orascom Construction Industries	Egypt	
					The Arab Contractors	Egypt	
Liu'an Expressway Project	Roads	3,459.12		China	Liu'an Project Company	China	
Bogota Metro Line Project	Railroads	3000		Colombia	China Communications Construction Company	China	
					APCA Transmimetro	Colombia	
Kempegowda International Airport Terminal 2	Airports	1,424.35	1,424.35	India	BIAL (Bangalore International Airport)	India	
Note: (*) represents pioneers deals assets in terms of value and highlighted in Section 4.6.1 Vehicle structures-Deals levels							

Source: Author's own analysis (Preqin data)

Table C.2.2: Summery of the largest deal levels in **Renewable energy sector** within EIM, Q1-2009-Q4-2019

Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Asset Country	Investors/ Buyers (Firms)	Investor Country	Trans-action year
Sogamoso Hydro Power Plant	Hydro Power	1,740	432	Colombia	Isagen S.A. E.S.P.	Colombia	2009
Kishau Hydel Power Project	Hydro Power	1,500		India	UJVN Limited	India	
Cheves Hydropower Plant	Hydro Power	400	250	Peru	Norfund	Norway	
					StatKraft	Norway	
Rayalaseema Thermal Power Stage IV Project	Geothermal Power	418.68		India	Gammon Infrastructure Projects Limited	India	2010
Bii Stinu Wind Power Project	Wind Power	400		Mexico	N+1 Eolia	Spain	
El Quimbo Hydroelectric Plant	Hydro Power	383.2		Colombia	Salini Impregilo	Italy	
Santo Domingo Wind Farm	Wind Power	381	240	Mexico	N+1 Eolia	Spain	
Ituango Hydroelectric Project	Hydro Power	2,104	1,000	Colombia	EPM	Colombia	2011
RBO Energia	Hydro Power	1000		Brazil	Rio Bravo	Brazil	
					Orteng Equipamentos e Sistemas Ltda	Brazil	
Ulu Jelai Hydroelectric Project	Hydro Power	573.69		Malaysia	Salini Impregilo	Italy	
Seli Hydel Power Project	Hydro Power	403.61		India	Hindustan Powerprojects Pvt Ltd	India	
300 MW Solar Farm	Solar Power	2400		China	China Merchants Group Limited	Hong Kong SAR - China	2012
					Talesun Solar Technologies Co., Ltd.	China	

Source: Author's own analysis (Preqin data)

Continue- C.2.2: Summery of the largest deal levels in **Renewable energy sector** within EIM, Q1-2009-Q4-2019

Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Asset Country	Investors/ Buyers (Firms)	Investor Country	Trans-action year
LAP	Renewable Energy	2000		Chile	BTG Pactual	Brazil	Cont. 2012
					GMR Group	India	
					Patria Infrastructure	Brazil	
Cerro del Águila Hydroelectric Power Plant	Hydro Power	900	585	Peru	Inkia Energy	Peru	
					Quimpac de Colombia SA	Colombia	
Rantau Dedap Geothermal Power Plant	Geothermal Power	900	540	Indonesia	Marubeni Corporation	Japan	
					Engie	France	
					Supreme Energy	Indonesia	
Jirau Hydroelectric Power Plant	Hydro Power	1,822.49	820.12	Brazil	Engie (Energia Sustentavel do Brasil)	France	2013
					ELETROSUL Centrais Elétricas	Brazil	
					CHESF	Brazil	
					Camargo Correa Infraestrutura SA	Brazil	
Alto Maipo Hydropower Plant	Hydro Power	1,217	1217	Chile	Antofagasta PLC	UK	
					AES Gener	Chile	
Sarulla Geothermal Plant	Geothermal Power	1170	undisclosed amount	Indonesia	ITOCHU Corporation	Japan	
					Ormat Technologies, Inc.	US	
					PT. Medco Power Indonesia	Indonesia	
					Kyushu Electric Power Co Inc	Japan	
Pampa Camarones Project	Solar Power	620		Chile	GDF-Suez (Cofely)	France	
Cerro Dominador Solar Power Project	Solar Power	1000	500	Chile	Abengoa	Spain	2014
Zheijang Solar Project	Solar Power	704.59		China	JinkoSolar Holding Co., Ltd	China	
Ventika Wind Farm	Wind Power	650	650	Mexico	Blackstone Group	US	
Ananthapuramu Ultra Mega Solar Park Project	Solar Power	2,093.4		India	Unidentified Investor/s	?	2015
Copiapo Solar Project	Solar Power	2000		Chile	SolarReserve Inc.	US	
Kurnool Ultra Mega Solar Park Project	Solar Power	1395.6		India	Unidentified Investor/s	?	
2015.379 : United PV Chinese Solar Development Project	Solar Power	1268.27		China	Huaxia Life Insurance	Hong Kong SAR - China	
					Panda Green Energy	Hong Kong SAR - China	
Villanueva I Solar Farm	Solar Power	1000	125	Mexico	Enel green power SpA	Italy	2016
Villanueva III Solar Farm	Solar Power						
Don José Solar Farm	Solar Power						
Mohammed Bin Rashid Al Maktoum Solar Power Complex Phase III	Solar Power	940	940	United Arab Emirates	Fotowatio Renewable Ventures	Spain	
					EDF Renouvelables	France	
					Masdar	United Arab Emirates	
					Grupo Gransolar	Brazil	

Source: Author's own analysis (Preqin data)

Continue-Table C.2.2: Summery of the largest deal levels in **Renewable energy sector** within EIM, Q1-2009-Q4-2019

Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Asset Country	Investors/ Buyers (Firms)	Investor Country	Trans-action year
Kathu Solar Park	Solar Power	800	600	South Africa	Engie	France	Cont. 2016
					Investec	South Africa	
					Public Investment Corporation	South Africa	
					Metier	South Africa	
					Unidentified Investor/s	?	
					Thebe Investment Corporation	South Africa	
					FMO	Netherlands	
					Old Mutual Investment Group	South Africa	
Taiwan Strait Wind Assets	Wind Power	5,970		Taiwan - China	Copenhagen Infrastructure Partners	Denmark	2017
Dewa Concentrated Solar Power Project	Solar Power	1500	1500	United Arab Emirates	ACWA Power International	Saudi Arabia	
					Shanghai Electric Group Corp	China	
Theparak Wind Farm	Wind Power	1,140	1,140	Thailand	Wind Energy Holdings	Thailand	
Tropical Wind Farm	Wind Power						
KRS Three Wind Farm	Wind Power						
Theparak 4 Wind Farm	Wind Power						
Krissana Wind Farm	Wind Power						
Nxuba Wind Power Project	Wind Power	1321.55	1046.14	South Africa	Enel green power SpA	Italy	2018
Oyster Bay Wind Power Project	Wind Power						
Garob Wind Power Project	Wind Power						
Karusa Wind Power Project	Wind Power				Unidentified Investor/s	?	
Soetwater Wind Power Project	Wind Power						
Gulf of Suez Wind Farm	Wind Power	650		Egypt	Toyota Tsusho Corporation	Japan	
					Engie	France	
					Orascom Construction Industries	Egypt	
Dumat Al Jandal Wind Farm	Wind Power	500	270	Saudi Arabia	EDF Renouvelables	France	
					Masdar Institute of Science and Technology	United Arab Emirates	
Yunlin Wind Project	Wind Power	3129.68	284.67	Taiwan - China	Sojitz Corporation	Japan	2019
					Chugoku Electric Power	Japan	
					Shikoku Electric Power Company	Japan	
					JXTG Nippon Oil & Energy Corporation	Japan	
					Chudenko Corporation	Japan	
					WPD	Taiwan - China	
Formosa II Wind Farm Project	Wind Power	2321.8	2321.8	Taiwan - China	Stonepeak Infrastructure Partners	US	
					Swancor Renewable	Taiwan - China	
					Macquarie Capital USA Inc	US	

Continue-Table C.2.2: Summery of the largest deal levels in **Renewable energy sector** within EIM, Q1-2009-Q4-2019

Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Asset Country	Investors/ Buyers (Firms)	Investor Country	Trans-action year
Andes Renovables Wind and Solar Portfolio	Renewable Energy	2293.28	2293.28	Chile	Mainstream Renewable Power	Ireland	Cont. 2019

Source: Author's own analysis (Preqin data)

Table C.2.3: Summery of the largest deal levels in **Conventional Power energy sector** within EIM, Q1-2009-Q4-2019

Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Asset Country	Investors/ Buyers (Firms)	Investor Country	Trans-action year
Tanjung Jati B Coal Fired Power Plant Expansion Project	Power Plants	1,800		Indonesia	Sumitomo Corporation	Japan	2009
Muara Tawar Gas-Fired Plant Expansion	Power Plants	900	900	Indonesia	PT Perusahaan Listrik Negara	Indonesia	
Denizli Power Plant	Power Plants	668.38	N/D	Turkey	RWE Group	Germany	
					Turcas Group	Turkey	
*Medupi Power Plant	Power Plants	3,050	3050	South Africa	Eskom Holdings SOC Ltd	South Africa	2010
Riyadh Gas-fired Power Plant	Power Plants	2,100	1,500	Saudi Arabia	Saudi Electricity Company	Saudi Arabia	
					Sojitz Corporation	Japan	
					Engie	France	
					Aljomaih Holding Co	Saudi Arabia	
Navabharat Power Plant	Power Plants	2000		India	Essar Group	India	
					Unidentified Investor/s	?	
Central Java Coal Fired Power Plant	Power Plants	4,000	3,000	Indonesia	J-Power	Japan	2011
					ITOCHU Corporation	Japan	
					PT Adaro Energy Tbk	Indonesia	
*Qurayyah Power Station	Power Plants	2,717		Saudi Arabia	Saudi Electricity Company	Saudi Arabia	
					Samsung C&T Corporation	South Korea	
					ACWA Power International	Saudi Arabia	
					MENA Infrastructure	United Arab Emirates	
Tanjung Bin Power Plant	Power Plants	2,140	2,140	Malaysia	Malakoff Corporation Berhad	Malaysia	2012
Cochrane Coal-Fired Power Plant 1	Power Plants	1300	1000	Chile	Unidentified Investor/s	?	
Cochrane Coal-Fired Power Plant 2	Power Plants				AES Corporation	US	
					Mitsubishi Corporation	Japan	
Tufanbeyli Lignite Power Plant	Power Plants	1,225.36	835.47	Turkey	Sabanci Holding	Turkey	
					E.ON	Germany	
Kineta Power Plant	Power Plants	1407.1		India	Jindal Steel & Power Ltd	India	2013
Dedisa Power Plant	Power Plants	866.82		South Africa	Mitsui & Co - Corporate Development Business Unit	Japan	
					Engie	France	
Avon Power Plant	Power Plants				Legend Power Solutions	US	

Source: Author's own analysis (Preqin data)

Continue-Table C.2.3: Summery of the largest deal levels in **Conventional Power energy sector** within EIM, Q1-2009-Q4-2019

Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Asset Country	Investors/ Buyers (Firms)	Investor Country	Trans-action year
Cirebon Coal-Fired Power Plant 2	Power Plants	2,471	2,471	Indonesia	Indika Energy	Indonesia	2014
					Samchully Asset Management	South Korea	
					Korea Electric Power Corporation	South Korea	
					JERA Co., Inc.	Japan	
					Marubeni Corporation	Japan	
Project 3B	Power Plants	2,730.83		Malaysia	1Malaysia Development Berhad	Malaysia	
					Mitsui & Co - Corporate Development Business	Malaysia	
Masinloc Power Plant Expansion	Power Plants	1,200		Philippines	AES Corporation	US	
Beni Suef Power Plant	Power Plats	8,947.6		Egypt	Orascom Construction Industries	Egypt	2015
New Capital Power Plant	Power Plats				Siemens Financial Services Ltd	Germany	
					Elsewedy Electric	Germany	
Mae Moh Lignite-Fired Power Plant PPP	Power Plants	1,000		Thailand	Marubeni Corporation	Japan	
					Alstom	France	
Salina Cruz Cogeneration Plant	Power Plants	950		Mexico	Enel green power SpA	India	
					Abengoa	Sweden	
Sembcorp Gayatri Power Complex	Power Plants	3000		India	Sembcorp Industries Ltd	Singapore	2016
					Gayatri Projects	India	
					NCC Infrastructure Holdings	India	
Dairut IPP Combined Cycle Power Plant Project	Power Plants	2,500		Egypt	ACWA Power International	Saudi Arabia	
Hassyan Clean Coal Power Plant	Power Plants	2,470	2,470	United Arab Emirates	ACWA Power International	Saudi Arabia	
					Silk Road Fund	China	
Java I Power Plant	Power Plants	2000		Indonesia	Japan's Marubeni Corporation Marubeni Corporation	Japan	2017
					PT Pertamina Persero	Indonesia	
Atimonan Coal Fired Power Plant	Power Plants	1907.6	1907.6	Philippines	Manila Electric Co.	Philippines	
*Tahrir Petrochemicals Complex	Power Plants	10,900	4,650	Egypt	Carbon Holdings	Egypt	2018
Red Sea Port of Hamrawein Power Plant	Power Plants	6190		Egypt	Mitsubishi Heavy Industries	Japan	
					Toyota Tsusho Corporation	Japan	
					Orascom Construction Industries	Egypt	
					Elsewedy Electric	Egypt	
*Jawa 1 Power Plant Project	Power Plants	1,800	1,312	Indonesia	Marubeni Corporation	Japan	
					Sojitz Corporation	Japan	
					PT Pertamina Persero	Indonesia	
					Mitsui O.S.K Lines	Japan	
35GW Indonesia Power Station Project	Power Plants	1,620	1,620	Indonesia	PT Perusahaan Listrik Negara	Indonesia	

Note: (*) represents pioneers deals assets in terms of value and highlighted in Section 4.6.1 Vehicle structures-Deals levels

Source: Author's own analysis (Preqin data)

Continue-Table C.2.3: Summery of the largest deal levels in **Conventional Power energy sector** within EIM, Q1-2009-Q4-2019

Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Asset Country	Investors/ Buyers (Firms)	Investor Country	Trans-action year
Jharkhand Power Plant	Power Plants	1430.49	1430.49	India	Adani Power	India	2019
Hamriyah Power Plant	Power Plants	1684	1684	United Arab Emirates	GE Energy Financial Services (EFC)	US	
					Sumitomo Corporation	Japan	
					Sharjah Asset Management	United Arab Emirates	
					Shikoku Electric Power Company	Japan	
Gulf Pluak Daeng Combined-Cycle Gas Turbine Project	Power Plants	1360	1360	Thailand	Mitsui & Co. Alternative Investments	Japan	
					Gulf Energy Development	Thailand	
Açu Port Thermoelectric Plant	Power Plants	1079.34	473.85	Brazil	Prumo Logistica	Brazil	
					BP Oil and Energy	UK	
					Siemens	Germany	

Source: Author's own analysis (Preqin data)

Table C.2.4: Summery of the largest deal levels in **Utilities services sector** within EIM, Q1-2009-Q4-2019

Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Asset Country	Investors/ Buyers (Firms)	Investor Country	Trans-action year
Mexico Wastewater Treatment Services Expansion Project	Water Treatment	551.1		Mexico	Sumitomo Corporation	Japan	2009
					Degremont India Limited JV	India	
New Cairo Wastewater Treatment Plant	Sewage Treatment Plants	472	103	Egypt	Orascom Construction Industries	Egypt	
					FCC Construcción	Spain	
Atotonilco Wastewater Treatment Plant	Water Treatment	386.78	235.1	Mexico	Mitsui & Co - Corporate Development Business Unit	Japan	
					Tokyo Gas	Japan	
					Ingenieros Civiles Asociados (ICA)	Mexico	
					Impulsora del Desarrollo y el Empleo en América Latina (IDEAL)	Mexico	
					Acciona	Spain	
					other minority shareholder	?	
Wama River Dam Project	Water Distribution	79.69		India	Supreme Infrastructure India	India	2010
					SPML Infra Ltd	India	
Brackish Water Desalination Plant	Water Treatment	46.05		India	Doshion Water Solution Pvt. Ltd.	India	
Al-Zawrah Desalination Plant	Water Treatment	45.67		United Arab Emirates	Ferrovial SA	Spain	
					ESSA Engineering & Marine Services	United Arab Emirates	
Ajman Desalination Plant PPP	Water Treatment	45.67		United Arab Emirates	Ferrovial SA	Spain	
					ESSA Engineering & Marine Services	United Arab Emirates	
El Zapotillo Aqueduct Project	Water Utilities	566	487	Mexico	Abengoa	Spain	2011

Continue-Table C.2.4: Summery of the largest deal levels in **Utilities services sector** within EIM, Q1-2009-Q4-2019

Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Asset Country	Investors/ Buyers (Firms)	Investor Country	Trans-action year
Levashovo Waste Treatment Plant Project	Sewage Treatment Plants	334.19		Russia	ELLAKTOR Group	Greece	Cont. 2011
Cleanairtech Sudamerica Desalination Plant	Water Treatment	180	120.05	Chile	Compania Minera del Pacifico S.A. (CAP Minería)	Chile	
					Mitsubishi Corporation	Japan	
Durgawati Reservoir Project	Water Treatment	148.53		India	Vijeta Projects and Infrastructure Ltd.	India	2012
Lower Pedhi Major Irrigation Project	Water Treatment	132.58		India	Unidentified Investor/s	?	
Arpa-Bhaisajhar Barrage Project	Water Distribution	84.63		India	Unidentified Investor/s	?	
São Lourenço Water PPP	Water Utilities	1469.95		Brazil	Camargo Correa Infraestrutura SA	Brazil	2013
Dahej Seawater Desalination Facility	Water Treatment	600		India	ITOCHU Corporation	Japan	
					Hitachi	Japan	
					Hyflux	Singapore	
Zhuhai Environmental Protection	Water Treatment	457.5		China	China Everbright International	Hong Kong SAR - China	
Rapti Main Canal Project	Water Treatment	231.67		India	Patel Infrastructure Pvt.Ltd.	India	2014
					APCO Infratech	India	
Guwahati Sewerage Scheme Project	Sewage Utilities	185.95		India	Unidentified Investor/s	?	
Falta-Mathurapur Water Supply Scheme Project	Water Treatment	185.95		India	Simplex Infrastructures Ltd	India	
Bulacan Water Supply Project	Water Distribution	477.3		Philippines	Korea Water Resources	South Korea	2015
					San Miguel Corporation	Philippines	
Narmada-Malwa-Gambhir Link Lift Irrigation Project	Water Treatment	257.07		India	Navayuga Engineering Company	India	
24X7 Urban Water Supply - Dharwad Project	Water Distribution	102.58		India	Tata Group	India	
El Salitre Wastewater Treatment Plant PPP	Sewage Treatment Plants	423.3		Colombia	Aqualia	Spain	2016
Zhenjiang Sponge City Project PPP	Water Utilities	364.28		China	China Everbright International	Hong Kong SAR - China, China	
					Zhenjiang Waterworks Corporation	Hong Kong SAR - China, China	
CT Environmental Wastewater Project	Water Treatment	250	250	China	Unidentified Investor/s	?	
Shuaibah Expansion II IWP Project	Water Treatment	315	307.8	Saudi Arabia	ACWA Power International	Saudi Arabia	2017
Saudi Arabia Desalination Plants	Water Treatment	183.2		Saudi Arabia	Hyflux	Singapore	
Rabigh 3 Independent Water Plant	Water Treatment	700.05	700.05	Saudi Arabia	ACWA Power International	Saudi Arabia	2018
					Saudi Brothers Commercial Company (SBCC)	Saudi Arabia	
Medan Drinking Water Production Plant	Water Distribution	211.48		Indonesia	Suez Environnement	France	

Source: Author's own analysis (Preqin data)

Continue-Table C.2.4: Summery of the largest deal levels in **Utilities services sector** within EIM, Q1-2009-Q4-2019

Asset Name	Sub-Sector	Deal Size ($MN)	Debt amount provided ($MN)	Asset Country	Investors/ Buyers (Firms)	Investor Country	Trans-action year
Anyang Integrated Environmental Plant	Water Utilities	142.06		China	Fengzhu Textile Technology	China	Cont. 2018
					Citic Envirotech	Singapore	
Recife Sewage Project	Sewage Utilities	1245	140.9	Brazil	Brookfield Asset Management	Canada	2019
					CompesaPrev	Brazil	
Dongying Chemical Industry Park Wastewater Treatment Plant	Sewage Treatment Plants	1098.84		China	Suez Environnement	France	
					NWS Holdings	Hong Kong SAR - China	
Taweelah Desalination Plant	Water Treatment	868.52	737.84	United Arab Emirates	Mubadala Investment Company	United Arab Emirates	
					Abu Dhabi Power Corporation	United Arab Emirates	
					ACWA Power International	Saudi Arabia	

Source: Author's own analysis (Preqin data)

Appendix C.3: Overview of total Funds levels (Q1-2006-Q4-2019)

The results of PEIF levels downloaded from the Preqin data stream: **913 results**. Post-organizing and re-structuring the infrastructure funds, the total number of funds that were invested in infrastructure assets was **908 infrastructure funds, managed by 405 fund managers**. These funds were divided into known fund value and unknown fund value. The total number of **known fund value was 851,** with a total size of USD 682,364.83 MN., and the number of unknown fund value **was 55 funds**. Table C.4 presents the unlisted infrastructure investment in infrastructure, broken down annually.

Table C.4: Overview of total Funds levels (Q1-2006-Q4-2019)

	Total Funds numbers	Total Unknown funds numbers	Total known Funds numbers	Total known Funds values ($Mn.)	Total known global funds numbers (GFL)	Total known global values ($Mn.) (GFL)	(2)Total Known regional funds numbers (RFL)	Total known regional funds values ($Mn.) (RFL)	(3)Total Known local funds numbers (LFL)	Total known local funds values ($Mn.) (LFL)	(4)Total funds numbers (GFL+RFL)	Total funds values ($ Mn.) (GFL+RFL)	Remarks
2006	**33 Fund**	-	33 Fund	**33,083.83**	7 Funds	5,954.88	9 Funds	**12,571.8**	17 Funds	**14,556.91**	**16 Funds**	**18,526.68**	4[L], 2[S]
2007	**47 Funds**	-	47 Funds	**44,357.07**	15 Funds	18,477.94	14 Funds	**13,374.37**	18 Funds	**12,504.76**	**29 Funds**	**31,852.31**	11[L], 2[S]
2008	**42 Funds**	2 Funds	40 Funds	**28,630.24**	11 Funds	7,712.89	10 Funds	**5,492.87**	19 Funds	**15,424.48**	**21 Funds**	**13,205.76**	2[L], 2[S]
2009	**36 Funds**	2 Funds	34 Funds	**21,987.29**	19 Funds	11,011.79	5 Funds	**2,197.5**	10 Funds	**8,778**	**25 Funds**	**13,209.29**	1[L], 2[S]
2010	**61 Funds**	2 Funds	59 Funds	**29,978.73**	17 Funds	11,289.07	9 Funds	**4,766.46**	33 Funds	**13,923.2**	**27 Funds**	**16,055.53**	5 [L], 4 [S]
2011	**47 Funds**	4 Funds	43 Funds	**22,308.29**	11 Funds	3,917.93	6 Funds	**2,094.38**	26 Funds	**16,295.98**	**17 Funds**	**6,012.31**	1 [L],3 [S]
2012	**66 Funds**	2 Funds	64 Funds	**34,758.71**	12 Funds	12,326.12	13 Funds	**6,948.34**	39 Funds	**15,484.25**	**25 Funds**	**19,274.46**	3 [L], 6 [S]
2013	**80 Funds**	5 Funds	75 Funds	**59,020.86**	22 Funds	23,653.67	10 Funds	**8,345.28**	43 Funds	**27,021.91**	**32 Funds**	**31,998.95**	1 [L], 9 [S]
2014	**77 Funds**	5 Funds	72 Funds	**57,081.34**	26 Funds	24,714.44	2 Funds	**3,081.08**	44 Funds	**29,3225.32**	**28 Funds**	**27,795.52**	2 [L], 9 [S]
2015	**97 Funds**	12 Funds	85 Funds	**54,722.56**	22 Funds	17,635.11	16 Funds	**5,913.09**	47 Funds	**31,174.36**	**38 Funds**	**23,548.2**	3 [L], 10 [S]
2016	**105 Funds**	9 Funds	96 Funds	**92,283.34**	30 Funds	45,440	15 Funds	**21,979.54**	49 Funds	**24,863.85**	**45 Funds**	**67,419.49**	1 [L], 19 [S]
2017	**99 Funds**	4 Funds	95 Funds	**68,754.69**	32 Funds	34,332	25 Funds	**12,557.96**	38 Funds	**21,864.83**	**57 Funds**	**46,889.86**	12 [S]
2018	**57 Funds**	2 Funds	55 Funds	**56,551.71**	16 Funds	20,514	7 Funds	**5,926.68**	32 Funds	**30,111.18**	**23 Funds**	**26,440.53**	1 [L], 3 [S]
2019	**61 Funds**	6 Funds	55 Funds	**78,846.17**	32 Funds	62,973	5 Funds	**3,192.56**	18 Funds	**12,680.96**	**37 Funds**	**66,165.21**	7 [S]
Total:	**908 Funds**	**55 Funds**	**853 Funds**	**682,364.83**	**272 Funds**	**299,952.84**	**146 Funds**	**108,441.91**	**433 Funds**	**537,909.99**	**420 Funds**	**408,394.1**	**25 [L], 90[S]**

Note: [L]: Liquidated Funds, [S]: Separately Managed Account

Source: Author calculation (Preqin data)

Appendix C.4: Infrastructure investment funds within GFL and RFL

Table C.4 Summary of fund managers that diversified their infrastructure investment funds within GFL and RFL, Q1-2006-Q4-2019, (USD MN.)

		GFL		RFL	
Fund Manager	**Funds manager location**	**Fund Name**	**Fund Size ($ MN)**	**Fund Name**	**Fund Size ($ MN)**
3i	UK	3i India Infrastructure Fund	1200	BEIF II	487
				3i MIA	900.88
[(1)]Macquarie Infrastructure and Real Assets (MIRA)	UK	ADCB Macquarie Infrastructure Fund	630	Macquarie European Infrastructure Fund II	6198.85
		Macquarie Global Infrastructure Fund III	265.71	Macquarie European Infrastructure Fund II	6198.85
		Macquarie Infrastructure Partners II	1600	Macquarie Russia & CIS Infrastructure Fund	630
		Macquarie Mexican Infrastructure Fund	401.17	Macquarie European Infrastructure Fund V	4504.5
		Macquarie State Bank of India Infrastructure Fund	1169	Macquarie Super Core Infrastructure Fund	2934.98
		Macquarie Korea Growth Fund	518.65		
		Philippine Investment Alliance for Infrastructure	625		
		Macquarie Everbright Greater China Infrastructure Fund	870		
		Macquarie Asia Infrastructure Fund	3100		
		MIRA Infrastructure Global Solutions	1004		
		Macquarie Asia Infrastructure Fund II	3300		
InfraRed Capital Partners	UK	InfraRed Environmental Infrastructure Fund	292.47	InfraRed Infrastructure Yield Fund	786.84
		InfraRed Infrastructure Fund V	1200		
		InfraRed Infrastructure Fund III	1216.5		
Platina	UK	Platina Energy III	279.91	European Renewable Energy Fund	288.07
Innisfree	UK	Innisfree PFI Secondary Fund II	829.49	Innisfree PFI Continuation Fund	608.76
				Innisfree PFI Secondary Fund	1196.35
UBS Asset Management	UK	Golden State Matterhorn	500	UBS Infrastructure Debt Platform	636.23
				UBS International Infrastructure Fund II	644
Meridiam	France	Meridiam Infrastructure Fund	864.12	Meridiam Infrastructure Europe II	1246.23
		Meridiam Infrastructure Africa Fund	613.1		
		Meridiam Infrastructure Europe III	1469.26		
Ardian	France	ASF VII Infrastructure	1,650	AXA Infrastructure Generation II	1445.5
		Ardian Americas Infrastructure Fund IV	770	Ardian Infrastructure Fund IV	2,870.76
		Ardian Infrastructure Fund V	6,881.34		
Mirova	France	FIDEPPP	263.94	EUROFIDEME IV	943.84
		FIDEPPP II	165.24	Mirova Core Infrastructure Fund II	1345.88
		Althelia Climate Fund	120		
HSBC Germany	Germany	HSBC Infrastructure II	397.68	HSBC Infrastructure I	343.72
		HSBC Infrastructure III	582.88		

Continue-Table C.6 Summery of funds managers diversified their infrastructure investment funds within GFL and RFL, Q1-2006-Q4-2019, (USD MN.)

		GFL		RFL	
Fund Manager	**Funds manager location**	**Fund Name**	**Fund Size ($ MN)**	**Fund Name**	**Fund Size ($ MN)**
EQT	Sweden	EQT Infrastructure IV	10195.57	EQT Infrastructure II	2568.04
				EQT Infrastructure III	4232.04
TIIC	Portugal	Transport Infrastructure Investment Company	189.01	TIIC 2	344.27
Capital Dynamics	Switzerland	Capital Dynamics Clean Energy and Infrastructure Fund VII-A	187.2	Capital Dynamics Clean Energy and Infrastructure Fund	462.5
				Capital Dynamics Clean Energy and Infrastructure Fund V JV	1205
				Capital Dynamics Clean Energy and Infrastructure Fund VI	67.4
				Capital Dynamics Clean Energy and Infrastructure Fund VII JV	1,205
KB Asset Management	South Korea	KB IGCF	10	KB Global Infrastructure	100
		KB Manzanillo Fund	46.4	KB Hungary Highway Infrastructure Fund	16.91
		KB Australia Infrastructure	41.29	KB PG Energy Infra Fund	68
		KB Gwangju SRF Plant Fund	38.56	KB Saudi SEPCO II	50
		KB TIF Core Infrastructure	71.83	KB Global Infrastructure Fund V	95.04
		KB AMP Infrastructure Debt Fund I	120		
		KB AMP Infrastructure Debt Fund II	60		
		KB North America Energy Private Special Asset 1	150		
		KB AMP Infrastructure Debt Fund III	80		
		KB Continental Europe Infrastructure I	194.87		
		KB Continental Europe Infrastructure II	60.2		
		KB Chile Solar Energy	50		
		KB Continental Europe Infrastructure III	69.93		
		KB Peru Transmission	30.3		
		KB Turkey Motorway	58.39		
		KB AMP Infrastructure Debt Fund IV	290		
		KB AMP Infrastructure Debt Fund V	230		
		KB AMP Infrastructure Debt Fund VI	150		
		KB AMP Infrastructure Debt Fund VII	100		
		KB Energy Infra Credit I	40		
		KB Global Infrastructure Fund VI	95.04		
		KB Mobility Solution I	159.4		
		KB Mobility Solution II	61.99		

Source: Preqin; Author’s own analysis

Continue-Table C.6 Summery of funds managers diversified their infrastructure investment funds within GFL and RFL, Q1-2006-Q4-2019, (USD MN.)

		GFL		RFL	
Fund Manager	**Funds manager location**	**Fund Name**	**Fund Size ($ MN)**	**Fund Name**	**Fund Size ($ MN)**
KDB Infrastructure Investments Asset Management	South Korea	Global Infrastructure Fund	117.72	KIAMCO Power Energy Private Fund Special Asset Trust 1	231
		Global Infrastructure Fund No.3	0.1	KIAMCO Power Energy Private Fund Special Asset Trust 2	439.11
				KIAMCO Power Energy Private Fund Special Asset Trust 3	2236.85

Source: Preqin; Author’s own analysis

Appendix D.1: Semi-Structured Interviews (SSI-A) - Professional Institutions perspective (first Strand)

Ulster University
Faculty of Computing, Engineering and Built Environment
School of the Built Environment
Doctoral Collage
Jordanstown Campus
Shore Rd, Newtownabbey, BT37 0QB

<u>TO WHOM IT MAY CONCERN</u>

Dear Sir/Madam

<u>LETTER OF CONSENT</u>

I am conducting this interview as a part of PhD research (postgraduate degree programme) at Ulster University, where I am assessing the Scale and Nature of Global Infrastructure Investment Challenges. This research focuses primarily on understanding of global investment in infrastructure projects, the current challenges and the implications for Emerging Infrastructure Markets within developing countries. In addition, Identify factors which influence investment flows into infrastructure projects and evaluates the specific barriers and constraints which prevent investment in emerging countries.

It's my intention to have inputs from key players in the universe of infrastructure investment and funds which involved in economic infrastructure projects (i.e. transport sector, energy sector, and utilities sector) in emerging markets and developing countries, which will allow me to better understand the current challenges, the needs, professional perspectives and a multi-disciplinary inputs and participatory approaches in infrastructure investment in emerging markets.

I would like to seek your assistance through the completion of this short semi-structure interviews, which is design to capture your experience and perception on economic infrastructure investment in Emerging Infrastructure Markets.

Your participation is strictly voluntary and you can withdraw from participating at any stage during this exercise and the data that you provided will withdraw and will not include in the analysis. You can also refuse to answer any of the questions included or indicate elements of your disclosure you do not wish to answer as a part of your response.

All information you provided during this exercise will be treated with the strictest of confidentially and will only be used for the purpose of this research. You are not required to provide any form of identification information for either yourself of place of employ and your responses will be fully anonymous.

If you agree to continue participating in this exercise, please indicate by ticking the appropriate box below.

Kind Regards,

I have read and understand the requirement of this interview and agreed to participate. ☐
I have read and understand the requirement of this interview and decline to participate further. ☐

Note: In this research, the Emerging Infrastructure Markets include countries: Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Saudi Arabia, South Africa, South Korea, Taiwan China, Thailand, Turkey, and United Arab Emirates.

IB Institution Background

IB-1 Please outline the nature of your institution's participation in infrastructure investment (General information):

IB1.1 Type of institution:						
IB 1.2 The institution (Office):						
□ North America and Canada	□ Europe	□ Latin America	□ Asia	□ Africa	□ Australia	□ Country:

IGS Institutions' strategy toward Emerging Infrastructure Markets

IGS.1	What was the main motive for market entry into E.E? (motivate global institutional investors to invest in the market of emerging infrastructure markets? 1- 2- 3-

IGS.2	What are the most important criteria for the country allocation process of institutional investors (international asset allocation in emerging infrastructuremarkets)? Please rank responses 1: most important, 5: least important		
[ ] Source of funding	[ ] Economic instability	[ ] Fiscal stress	[ ] Gov. regulation and rule
[ ] Nature and duration of the project	[ ] Economic growth and development	[ ] Capital market (financial market development)	[ ] Expected deal flows
[ ] Political instability	[ ] Business transparency and market openness	[ ] Availability of financial debt	[ ] Interest rate
[ ] PPP framework	[ ] Internal rate of return	Other:	

IGS.3	What are the most important elements of an Emerging Infrastructure Markets investment strategy? Can you rank them 1: most important, 4: least important		
□ Business risk	□ Geographic location	□ Investment strategy (core, core plus, opportunistic strategy)	□ Industry development

IGS.4	What makes investors and fund managers concentrate their investment in a specific country in emerging markets? Why do they not distribute their investment among other areas?

IPS	**Infrastructure projects in the pipeline in EIM, strategies and policy:**
IPS.1	In your opinion, what policies boost the infrastructure investment market in Emerging Infrastructure Markets? there are many MDBs, massive amount of private investors and fund managers distributed across the worlds, and EM countries are in needs for infrastructure services, why the gap is exist in spite of all these entities?

IC1 Investor challenges in Emerging Infrastructure Markets

IC1.1 Risk/return challenges

IC1.1.3 What critical risks in Emerging Infrastructure Markets do investors encounter? How do they integrate risks in the investment analysis process assessment?

FC Funds and financial instruments challenges

FC.1 How do investors select infrastructure assets to invest in EM?

EMIC Emerging Infrastructure Markets- internal challenges

EMIC1 EIM internal common challenges and barriers

EMIC1.1 What are the factors that affect infrastructure investment in EIM (i.e. what make infrastructure investment in EIM challenging)?

1-
2-
3-
4-

EMIC1.2 In your opinion, what are the key considerations that investors need to take into account in the investment analysis process in EIM? What factors are considered when assessing the attractiveness of an emerging market?

1-
2-
3-
4-

EMIC2 EIM government regulation and rules

EMIC2.1 To what extent is the regulatory framework important for infrastructure investment in EIM?

□ Very unimportant □ unimportant □ Neither □ Important □ Vey Important

AAC Asset allocation challenges

AAC1: What types of sectors and regions are investors and fund managers targeting in EIM (the markets with the most potential)? Please rank.

AAC1.1: **Sectors:** [ ] Transport [ ] Renewable energy [ ] conventional Power energy [ ] Water services [ ] Sewage services

AAC 1.2**: Regions (countries):**	[ ] Malaysia	[ ] Indonesia	[ ] Philippines	[ ] Poland	[ ] Thailand
[ ] China	[ ] Taiwan China	[ ] India	[ ] Saudi Arabia	[ ] Mexico	[ ] Brazil
[ ] Czech Republic	[ ] Egypt	[ ] Chile	[ ] Colombia	[ ] Russia	[ ] Greece
[ ] United Arab Emirates	[ ] Turkey	[ ] South Africa	[ ] South Korea	[ ] Peru	[ ] Hungary

AAC2: Raising specific funds to invest in Emerging Infrastructure Markets is about:

□ Better access to deal flows from that country
□ Recognition of deal opportunities
□ A route to accessing investors' capital in that geographical area
□ Other – please specify: -----------------------------------

You have come to the end of this interviews. Thank you for your participation and cooperation as it will help me to better understand critical factors and challenges that influence on infrastructure investment in emerging markets and provide answers to my research questions. I remind you that all the information you provided in this exercise will be treated with the strictest of confidence, and there will be no way of identifying your responses when the information from other interview respondents are collated.

Below are my contact details. If you have any additional quarries, clarification or want to make any adjustment to your responses, please feel free to contact me.
If your participation in this exercise has caused any concerns, anxiety, or otherwise distressed you, you may contact.

Professor Martin Haran
Professor of Real Estate and Urban Studies
Built Environment Research Institute, Ulster University
Jordanstown Campus, Shore Road , Newtownabbey , Co Antrim , BT37 0QB
Tel.: 028 9036 8757, Email: m.haran@ulster.ac.uk

for further clarification or to lodge a complaint. If you would like to learn more about details of this research I would be happy for forward you some additional information.

Name: Nijood M Alnaseem Email: Alnaseem-n@ulster.ac.uk T: +447493371154

Appendix D.2: Semi-Structured Interviews (SSI-B)- most Active investors (selective case studies (Second Strand)

Ulster University
Faculty of Computing, Engineering and Built Environment
School of the Built Environment
Doctoral Collage
Jordanstown Campus
Shore Rd, Newtownabbey, BT37 0QB

TO WHOM IT MAY CONCERN

Dear Sir/Madam

LETTER OF CONSENT

I am conducting this interview as a part of PhD research (postgraduate degree programme) at Ulster University, where I am assessing the Scale and Nature of Global Infrastructure Investment Challenges. This research focuses primarily on understanding global investment in infrastructure projects, the current challenges and the implications for Emerging Infrastructure Markets within developing countries. In addition, it seeks to identify factors that influence investment flows into infrastructure projects and evaluates the specific barriers and constraints which prevent investment in emerging countries.

As part of this research, I would like to obtain input from key players in the field of infrastructure investment and funds concerned with economic infrastructure projects (i.e. the transport sector, the energy sector, and the utilities sector) in emerging markets and developing countries, which would allow me to better understand the current challenges, needs, professional perspectives and multi-disciplinary inputs and participatory approaches related to infrastructure investment in emerging markets.

As part of the empirical arm of this research, a preqin data stream was exploited to conduct an analysis of infrastructure deals and funds level in Emerging Infrastructure Markets. The assessment reveals that your organisation is considered to be one of the top investors that target their infrastructure investment strategy toward emerging markets. Therefore, I would like to ask for your assistance through the completion of this short semi-structured questionnaire which is designed to capture your experience and perception on economic infrastructure investment in Emerging Infrastructure Markets.

Your participation is strictly voluntary and you can withdraw from participating at any stage during this exercise. If you do decide to withdraw, the data that you would have provided will be withdrawn and would not be included in the analysis. You can also refuse to answer any of the questions included in the questionnaire or indicate elements of your disclosure you do not wish to be included in the analysis.

All the information you provide during this exercise will be treated with the strictest confidence and will only be used for the purposes of this research. You are not required to provide any form of identification information for either yourself or your place of employ and your responses will be fully anonymous.

If you agree to continue participating in this exercise, please indicate by ticking the appropriate box below.

Kind Regards,

I have read and understand the requirement of this interview and agreed to participate. ☐

I have read and understand the requirement of this interview and decline to participate further. ☐

Note: In this research, the Emerging Infrastructure Markets include countries: Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Poland, Russia, Saudi Arabia, South Africa, South Korea, Taiwan China, Thailand, Turkey, and United Arab Emirates.

IB Institution Background (Investor and/or fund managers)

IB-1 Please outline the nature of your institution's participation in infrastructure investment (General information):

IB1.1 Type of institution:

□ Corporate investor □ Construction and engineering service □ Electric power distribution company □ Fund manager □ Fund of Funds manager □ Investment company specialising in renewable energy

□ Investment company in infrastructure □ Investment bank □ Investment company □ Infrastructure firm □ Insurance company □ Other:

IB 1.2 The investors/ institution (Office):

□ North America and Canada □ Europe □ Latin America □ Asia □ Africa □ Australia □ Country:

IB1.3 Investors/ institution asset type focus (you can select more than one):

□ Diversified (Economic/ Social) □ Diversified (Economic) □ Transport □ conventional Power energy □ Renewable energy □ Utilities (water & sewage services) □ Other:

IGS Institution's general strategy toward Emerging Infrastructure Markets

IGS.1 Can you outline the overall fund size being managed and the percentage of funds allocated to Emerging Infrastructure Markets (EIM):

□ <$100 Mn. □ $100 Mn.-$999Mn. □ $1,000 Mn.-$9,999Mn. □ >$9,999 Mn. □ Not Applicable EIM%:

IGS.2 As a long-term investor/fund manager, what are the most important criteria for the country allocation process of institutional investors (international asset allocation in Emerging Infrastructure Markets)? Please rank responses 1: most important, 5: least important

[ ] Source of funding	[ ] Economic instability	[ ] Fiscal stress	[ ] Gov. regulation and rule
[ ] Nature and duration of the project	[ ] Economic growth and development	[ ] Capital market (financial market development)	[ ] Expected deal flows
[ ] Political instability	[ ] Business transparency and market openness	[ ] Availability of financial debt	[ ] Interest rate
[ ] PPP framework	[ ] Internal rate of return	Other:	

IGS.3 What are the most important elements of an Emerging Infrastructure Markets investment strategy? Please rank them 1: most important, 4: least important

□ Business risk □ Geographic location □ Investment strategy (core, core plus, opportunistic strategy) □ Industry development

IGS.4 What was the main motive for market entry into E.E? (motivate global institutional investors to invest in the market of emerging infrastructure markets?

1-
2-
3-

ISS Institution's specific strategy toward Emerging Infrastructure Markets

ISS1 Mega trends in Emerging Infrastructure Markets (most active investors):

ISS1.1 Can you outline why you choose to invest in emerging markets?

ISS1.2 Do you concentrate your investment in specific countries in emerging markets?

	[ ] Yes, can you state them: [ ] No , if yes, please answer the following sub-question
	What makes investors and fund managers concentrate their investment in a specific country in emerging markets? Why do they not distribute their investment among other areas?

ISS2	**Investment process in Emerging Infrastructure Markets (investment policy [IP]):**
ISS2.1	How do you evaluate the multi-national markets (i.e. investment criteria)?

IPS	**Infrastructure project pipeline future in EIM, strategies and policy:**
IPS.1	In your opinion, what policies boost the infrastructure investment market in Emerging Infrastructure Markets? there are many MDBs, massive amount of private investors and fund managers distributed across the worlds, and EM countries are in needs for infrastructure services, why the gap is exist in spite of all these entities?

IC1 Investor challenges in Emerging Infrastructure Markets

IC1.1	**Risk/return challenges**
IC1.	As a long-term investor, what are the critical risks in Emerging Infrastructure Markets? How do you integrate risks in the investment analysis process assessment?

FC	**Funds and financial instruments challenges**
FC.1	How do you select infrastructure assets to invest in EM?

EMIC Emerging Infrastructure Markets- internal challenges

EMIC1	**EIM internal common challenges and barriers**
EMIC1.1	What are the factors that affect infrastructure investment in EIM (i.e. what make infrastructure investment in EIM challenging)? 1- 2- 3- 4-

EMIC1.2	In your opinion, what are the key considerations that investors need to take into account in the investment analysis process in EM? What factors are considered when assessing the attractiveness of an emerging market? 1-

2-
3-

AAC Asset allocation challenges

AAC1: What types of sectors and regions are you targeting in EIM In the future (the markets with the most potential)? Please rank.					
AAC1.1**: Sectors:**	[ ] Transport	[ ] Renewable energy	[ ] conventional Power energy	[ ] Water services	[ ] Sewage services

AAC 1.2**: Regions (countries):**	[ ] Malaysia	[ ] Indonesia	[ ] Philippines	[ ] Poland	[ ] Thailand
[ ] China	[ ] Taiwan China	[ ] India	[ ] Saudi Arabia	[ ] Mexico	[ ] Brazil
[ ] Czech Republic	[ ] Egypt	[ ] Chile	[ ] Colombia	[ ] Russia	[ ] Greece
[ ] United Arab Emirates	[ ] Turkey	[ ] South Africa	[ ] South Korea	[ ] Peru	[ ] Hungary

AAC2: Raising specific funds to invest in Emerging Infrastructure Markets is about:	
□ Better access to deal flows from that country	□ Recognition of deal opportunities
□ A route to accessing investors' capital in that geographical area	□ Other – please specify: -----------------------------------

You have come to the end of this interviews. Thank you for your participation and cooperation as it will help me to better understand critical factors and challenges that influence on infrastructure investment in emerging markets and provide answers to my research questions. I remind you that all the information you provided in this exercise will be treated with the strictest of confidence, and there will be no way of identifying your responses when the information from other interview respondents are collated.

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for further clarification or to lodge a complaint. If you would like to learn more about details of this research I would be happy for forward you some additional information.

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Appendix D.3: Predominant global investors and fund managers of infrastructure investment geographical focus within EM

Table: D.3.1 Breakdown of predominant global investors and fund managers of infrastructure investment geographical focus within EM, Q1-2009-Q4-2019, (USD, MN.), Source: Preqin; Author's own analysis

Investors Profile					Investment Detailed Breakdown						Funds Detailed Breakdown					funds Family Details		
Investors Name	Investor Location	Type of investors	Total investment No.	Total Deals size (USD MN.)	Country	Total Deals size (USD MN.)	Asset Name	Industry	Project Stage	Partnership with other investors	Fund Name	Fund Manager	Funds Size	Investment Strategy	Geographical target	Total funds No.	Target EM geographical allocation	Industry Focus
[1] Enel green power SpA	Italy	Renewable energy company	33	4,515.17	Peru	150[1]	Rubi Solar PV Plant	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					Peru	160[1]	Wayra I Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Mexico	340	1.7GW Mexico Solar and Wind Portfolio	Solar Portfolio is comprised of eight solar and wind power plants	Greenfield	Yes [5] investors (80%)	CKD Infraestructura Mexico Fund	CKD Infraestructura **(LFL)**	1055.57	Infrastructure Core Plus	Mexico	1	Mexico	Diversified (Economic)
					Mexico	76[1]	Bii Nee Stipa II Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Mexico	100[1]	La Mata Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Mexico	115	Amistad II Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
							Amistad III Wind	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
							FarmAmistad IV wind farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Mexico	160	Magdalena 2 Solar Plant	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					Mexico	104[1]	Dominica Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Mexico	1,000	Villanueva I Solar Farm	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
							Villanueva III Solar Farm	Solar Power	Greenfield									
							Don José Solar Farm	Solar Power	Greenfield									
					Brazil	100[1]	260MW Brazil Wind Portfolio	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Brazil	600	Nova Olinda Solar Power Facility	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
							Horizonte MP Solar Power Facility	Solar Power	Greenfield									
							Lapa Solar Power Facility	Solar Power	Greenfield									
					Brazil	46.32	Cristalandia Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Brazil	100.26[1]	Ituverava Solar Power Plant	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					Brazil	212[1]	350MW Brazilian Solar Portfolio	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					Chile	108.11[1]	Taltal Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
							Valle De Los Vientos Wind Farm	Wind Power	Greenfield									
					Chile	320	Cerro Pabellón Geothermal Plant	Geothermal Power	Greenfield	Yes [1] 49%	-	-	-	-	-	-	-	-
					Russia	300	Kolskaya Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Russia	143.76[1]	Azovskaya Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Russia	340.49[1]	Murmansk Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					South Africa	1321.55[1]	Nxuba Wind Power Project	Wind Power	Greenfield	Yes [1] investor	-	-	-	-	-	-	-	-
							Oyster Bay Wind Power Project	Wind Power	Greenfield		-	-	-	-	-	-	-	-
							Soetwater Wind Power Project	Wind Power	Greenfield		-	-	-	-	-	-	-	-
							Garob Wind Power Project	Wind Power	Greenfield		-	-	-	-	-	-	-	-
					South Africa	170.1[1]	Gibson Bay Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
Note: [1]the investor secured debt financing from Bank					**Total PE investment in Latin America and Caribbean region 25 infrastructure assets, 5 Assets in Africa region, and 3 Deals in Europe region.**													

Cont.-Table: D.3.1 Breakdown of predominant global investors and fund managers of infrastructure investment geographical focus within EM, Q1-2009-Q4-2019, (USD, MN.)

Investors Profile					**Investment Detailed Breakdown**						**Funds Detailed Breakdown**							
																funds Family Details		
Investors Name	**Investor Location**	**Type of investors**	**Total investment No.**	**Total Deals size (USD MN.)**	**Country**	**Total Deals size (USD MN.)**	**Asset Name**	**Industry**	**Project Stage**	**Partnership with other investors**	**Fund Name**	**Fund Manager**	**Funds Size**	**Investment Strategy**	**Geographical target**	**Total funds No.**	**Target EM geographical allocation**	**Industry Focus**
[2] Engie	**France**	**Corporate Investor**	**22**	**8,574.46**	Brazil	19.48(1)	Trairi Wind Farm	Wind Power	Greenfield	Yes [1]	-	-	-	-	-	-	-	-
					Brazil	23.65(1)	Fleixeiras Wind Farm	Wind Power	Greenfield	Yes [1]	-	-	-	-	-	-	-	-
					Brazil	22.82(1)	Guajiru Wind Farm	Wind Power	Greenfield	Yes [1]	-	-	-	-	-	-	-	-
					Brazil	21.31(1)	Mundaú Wind Farm	Wind Power	Greenfield	Yes [1]	-	-	-	-	-	-	-	-
					Brazil	1,822.49(1)	Jirau Hydroelectric Power Plant	Hydro Power	Greenfield	Yes [3] 49.9%	-	-	-	-	-	-	-	-
					Brazil	3.59(1)	Umburanas I Wind Power Complex Project	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
							Umburanas II Wind Farm Project	Wind Power	Greenfield									
					Brazil	253.52(1)	Campo Largo I Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Brazil	383.52	Umburanas I Transmission Systems	Power Distribution	Greenfield	No	-	-	-	-	-	-	-	-
					Chile	688.7(1)	Transmisora Eléctrica Del Norte Transmission Line	Power Distribution	Greenfield	Yes [1] 50%	-	-	-	-	-	-	-	-
					Chile	65(1)	Los Loros Solar Farm	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					Poland	20.82	Klukowo/Samborsko Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Indonesia	900	Rantau Dedap Geothermal Power Plant	Geothermal Power	Greenfield	Yes [2] 70%	-	-	-	-	-	-	-	-
					South Africa	178.23(1)	West Coast One Wind Farm	Wind Power	Greenfield	Yes [3] 54.5%	-	-	-	-	-	-	-	-
					South Africa	866.82	Dedisa Power Plant	Power Plants	Greenfield	Yes [2](2)	-	-	-	-	-	-	-	-
							Avon Power Plant	Power Plants	Greenfield									
					South Africa	800(1)	Kathu Solar Park	Solar Power	Greenfield	Yes [7] 51.5%	Lereko Metier Sustainable Capital Fund (LFL)	Metier	66.52	Infrastructure Opportunistic	Africa [Regional]	2	Infrastructure Opportunistic	Renewable Energy
											Lereko Metier REIPPP Fund (LFL)	Metier	57.46					
					Egypt	400(1)	Ras Ghareb Wind Farm	Wind Power	Greenfield	Yes [2] (2)60%	-	-	-	-	-	-	-	-
					Egypt	320(1)	262.5MW Ras Ghareb Wind Farm	Wind Power	Greenfield	Yes [3] (2)80%	-	-	-	-	-	-	-	-
					Egypt	400(1)	Rhas Gharib Wind Farm	Wind Power	Greenfield	Yes [3] (2)60%	-	-	-	-	-	-	-	-
					Egypt	650	Gulf of Suez Wind Farm	Wind Power	Greenfield	Yes [2] (2)	-	-	-	-	-	-	-	-
					United Arab Emirates	1500(1)	Mirfa IWPP	Hydro Power	Greenfield	Yes [1]	-	-	-	-	-	-	-	-
					Total PE investment in Latin America and Caribbean region 11 infrastructure assets, 8 Assets in Africa region, and 1 Deal in each region: Europe, Middle East and Asia region.													

Note: (1)the investor secured debt financing from Bank, (2)the partnership investor is included in the selective case studies analysis.

Source: Preqin; Author's own analysis

Cont.-Table: D.3.1 Breakdown of predominant global investors and fund managers of infrastructure investment geographical focus within EM, Q1-2009-Q4-2019, (USD, MN.)

Investors Profile					Investment Detailed Breakdown						Funds Detailed Breakdown					funds Family Details		
Investors Name	Investor Location	Type of investors	Total investment No.	Total Deals size (USD MN.)	Country	Total Deals size (USD MN.)	Asset Name	Industry	Project Stage	Partnership with other investors	Fund Name	Fund Manager	Funds Size	Investment Strategy	Geographical target	Total funds No.	Target EM geographical allocation	Industry Focus
[3] Actis	UK	Fund Manager	15	7,800	Chile	240	Sarco Wind Project	Wind Power	Greenfield	Yes [1] 40%	Actis Energy Infrastructure Fund III	Actis	1148	[3] Infrastructure Value Added, [1] Infrastructure Opportunistic	Emerging Markets	4	Emerging Markets	Energy
							Aurora Wind Project	Wind Power	Greenfield									
					Chile	52(1)	Negrete Cuel Wind Farm	Wind Power	Greenfield	Yes [1] 40%	N/D	Actis	N/D					
					Chile	1400(1)	Aela Energía	Renewable Energy	Greenfield	Yes [1] 40%	Actis Energy Infrastructure Fund II	Actis	752					
					Brazil	269	Atlantic Energias Renovaveis	Renewable Energy	Greenfield	Yes [2]	Actis Energy Infrastructure Fund III	Actis	1148					
					Brazil	416.78 (1)	Lagoa Do Barro Wind Complex	Wind Power	Greenfield	No	N/D	Actis	N/D					
					Mexico	250	Zuma Energía	Renewable Energy	Greenfield	No	Actis Energy Infrastructure Fund III	Actis	1148					
					India	2,000	TRIL Roads	Roads	Greenfield	Yes [1] 65%	Actis Energy Infrastructure Fund II	Actis	752	[3] Infrastructure Value Added, [1] Infrastructure Opportunistic	Emerging Markets	4	Emerging Markets	Energy
					India	250	Ostro Energy	Renewable Energy	Greenfield	No	Actis Energy Infrastructure Fund III	Actis	1148					
					India	200 (1)	Rewa Solar Power Plant Unit I	Solar Power	Greenfield	No	Actis Energy Infrastructure Fund IV	Actis	2,750					
							Rewa Solar Power Plant Unit II	Solar Power	Greenfield									
							Rewa Solar Power Plant Unit III	Solar Power	Greenfield									
					South Africa	1,900(1)	Lekela Power	Renewable Energy	Greenfield	Yes [1] 40%	Actis Energy Infrastructure Fund III	Actis	1148	[3] Infrastructure Value Added, [1] Infrastructure Opportunistic	Emerging Markets	4	Emerging Markets	Energy
					Egypt	350(1)	Gulf of Suez Wind Power Plant	Wind Power	Greenfield	Yes [1] 40%	Actis Energy Infrastructure Fund III	Actis	1148					
					Egypt	252(1)	West Bakr Wind Project	Wind Power	Greenfield	Yes [1] 40%	N/D	N/D	N/D					
					Total PE investment in Latin America and Caribbean region 7 infrastructure assets, 5 Assets in Asia region, and 3 Deals in Africa region.													
[4]Aleatica	Spain	Corporate Investor	12	5,406.1	Peru	347.56	Northern Toll Road	Toll Roads	Brownfield	No	-	-	-	-	-	-	-	-
					Peru	500	Conexión La Molina-Angamos road PPP project	Roads	Greenfield	No	-	-	-	-	-	-	-	-
					Mexico	665.03(1)	Poetas Expressway	Toll Roads	Brownfield	Yes [1] 68.20%	-	-	-	-	-	-	-	-
					Mexico	792.03(1)	Autopista Urbana Norte	Toll Roads	Brownfield	No	-	-	-	-	-	-	-	-
					Mexico	602.65	Atizapan-Atlacomulco Toll Road	Toll Roads	Greenfield	Yes [1] 36%	-	-	-	-	-	-	-	-
					Mexico	590.96	Puebla Elevated Bypass	Toll Roads	Greenfield	Yes [1] 49%	-	-	-	-	-	-	-	-
					Chile	471.65	Port of Valparaiso Terminal 2	Sea Ports	Greenfield	No	-	-	-	-	-	-	-	-
					Chile	161.52	Industrial Bridge Toll Road	Toll Roads	Greenfield	No	-	-	-	-	-	-	-	-
					Chile	1,200(1)	Américo Vespucio Oriente Highway	Roads	Greenfield	Yes [1] 50%	-	-	-	-	-	-	-	-
					Chile	196	Biobío River Industrial Bridge PPP	Bridges	Greenfield	No	-	-	-	-	-	-	-	-
					Chile	210	Nogales-Puchuncaví Road PPP	Roads	Brownfield	No	-	-	-	-	-	-	-	-
					Colombia	932.38(1)	Rio Magdalena 2 Toll Road	Toll Roads	Brownfield	No	-	-	-	-	-	-	-	-
Note: (1)the investor secured debt financing from Bank, (2)the partnership investor is included in the selective case studies analysis.									**Total PE investment in Latin America and Caribbean region 12 infrastructure assets.**									

Source: Preqin; Author's own analysis

Cont.-Table: D.3.1 Breakdown of predominant global investors and fund managers of infrastructure investment geographical focus within EM, Q1-2009-Q4-2019, (USD, MN.)

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Investors Name	**Investor Location**	**Type of investors**	**Total investment No.**	**Total Deals size (USD MN.)**	**Country**	**Total Deals size (USD MN.)**	**Asset Name**	**Industry**	**Project Stage**	**Partnership with other investors**	**Fund Name**	**Fund Manager**	**Funds Size**	**Investment Strategy**	**Geographical target**	**Total funds No.**	**Target EE geographical allocation**	**Industry Focus**
[5]Grupo Isolux Corsán	**Spain**	**Construction engineering company**	**10**	**2,468.61**	India	210.61	Gujarat/Maharashtra Border-Surat Hazira Port Road Project	Roads	Brownfield	No	-	-	-	-	-	-	-	-
					India	210.6	Gujarat-Maharashtra Border (NH-6) Road Project	Roads	Brownfield	No	-	-	-	-	-	-	-	-
					India	385	Isolux Corsán Concesiones Road Portfolio	Toll Roads	Greenfield	Yes [1] 52%	North Haven Infrastructure Partners I	Morgan Stanley Infrastructure Partners	4,000	Infrastructure Value Added	Global	3	Global	Diversified (Economic)
					India	34.62	Chandbali-Bhadrak-Anandpur Road Upgradation Project	Roads	Brownfield	No	-	-	-	-	-	-	-	-
					India	113.18	Jhanjhi-Demow Road Upgradation Project	Roads	Brownfield	No	-	-	-	-	-	-	-	-
					India	89.12	NH-75 Motorway PPP	Roads	Brownfield	No	-	-	-	-	-	-	-	-
					Brazil	802.05	Salvador de Bahía-Rio de Janeiro Toll Road	Toll Roads	Greenfield	Yes [2] 10%	-	-	-	-	-	-	-	-
					Chile	83.55	Santiago Metro Section 3 of Line 3	Railroads	Greenfield	No	-	-	-	-	-	-	-	-
					Mexico	39.88	Bypass Poniente Acapulco	Roads	Greenfield	No	-	-	-	-	-	-	-	-
					Peru	500	Moyobamba - Iquitos Transmission Line	Power Distribution	Greenfield	No	-	-	-	-	-	-	-	-
					Total PE investment in Asia region 6 infrastructure assets, and 4 Assets in Latin America and Caribbean region.													
[6]Abengoa	**Spain**	**IT and Infrastructure company**	**10**	**3,901.31**	Mexico	640(1)	Nuevo Pemex Cogeneration Power Plant	Power Plants	Greenfield	Yes [2](2) 40%	-	-	-	-	-	-	-	-
					Mexico	566(1)	El Zapotillo Aqueduct Project	Water Utilities	Greenfield	No	-	-	-	-	-	-	-	-
					Brazil	40	Linha Verde Transmission Line	Power Utilities	Greenfield	Yes [1] 51%	-	-	-	-	-	-	-	-
					Chile	1,000(1)	Cerro Dominador Solar Power Project	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					India	69	Dahej-Vadodara Transmission Line Project	Power Distribution	Greenfield	No	-	-	-	-	-	-	-	-
							Bhestan-Navsari Transmission Line Project	Power Distribution	Greenfield	No	-	-	-	-	-	-	-	-
					United Arab Emirates	300(1)	Shams 1 Solar Plant	Solar Power	Greenfield	Yes [2](2) 80%	-	-	-	-	-	-	-	-
					South Africa	468.02(1)	Khi Solar One	Solar Power	Greenfield	Yes [2]	-	-	-	-	-	-	-	-
					South Africa	626.03(1)	Xina Solar Power Plant	Solar Power	Greenfield	Yes [3]	-	-	-	-	-	-	-	-
					South Africa	492.26	KaXu Solar Power Plant	Solar Power	Greenfield	Yes [2] 49%	-	-	-	-	-	-	-	-
					Total PE investment in Latin America and Caribbean region 4 infrastructure assets, 3 Assets in Africa region, and 1 Deal in Middle East region and 2 Assets Asia region.													

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Cont.-Table: D.3.1 Breakdown of predominant global investors and fund managers of infrastructure investment geographical focus within EM, Q1-2009-Q4-2019, (USD, MN.)

Investors Profile					Investment Detailed Breakdown						Funds Detailed Breakdown							
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Investors Name	Investor Location	Type of investors	Total investment No.	Total Deals size (USD MN.)	Country	Total Deals size (USD MN.)	Asset Name	Industry	Project Stage	Partnership with other investors	Fund Name	Fund Manager	Funds Size	Investment Strategy	Geographical target	Total funds No.	Target EM geographical allocation	Industry Focus
[7]Astaldi SpA	Italy	Construction company-Renewable	10	5,799.4	Turkey	163.75	Halic Bridge Project	Bridges	Brownfield	No	-	-	-	-	-	-	-	-
					Russia	2,450.71	Western High Speed Diameter PPP Project	Roads	Brownfield	Yes [1] 50%	-	-	-	-	-	-	-	-
					Turkey	836.58	M4 Underground Metro Line	Railroads	Brownfield	Yes [2] 58%	-	-	-	-	-	-	-	-
					Poland	232.82	Warsaw Underground Line 2 Project	Railroads	Brownfield	No	-	-	-	-	-	-	-	-
					Peru	116	Huanza Hydroelectric Plant	Hydro Power	Greenfield	Yes [1] 40%	-	-	-	-	-	-	-	-
					Peru	122.54	Alto Piura Hydro Project	Hydro Power	Greenfield	Yes [1]	-	-	-	-	-	-	-	-
					Chile	450	Chacayes Hydroelectric Project	Hydro Power	Greenfield	No	-	-	-	-	-	-	-	-
					Chile	593	Comodoro Arturo Merino Benítez International Airport	Airports	Brownfield	Yes [2] 85%	-	-	-	-	-	-	-	-
					Chile	600	Punilla Reservoir Concession Project	Hydro Power	Greenfield	No	-	-	-	-	-	-	-	-
					Indonesia	234	Upper Cisokan Pumped Storage Hydropower Plant Project	Hydro Power	Greenfield	Yes [2] 70%	-	-	-	-	-	-	-	-
					Total PE investment in Latin America and Caribbean region 5 infrastructure assets, 4 Assets in Europe region, and 1 Deal in Asia region.													
[8] Iberdrola SA	Spain	electric utility company-Renewable	10	1,638.38	Mexico	99	Piedra Larga Wind Facility Phase 1	Wind Power	Greenfield	Yes [1] 49.7%	-	-	-	-	-	-	-	-
							Piedra Larga Wind Facility Phase 2	Wind Power	Greenfield									
					Mexico	400	Noreste Power Plant	Power Plants	Greenfield	No	-	-	-	-	-	-	-	-
					Mexico	400	Topolobampo III	Power Plants	Greenfield	No	-	-	-	-	-	-	-	-
					Mexico	300	Puebla Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Brazil	162.46	Canoas Wind Farm	Wind Power	Greenfield	Yes [1] 50%	-	-	-	-	-	-	-	-
							Lagoa I Wind Farm	Wind Power	Greenfield		-	-	-	-	-	-	-	-
							Lagoa II Wind Farm	Wind Power	Greenfield		-	-	-	-	-	-	-	-
					Brazil	276.92[1]	520MW Brazil Wind Portfolio Project	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Poland	160	San Felipe Wind Farm	Wind Power	Greenfield	Yes [1] 50%	-	-	-	-	-	-	-	-
					Total PE investment in Latin America and Caribbean region 9 infrastructure assets and 1 Deal in Europe region.													

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[9] Mainstream Renewable Power	Ireland	Infrastructure Firm	10	6,525.28	Chile	240	Sarco Wind Project	Wind Power	Greenfield	Yes [1] (2) 50%	Actis Energy Infrastructure Fund III	Actis	1148	[3] Infrastructure Value Added, [1] Infrastructure Opportunistic	Emerging Markets	4	Emerging Markets	Energy
							Aurora Wind Project	Wind Power	Greenfield									
					Chile	1400(1)	Aela Energía	Renewable Energy	Greenfield	Yes [1] (2) 60%	Actis Energy Infrastructure Fund II	Actis	752					
					Chile	52(1)	Negrete Cuel Wind Farm	Wind Power	Greenfield	Yes [1] 60%	N/D	Actis	N/D					
					Chile	290	Valle Escondido Solar Park	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
							Río Escondido Solar Park	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					Chile	2,293.28(1)	Andes Renovables Wind and Solar Portfolio	Renewable Energy	Greenfield	No	-	-	-	-	-	-	-	-
					South Africa	1,900(1)	Lekela Power	Renewable Energy	Greenfield	Yes [2] (2) 60%	Actis Energy Infrastructure Fund III	Actis	1148	[3] Infrastructure Value Added, [1] Infrastructure Opportunistic	Emerging Markets	4	Emerging Markets	Energy
					Egypt	350(1)	Gulf of Suez Wind Power Plant	Wind Power	Greenfield	Yes [2] (2) 60%	Actis Energy Infrastructure Fund III	Actis	1148					
					Egypt	252(1)	West Bakr Wind Project	Wind Power	Greenfield	Yes [1] 60%	N/D	Actis	N/D					
					Total PE investment in Latin America and Caribbean region 7 infrastructure assets and 3 Assets in Africa region.													
[10] Acciona	Spain	Infrastructure Firm-Renewable	10	5,859	Mexico	386.78(1)	Atotonilco Wastewater Treatment Plant	Water Treatment	Greenfield	Yes [5] 75.74%	-	-	-	-	-	-	-	-
					Mexico	50(1)	Eurus Wind Park	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Mexico	4,200(1)	Mexico City New International Airport (NAICM)	Airports	Greenfield	Yes [6] (2)	-	-	-	-	-	-		
					Mexico	251.75(1)	Puerto Libertad Solar Project	Solar Power	Greenfield	Yes [1] 50%	-	-	-	-	-	-	-	-
					Turkey	16.82	Kutahya Wastewater Treatment Plant PPP	Sewage Treatment Plants	Brownfield	No	-	-	-	-	-	-	-	-
					Turkey	11.59	201Aksehir Wastewater Treatment Plant PPP	Sewage Treatment Plants	Brownfield	No	-	-	-	-	-	-	-	-
					Egypt	180	150MW Benban Solar Plant Portfolio	Solar Power	Greenfield	Yes [1] 50%	-	-	-	-	-	-	-	-
					Saudi Arabia	600	Shuqaiq 3 Independent Water Project Expansion	Water Treatment	Brownfield	Yes [2]	-	-	-	-	-	-	-	-
					India	64.61	Tuppadahalli Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Philippines	100	Putatan Water Treatment Plant 2	Water Treatment	Brownfield	No	-	-	-	-	-	-	-	-
					Total PE investment in Latin America and Caribbean region 4 infrastructure assets, 2 Assets in in each region: Europe and Asia region, and 1 Deal in each region: Middle East and Africa region.													
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[11] EDF Group	France	Corporate Investor	9	893.92	Mexico	189(1)	La Ventosa Wind Farm	Wind Power	Greenfield	No	-	-	-	-	-	-	-	-
					Turkey	23.62(1)	Sayalar II Wind Farm	Wind Power	Greenfield	Yes [2] 50%	-	-	-	-	-	-	-	-
					Turkey	37(1)	Kozbeyli Wind Farm	Wind Power	Greenfield	Yes [2] 50%	-	-	-	-	-	-	-	-
					Turkey	40.1(1)	Samurlu Wind Farm	Wind Power	Greenfield	Yes [2] 50%	-	-	-	-	-	-	-	-
					Turkey	83.55(1)	Poyraz Wind Farm	Wind Power	Greenfield	Yes [2] 50%	-	-	-	-	-	-	-	-
					Turkey	97(1)	Soma II Wind Farm	Wind Power	Greenfield	Yes [2] 50%	-	-	-	-	-	-	-	-
					Turkey	257(1)	Geycek Wind Farm	Wind Power	Greenfield	Yes [2] 55%	-	-	-	-	-	-	-	-
					Poland	142.54(1)	Torun Power Plant	Power Plants	Greenfield	No	-	-	-	-	-	-	-	-
					India	39.9	Chhattisgarh Solar Power Plants	Solar Power	Greenfield	Yes [2]	-	-	-	-	-	-	-	-
					Total PE investment in Europe region 7 infrastructure assets and 1 Deal in each region: Latin America and Caribbean and Asia region.													
[12]Alstom Transport SA	France	Corporate Investor	9	9,456.7	Mexico	584	Los Humeros II Geothermal Plant	Geothermal Power	Greenfield	No	-	-	-	-	-	-	-	-
					India	10.84	Gangapur-Malegaon & Dhule-Sakri Transmission Line Project	Power Distribution	Greenfield	Yes [1] 50%	-	-	-	-	-	-	-	-
					India	12.03	Alkud Substation Project	Power Distribution	Greenfield	No	-	-	-	-	-	-	-	-
					India	7.94	Supaul Substation Project	Power Distribution	Greenfield	No	-	-	-	-	-	-	-	-
					Thailand	1,000	Mae Moh Lignite-Fired Power Plant PPP	Power Plants	Brownfield	Yes [1]	-	-	-	-	-	-	-	-
					India	21.89	Bhadla & Bikaner Substations Project	Power Distribution	Brownfield	No	-	-	-	-	-	-	-	-
					Saudi Arabia	7,820	Riyadh Metro Orange Line Riyadh Metro Yellow Line Riyadh Metro Purple Line	Railroads	Brownfield	Yes [6] (2)	-	-	-	-	-	-	-	-
					Total PE investment in Asia region 5 infrastructure assets, 3 Assets in Middle East region, and 1 Deal in Latin America and Caribbean region.													
[13] SunEdison	USA	Corporate Investor	8	941.77	Chile	85.03(1)	San Andres Solar Power Plant	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					Chile	130(1)	Javiera Solar Park	Solar Power	Greenfield	Yes [1] 40%	-	-	-	-	-	-	-	-
					Chile	190(1)	Maria Elena Solar Power Plant	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					Chile	66.4(1)	Crucero PV Plant	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					Chile	160(1)	Quilapilun Solar Plant	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					India	64.91	Andhra Pradesh Solar Park Project	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					South Africa	115(1)	Soutpan Solar Park	Solar Power	Greenfield	Yes [3] 89%	-	-	-	-	-	-	-	-
					South Africa	158.83(1)	Boshof Solar Park	Solar Power	Greenfield	Yes [2] 49%	-	-	-	-	-	-	-	-
					Total PE investment in Latin America and Caribbean region 5 infrastructure assets,2 Assets in Africa region, and 1 Deal in Asia region.													

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[14] AES Corporation	**USA**	**Electric power distribution company**	**8**	**4,063.31**	Chile	1,034(1)	Electrica Angamos Power Plant	Power Plants	Greenfield	Yes [1] 20%	-	-	-	-	-	-	-	-
					Chile	1,300(1)	Cochrane Coal-Fired Power Plant 1	Power Plants	Greenfield	Yes [2] 57.4%	-	-	-	-	-	-	-	-
							Cochrane Coal-Fired Power Plant 2	Power Plants	Greenfield									
					Chile	500	Ventana IV Power Facility	Power Plants	Greenfield	No	-	-	-	-	-	-	-	-
					Chile	600(1)	Las Lajas Hydroelectric Facility	Hydro Power	Greenfield	No	-	-	-	-	-	-	-	-
					Chile	600(1)	Alfalfal II Hydroelectric Facility	Hydro Power	Greenfield	No	-	-	-	-	-	-	-	-
					India	29.31	Santalpur Solar Power Project	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					Philippines	1,200	Masinloc Power Plant Expansion	Power Plants	Brownfield	No	-	-	-	-	-	-	-	-
					Total PE investment in Latin America and Caribbean region 5 infrastructure assets and 2 Deals in Europe region.													
[15] Macquarie Infrastructure and Real Assets (MIRA)	**UK**	**Fund Manager**	**8**	**2,784**	Mexico	89(1)	Mareña Renovables	Wind Power	Greenfield	Yes [2] 33.75%	Macquarie Mexican Infrastructure Fund	Macquarie Infrastructure and Real Assets (MIRA)	401.17	Infrastructure Opportunistic	Mexico (100%)	Total [21]	[6] target Asia [6] target Europe	[2] Diversified (Economic/ Social)
					Mexico	74.09(1)	Nayarit Hydroelectric Power Plant	Hydro Power	Greenfield	Yes [1] 51%							[6] target global [diversified countries]	[18] Diversified (Economic)
					Mexico	38.18	Coahuila Solar Power	Solar Power	Greenfield	No							[1] target Mexico	[1] Utilities
					India	80.94	Anuppur Thermal Power Plant	Power Plants	Greenfield	Yes [1]	Macquarie State Bank of India Infrastructure Fund	Macquarie Infrastructure and Real Assets (MIRA)	1169	Infrastructure Opportunistic	India (100%)	Total [21]	[6] target Asia [6] target Europe	[2] Diversified (Economic/ Social)
					China	140.92	Chinese Highway Project	Roads	Greenfield	No	Macquarie Everbright Greater China Infrastructure Fund	Macquarie Infrastructure and Real Assets (MIRA)	870	Infrastructure Opportunistic	Asia [Regional]		[6] target global [diversified countries]	
					Philippines	543	North Luzon Renewables	Wind Power	Greenfield	Yes [2] 68%	Philippine Investment Alliance for Infrastructure	Macquarie Infrastructure and Real Assets (MIRA)	625	Infrastructure Opportunistic	Philippines (100%)		[1] target Mexico	[18] Diversified (Economic)
					Philippines	1,440	Manila Light Rail Transit 1	Railroads	Greenfield	Yes [2] 90%	Philippine Investment Alliance for Infrastructure	Macquarie Infrastructure and Real Assets (MIRA)	625	Infrastructure Opportunistic	Philippines (100%)		[2] target North America	[1] Utilities
					Poland	323.05(1)	DCT Gdansk	Sea Ports	Brownfield	Yes [3] 36.2%	Macquarie Global Infrastructure Fund II	Macquarie Infrastructure and Real Assets (MIRA)	327.96	Infrastructure Core	Global, Hong Kong SAR - China, OECD, Singapore	Total [21]	[6] target Asia [6] target Europe [6] target global [diversified countries] [1] target Mexico [2] target North America	[2] Diversified (Economic/ Social) [18] Diversified (Economic) [1] Utilities
					Total PE investment in Asia region 4 infrastructure assets, 3 Assets in Latin America and Caribbean region, and 1 Deal in Europe region.													

Investment Strategy:					**Industry focus:**					
Infrastructure Core: Total: 13	[6] target Europe	[2] target North America	[3] target global [diversified countries]	[2] target Asia	**Diversified (Economic): Total: 18**	[5] target Europe	[2] target North America	[5] target global [diversified countries]	[1] target Mexico	[5] target Asia
Infrastructure Core Plus: Total: 2	[1] target global [diversified countries]		[1] target Asia		**Diversified (Economic/Social): Total: 2**	[1] target global [diversified countries]				[1] target Asia
Infrastructure Opportunistic: Total: 6	[2] target global [diversified countries]		[1] target Mexico	[3] target Asia	**Utilities: Total: 1**				[1] target Europe	

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[16] Scatec Solar	Norway	Renewable energy company	8	1,610.06	Brazil	101.9	78MW Piaui Solar Project	Solar Power	Greenfield	Yes [1] 30%	-	-	-	-	-	-	-	-
					Brazil	147(1)	Apodi Solar Project	Solar Power	Greenfield	Yes [2]	-	-	-	-	-	-	-	-
					Czech Republic	42.62(1)	Sulkov Solar Farm	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					South Africa	287(1)	Kalkbult Solar Farm	Solar Power	Greenfield	Yes [4] 61%	-	-	-	-	-	-	-	-
					South Africa	241.54(1)	258MW Upington Solar Project Portfolio	Solar Power	Greenfield	Yes [2] 58%	-	-	-	-	-	-	-	-
					Egypt	450(1)	400MW Ben Ban Solar Farm Portfolio	Solar Power	Greenfield	Yes [2] 75%	African Development Bank [listed]	Africa50	N/D	Infrastructure Value Added	Africa	1	Africa	Diversified (Economic)
					Malaysia	293(1)	Malaysian Solar Projects	Solar Power	Greenfield	Yes [1] 51%	-	-	-	-	-	-	-	-
					Malaysia	47(1)	Redsol Solar Farm	Solar Power	Greenfield	Yes [1]	-	-	-	-	-	-	-	-
					Total PE investment in Africa region 3 infrastructure assets, 2 Deals in each region: Latin America and Caribbean and Asia region, and 1 asset in Europe.													
[17] FCC Construcción [Fomento de Construcciones y Contratas]	Spain	Construction company	7	19,428.67	Peru	6,500(1)	Lima Metro Line 2	Railroads	Greenfield	Yes [4] (2) 81%	-	-	-	-	-	-	-	-
					Mexico	4,200(1)	Mexico City New International Airport (NAICM)	Airports	Greenfield	Yes [6] (2)	-	-	-	-	-	-	-	-
					Colombia	436.67	Toyo Tunnel Project	Tunnels	Greenfield	Yes [1] 60%	-	-	-	-	-	-	-	-
					Egypt	472(1)	New Cairo Wastewater Treatment Plant	Sewage Treatment Plants	Greenfield	Yes [1]	-	-	-	-	-	-	-	-
					Saudi Arabia	7,820	Riyadh Metro Orange Line	Railroads	Brownfield	Yes [6] (2)	-	-	-	-	-	-	-	-
							Riyadh Metro Yellow Line											
							Riyadh Metro Purple Line											
					Total PE investment in Latin America and Caribbean region 3 infrastructure assets, 3 Assets in Middle East region, and 1 Deal in Africa region.													
[18] Solar Pack	Spain	Renewable energy company	7	391.4	Peru	251(1)	Panamericana Solar Plant	Solar Power	Greenfield	Yes [1] 50%	-	-	-	-	-	-	-	-
							Tacna Solar Plant	Solar Power	Greenfield									
					Chile	41.4(1)	Pozo Almonte II Solar Farm	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
							Pozo Almonte III Solar Farm	Solar Power	Greenfield									
							Calama III Solar Plant	Solar Power	Greenfield									
					Chile	30	Panquehue Solar Farm	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					India	69(1)	104MW Telangana Solar Portfolio	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					Total PE investment in Latin America and Caribbean region 6 infrastructure assets, and 1 Deal in Asia region.													

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[19] ACS Group	**Spain**	**Construction company**	**7**	**9,235.91**	Chile	169.5	Ruta 5 Puerto Montt-Pargua Highway	Roads	Brownfield	No	-	-	-	-	-	-	-	-
					Chile	623(1)	Mejillones Desalination Plant	Water Treatment	Greenfield	Yes [4] 50%	-	-	-	-	-	-	-	-
					Peru	172(1)	Eten Cold Reserve Power Plant	Power Plants	Greenfield	Yes [1]	-	-	-	-	-	-	-	-
					Peru	6,500(1)	Lima Metro Line 2	Railroads	Greenfield	Yes [4] (2) 75%	-	-	-	-	-	-	-	-
					Brazil	523	Brazil Solar Plant Portfolio	Solar Power	Greenfield	No	-	-	-	-	-	-	-	-
					Brazil	814.98(1)	Minas Gerais Transmission Line Project	Power Distribution	Greenfield	Yes [1]	N/D	Brookfield Asset Management	N/D	N/D	N/D	N/D	N/D	N/D
					Brazil	433.43(1)	Chimarrão Transmission Lines	Power Distribution	Greenfield	Yes [1]	Brasil Energia FIP	Brookfield Brasil Asset Management	88.53	Infrastructure Opportunistic	Brazil	1	Brazil	Energy
					Total PE investment in Latin America and Caribbean region 7 infrastructure assets.													
[20] Arroyo Energy Investors	**USA**	**Fund Manager**	**7**	**237.1**	Mexico	126	Pesquería Power Plant	Power Plants	Greenfield	No	N/D	Arroyo Energy Investors -	N/D	[1] Infrastructure Core, [1] Infrastructure Core Plus	[1] South America	2	[1] Emerging USA (100%)	Energy
					Chile	28	El Cernicalo Solar Park	Solar Power	Greenfield	No	N/D	Arroyo Energy Investors -	N/D					
					Chile	28	Queltehue Solar Park	Solar Power	Greenfield	No	N/D	Arroyo Energy Investors -	N/D					
					Chile	28	El Pilpen Solar Park	Solar Power	Greenfield	No	N/D	Arroyo Energy Investors -	N/D					
					Chile	28	Las Turcas Solar Park	Solar Power	Greenfield	No	N/D	Arroyo Energy Investors -	N/D					
					Chile	28	Los Gorriones Solar Park	Solar Power	Greenfield	No	N/D	Arroyo Energy Investors -	N/D					
					Chile	69.1(1)	ARCO Solar PMGD Portfolio	Solar Power	Greenfield	No	Arroyo Energy Investors Fund II	Arroyo Energy Investors	500					
					Total PE investment in Latin America and Caribbean region 7 infrastructure assets.													

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