Chapter 2

LITERATURE REVIEW

2.1 INTRODUCTION

"A literature review is an evaluative report of information found in the literature related to selected area of study. The review describes, summarizes, evaluates & clarifies this literature. It gives a theoretical base for the research & helps to determine the nature of research…." (Queensland University, 1999) This chapter documents a comprehensive review of the published and unpublished work from primary and secondary sources of data in public private partnerships in areas related to the study.

The chapter begins with brief outline of objectives set for literature review and the process followed before giving summary of thematic literature survey. First, an attempt has been made to understand urban metro systems, existing trends, globally and in India. Secondly, a thorough understanding of PPP framework has been attempted. Then, an extensive literature review on PPP projects in general and urban transport in particular has been carried out with emphasis on PPPs in urban metros. Criteria to define a PPP project as successful and factors that contribute to its success have been identified on the basis of current literature on the subject. This exercise has led to defining the variables for the study which have been presented in tabular form. Existing and under construction Indian metros on PPP framework have been briefly mentioned in this chapter with highlights of differences and similarities in approach and risk management covered in a separate chapter titled 'Indian experience with PPP metros'. A brief review of SAP-LAP methodology and its applications has also been included with aim to conduct SAP-LAP study of one of the Indian PPP metros. Finally, gaps in current literature on the subject have been summarised and research problem formulated before concluding the chapter.

2.2 OBJECTIVES OF THE LITERATURE REVIEW

The primary purpose for undertaking literature review was to acquire a comprehensive understanding of the existing knowledge and for gaining insight into the significance of new research.

"Beecroft et al (2006) argue that a sufficiently focused research question is essential before undertaking a literature review. Equally, however, it can help refine or focus a broad research question and is useful for both topic selection and topic refinement. It can also be helpful in developing conceptual or theoretical frameworks" (Coughlan et al, 2007). In the present review a broad question emerging from the business problem as to what are the factors that are critical to the success of public private partnerships in urban metro in Indian context was further refined and developed.

The following objectives were set for literature review

- ***For better clarity and focus on the problem selected for the study.*** To define the relationship between business problems selected for the study and the existing knowledge in the area.
- ***Improve research methodology for the current study.*** To familiarise researcher with the methodologies used by earlier researchers to find answers to questions similar to the one under investigation, which procedures and methods worked well for those studies and pitfalls to be avoided.
- ***Widen knowledge base in the area related to the study.*** To acquaint researcher with the ideas and knowledge already established in the field of research, findings of earlier researchers as regards the same or similar questions, what propositions have been made and validated and what gaps exist in the relevant body of knowledge
- ***Contextualise findings from this study***. A comparison of outcome of research with that of findings of earlier researchers to assess how the

findings differ in order to assess contribution to the existing body of knowledge.

2.3 LITERSTURE SEARCH PROCESS

Both primary and secondary sources were searched for scholarly articles and research work by earlier researchers on the topics relevant to the study. While computer database and internet was the primary source of search[3], valuable inputs on various reports prepared by World Bank, ADB, planning commission, MoUD etc were also obtained during personal interviews with economists and transport planners and visit to libraries e.g. that of IIT Delhi and Institute of Urban Transport.

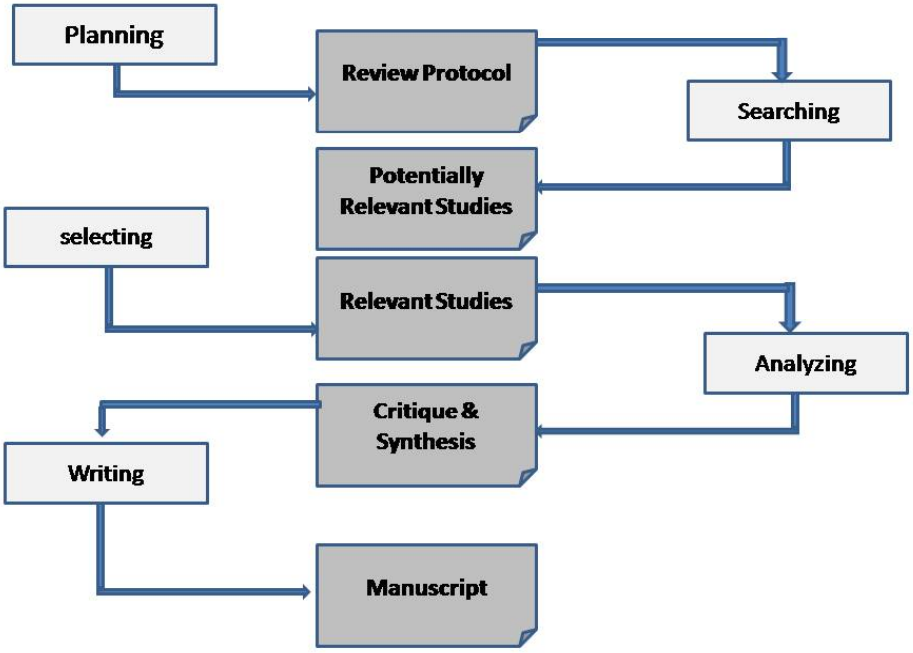

Figure 2. 1 Literature Review Process

(Source: Myllärniemi, 2015)

"Keyword searches are the most common method of identifying literature" (Ely and Scott, 2007). Construction of search strings for search in selected database such as EBSCOS commenced with identification of keywords such as 'public private partnerships', 'urban transport' 'metro rail',

[3]" Computer databases offer access to vast quantities of information, which can be retrieved more easily and quickly than using a manual search" (Younger, 2004).

'critical success factors' and search was widened by including Boolean operators 'and' and 'or'. Methodology and techniques used by other researchers such as 'chi square test', 'factor analysis' etc were also searched to

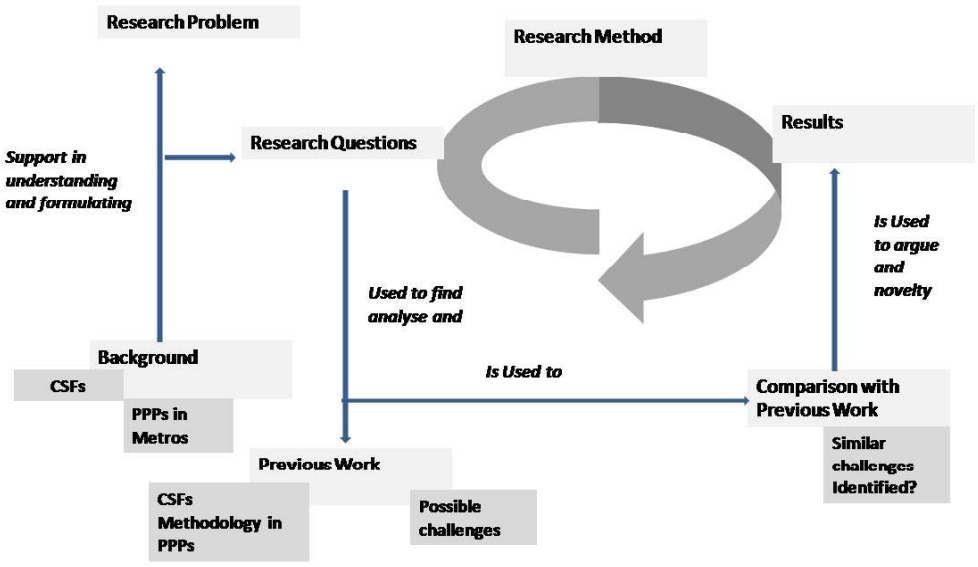

Figure 2. 2 Contribution of Literature Review to the Study
(Source: Adopted from Myllärniemi, 2015)

gather material for selection of statistical tools for the study. Potentially relevant studies were shortlisted and snowballing (which studies cite a relevant study?) was used to narrow down on relevant studies and concepts for analysis. Figure 2.1 schematically represents the process followed and Figure 2.2 depicts how the literature review contributes to the overall study.

2.4 THEMATIC REVIEW OF LITERATURE

"A literature review is concept-centric. Thus, concepts determine the organizing framework of a review." (Webster & Watson, 2002) The literature review for this study was organised on the key concepts or themes as given below:

1. Urban transport and metro rapid transit systems (MRTS)
2. What are PPPs and existing framework on PPP
3. Public Private Partnerships in Urban Transport
4. Critical Success Factors (CSFs) in A PPP metro.
5. Risk analysis and risk management in PPP projects

6. What defines success of a PPP metro project
7. Indian Experience with PPP Metros
8. SAP-LAP Analysis

The ensuing paragraphs detail literature review under each of the above themes. A summary of literature survey on a particular theme giving author-wise details, main premise of the paper/study and inferences/gaps is presented in tabular form at the end of each sub-section.

2.5 DEFINITION OF KEY TERMS

"The term 'Public-Private Partnership' has been in general use since 1990s yet, there is no widely agreed single definition or model of a PPP" (Bernardino, 2010). A definition of PPP as applicable to this study is necessary. Similarly, other key terms such as "Metro Rail", "Public Transport", "Urban Transport"," Critical Success Factor" etc need to be defined in the beginning of the study.

Urban Transportation. Urban Transportation, "mass transit, also called mass transportation, or public transportation, the movement of people within urban areas using group travel technologies such as buses and trains. The essential feature of mass transportation is that many people are carried in the same vehicle (e.g., buses) or collection of attached vehicles (trains/trams). This makes it possible to move people in the same travel corridor with greater efficiency, which can lead to lower costs to carry each person or—because the costs are shared by many people—the opportunity to spend more money to provide better service, or both". (Encyclopaedia Britannica)

"Public transport is a shared passenger transport service which is available for use by the general public, as distinct from modes such as taxicab, car pooling or hired buses which are not shared by strangers without private arrangement. Public transport modes include buses, trolleybuses, trams and trains and ferries. Public transport between cities is dominated by airlines, coaches, and intercity rail. High-speed rail networks are being developed in many parts of the world". (Verma & Ramanayya, 2015)

Sustainable Transport. "Sustainable transport system is one that is accessible, safe, environment friendly and affordable". (ADB, 2009)

Mass Rapid Transit system (MRTS). "Mass Rapid Transit system (MRTS) is a bus or rail based public transport mode operating or fully or partially exclusive rights of the way-also known as the alignment. This alignment can be surface based, elevated, or underground. Some of the most common forms of MRT are metros, streetcars, tramways (sometimes referred to as light rail transport or LRT and bus rapid transit (BRT)". An IFC, World Bank study has classified rail systems urban transport into four categories; street car/tram, light rail train, light metro and heavy metro depending upon speed and peak hour capacity (Leber & Perrot, 2012). For this study MRTS, metro system, metro rail, metro project, metro have been used interchangeably to denote all urban mass transit systems using electric rails in dedicated corridor either elevated or underground with platforms/stations for boarding/de-boarding of passengers, having an average speed of 30 kmph or more. While light rail trains having speed of more 30kmph or more are included, trams, cable cars, street cars are not included.

Public–private-partnership (PPP). "PPP means an arrangement between a government or statutory entity or government owned entity on one side and a private sector entity on other side, for the provision of public assets and/or related services for public benefit, through investments being made by and/or management undertaken by the private sector entity for a specified time period, where there is a substantial risk sharing with the private sector and the private sector receives performance linked payments that conform (or are benchmarked) to specified, pre-determines and measurable performance standards and/or through user charges". {Adopted from umbrella definition given in a discussion note (DEA, 2010)}

Critical Success Factors. The critical success factors are defined as "three to six factors that determine success. These are key jobs that must be done exceedingly well". (Gates, 2010)

2.6 URBAN TRANSPORT AND METRO RAPID TRANSIT SYSTEMS

There has been extensive research both by Government, Financial and Academic institutions on urbanisation trends and the need for infrastructure development as a vehicle for economic and social development. Both locally and internationally there is increasing realization that cities are the engines of growth and transportation is a driver to economic and social development of the developing world.

Transport overtakes all other infrastructure concern and has the biggest impact on city competitiveness and transportation is the most serious challenge facing City's infrastructure across cities of the world. In a survey conducted by Siemens and presented in the 'Megacity Challenges: A stakeholder perspective' 522 stakeholders were surveyed in 25 cities across world. The report concluded that there is a general consensus of largest proportion of 85% of population which put investment requirements in coming 5-10 years highest in transportation sector with transportation ranked much higher above housing, water, healthcare, environment etc. (Hazel, 2007)

Developed and developing cities in the world are facing the challenge of traffic jams, increasing rate of road accidents higher emission of green house gases. In the words of Rudyard Kipling "transport is civilization" but going by the chaotic traffic condition in big cities, city life is anything but civilized. "Cities are sprawling with the 'haves' escaping to areas with better living conditions and the 'have nots' trapped and increasingly marginalized." (ADB, 2009)

Arthur D Little assessed the mobility performance of 66 cities and found that most of the cities fail to meet the challenge of fulfilling urban mobility needs of growing population and the traffic situation in most of the cities is chaotic. . As per author "it would not be putting it too strongly to say that many cities mobility systems are standing on a burning platform and if action is not taken in the very near future they will play a major role in slowing down the growth and development of their host nations". (Little, 2011)

Motor vehicle fleets are already doubling every 5 to 7 years. IEA vehicle ownership trend projection shows that "India, China and other Asian countries would have a high rate of vehicle ownership by 2050 leading to more carbon emission and transportation issue like traffic congestion, pollution etc" (IEA, 2012)

"For workers to access jobs and for businesses to access suppliers and markets, a reliable and affordable transport system is needed to enhance urban mobility. Limited transportation options can turn commuters to Indian cities into arduous treks, and many people are forced to live in substantial housing and slums to close to jobs when transport is inaccessible and unaffordable". (World Bank, 2013) "Transportation provides vital support to the economic and social development". (Hidalgo, 2013).

Recognising importance of urban transport as one of the major challenges facing Indian urbanisation, National Urban Transport Policy (NUTP) encourages high capacity public transport systems including metro rail projects through SPV with financial support in the form of grant/VGF up to 20% of capital expenditure. (MoUD, 2006).

In Mckinsey Global Institute had come out with a report titled "India's urban awakening: building inclusive cities, sustaining economic growth" (Mckinsey, 2010) which projected an investment requirement of US$ 1.2 trillion (about `53 lakh crores) over next 20 years to bridge the infrastructure deficit to be able to reap full benefits of urbanisation. Urban transport and roads together require about half the estimated capital expenditure (approx `26 lakh crores). The report advocated rapid construction of rail based and bus based mass transit system to increase share of public transportation from current 30% to 50%.

In view of the nature of urbanisation challenges facing India, ministry of urban development, GoI setup a High powered expert committee (HPEC) in 2011 for projecting the likely investment for developing urban infrastructure in the country. "India's urban population as presently defined will be close to 600 million by 2031, more than double that in 2001", states HPEC's report.

The report has also estimated that ` 30,00,000 crores will have to be spent on Urban Infrastructure during next 20 years and relative share of urban transportation of infrastructure spending would be 14.5 % i.e. `4,50,00 crores out of which capital expenditure on rail based MRTS would be `3,60,000 crores. In addition to capital expenditure requirements cited above, HPEC has also estimated that approx `18 lakh crores would be required for operation and Maintenance of Infrastructure in the country in next 20 years. The committee observed that larger share for urban transport is on account of high service backlog which was estimated to be 80% for rail based MRTS and 100% for road based MRTS for Class 1A and 1B cities. (HPEC, 2011)

Task force on urban Transport for 12th FYP has projected a capital expenditure of `388,000 crores. The working group has further estimated that only 48% of the finances may come from Central and State Government and other development agencies and 35% i.e. ` 135,000 crores for urban transport projects would be financed by Private Sector. (WG 12th FYP, 2011). Thus a huge amount of private investment is required, even larger than estimated by the working group, given the track record of successive governments, if the wide gaps in current and desired levels of mobility needs are to be bridged.

Involvement of private sector in infrastructure projects has been studied, researched and debated world-wide and while there is consensus on the need for PPPs to bridge infrastructure divide in developing countries, there is no standard model, practice or formula for its success. Even in developed country like US, Centre of Strategic and International Studies has come out with a detailed report on addressing concerns on how "US governments can improve its ability to partner with the private sector and how lessons for creating and maintaining relationships with the private sector can improve its ability to partner with the private sector and how lessons for creating and maintaining relationships with the private sector can be institutionalized in

order to be able to set up partnerships or projects that work to scale and make them sustainable". (CSIS, 2011).

A tabular summary of major resources referred for understanding urban transport and role of rail based rapid transit system in improving urban mobility is given inTable-2.1.

TABLE-2.1: Summary of Literature Survey on Urban Transport and Metro Rapid Transit Systems

S.No	Author (s)	Title	Theme	Inference/Research gap
1	(Verma & Ramanayya, 2015).	"Public Transport Planning and Management in Developing Countries"-Book	Principles of public transport planning and management for developing countries	"Examines the status of urban transport in India and other developing countries. Addresses current transportation system inefficiencies, explores the relationship between mobility and accessibility, and analyzes the results for future use; sustainability in terms of environment, energy, economic, and land use perspectives".
	(Ahluwalia, 2014)	Transforming our Cities: Post Cards of Change-Book	Success stories in civic management and urban service delivery	Using a case study approach, author has demonstrated that resources are available for urban reforms. What are required are appropriate revenue models, unlocking the high value of public land and PPPs that are transparent and innovative. One section is devoted to transport covering five case studies including that of Hyderabad metro which according to author can be emulated by other cities for attracting private capital in transport infrastructure.
3	(Little, 2011)	"The Future of Urban Mobility: Towards Networked Multimodal Cities of 2050".	Global study of urban mobility-assesses mobility maturity and performance of 66 cities.	The paper questions the state of affairs in developed cities and presents best practices. The author "identifies three strategic imperatives for cities; network the system,: redesign mobility systems so that they become more public and sustainability orientated and establish sustainable

				core"
4	(ADB, 2009)	"Sustainable Transport Initiative (STI)"	Aligning ADB's current involvement with Transport to its long term Strategy	Highlights significance of sustainable transport for inclusive growth, climate change and regional integration. Advocates demand management to reduce city congestion, emphasizes private participation and offers "sustainable transport partnership facility for partners to provide a mechanism to partners for financing and expertise for STI"
5	PricewaterhouseCooper (2007)	Infrastructure in India-a vast land of opportunity	Why India is an emerging opportunity for foreign EPC companies for PPP in infra projects	Opportunities and challenges analyzed for foreign EPC companies planning to enter Indian markets for PPP infra projects including in railway sector e.g. dedicated freight corridor, Station development etc. A tie up with local company will bring in synergy of technology, project managerial capabilities and understanding of local market and ability to structure appropriate contractual framework for sustainable infra development. ***Metro systems not covered.***
6	(Hazel, 2007)	Megacity Challenges: A stakeholder perspective	The authors surveyed 522 stakeholders in 25 cities to determine the most important challenge facing city's infrastructure.	Transport overtakes all other infrastructure concern and has the biggest impact on city competitiveness and transportation is the most serious challenge facing City's infrastructure across cities of the world. There is a general consensus of 85% of population which put investment requirements in coming 5-10 years highest in

				transportation sector with transportation ranked much higher above housing, water, healthcare, environment etc
7	(ADB, 2010)	Cities at a Cross Roads- Unlocking the potential for Green Transport	Conceptual paper for G20 summit focusing on developing cities for people rather than cars	Conceptual framework for integrated strategy for land use development and urban transport
8	(ADB, 2009)	"Changing Course : A new Paradigm for Sustainable Transport"	Advocates new approach to in how urban mobility is assessed.	"New paradigm for sustainable urban transport calls for a people focused approach that manages demand for travel and promotes accessibility over mobility. Focuses on non motorized transport and public transport systems, coupled with pricing mechanisms that ensure private vehicle usage covers full costs of externalities".
9	(IEA, 2012)	"Global Land Transport Infrastructure Requirements"	"Estimating road and railway infrastructure capacity and costs to 2050"	'The potential shift of travel to more sustainable modes in the Energy Transport Perspective (ETP) 2012 2S could result in significant savings in infrastructure investments and maintenance costs. Increased transit and land-use planning should provide net mobility benefits with net reductions in transport spending, energy use and emissions".
10	(Hidalgo, 2013)	"Implementation of sustainable urban transport in Latin America"	"Sustainable transportation for vital support to the economic and social development"	Development in Latin America demonstrates that dependence on private vehicle can be influenced through policy initiatives. This can be done through reallocation of resources already dedicated to transportation to emphasize the provision of access for people and goods rather than maximizing transport activity.

11	(AM Capital Investors Ltd, 2014)	Green Field Economic Infrastructure: A new Model-Infrastructure Research Report	Failure to maintain adequate level of investments will lead to a spiral of reduced future economic growth	Investment is at low level in most developed economies as governments struggle with high debt burdens and insatiable demand social services. Unlocking private funding could be a good beginning. The cost of delaying investment due to a lack of government funding far outweighs the apparent higher cost of private sector funding. De-risking demand exposure sufficiently to attract private sector development while protecting the public interest is recommended.

2.7 WHAT ARE PPPS AND EXISTING FRAMEWORK ON PPP ?

For defining and understanding public–private partnership (PPP) for the purpose of this study, various definitions and meanings provided by World Bank, IMF, OECD, some of the countries and Indian States were reviewed. According to World Bank, "PPP broadly, refers to arrangements between the public and private sectors whereby part of the services or works that fall under the responsibilities of the public sector are provided by the private sector, with clear agreement on shared objectives for delivery of public infrastructure and/ or public services." (World bank, 2014)

"Public-private partnerships (PPPs), as long-term contractual relationships between the public and private sector, are usually controlled by a rigid contractual structure". (Dong, 2010).

"There are usually two fundamental drivers for PPPs. Firstly, PPPs enable the public sector to harness the expertise and efficiencies that the private sector can bring to the delivery of certain facilities and services traditionally procured and delivered by the public sector. Secondly, a PPP is structured so that the public sector body seeking to make a capital investment does not incur any borrowing. Rather, the PPP borrowing is incurred by the private sector vehicle implementing the project and therefore, from the public sector's perspective, a PPP is an 'off-balance sheet' method of financing the

delivery of new or refurbished public sector assets". (Virginia, Allen, & Overy, 2012)

The main rationale of private sector participation and promoting public private partnerships in infrastructure projects stems from supplementing governments' efforts in raising large sums of capital required to meet infrastructure needs and utilizing private sector efficiency, innovative approach and advanced technology for design and implementation of sustainable urban mobility solutions. Within these larger concerns are questions about what the private sector needs in order to partner with the government in the development context and how the government can approach private sector partnerships in a more dynamic way. (World Bank, 2013)

PPPs are arrangements between government and private actors for providing public infrastructure, facilities and services. A number of developing countries are using multi-year concessions or franchises, competitively awarded to private companies, for construction and operation of urban transport infrastructure and for provision of public transport services.

There is no single model PPP framework. A government's PPP framework typically evolves over time often in response to specific challenges facing the PPP program. In the early stages, the emphasis may be on enabling PPPs and creating and promoting PPP opportunities. Gradually this may lead to introducing PPP specific processes, rules and institutions to ensure PPP projects are subjected to similar discipline as public investment projects. (World Bank, 2014).

According to World Bank PPP reference guide, the components of a comprehensive PPP framework can include the following:

a. ***Policy***: articulation of government's intent to use PPPs to deliver public services, and the objectives, scope and implementing principles of the PPP program.
b. ***Legal framework***- the laws and regulations that underpin the PPP program. This can include PPP-specific legislation, other public financial management laws and regulations, or sector-specific laws and regulations.

c. ***Processes and institutional responsibilities***: the steps by which PPP projects are identified, developed, appraised, implemented and managed and the roles of different entities in that process.

d. ***Public financial management approach***: how fiscal commitments under PPPs are controlled, reported and budgeted for, to ensure PPPs provide value for money and to manage the associated fiscal risk.

e. ***Broader governance arrangements***: how other entities such as legislature and the public participate in the PPP program and hold those responsible for implementing PPPs accountable for their decisions and actions.

In practice these elements are closely inter-related. (Figure 2.3)

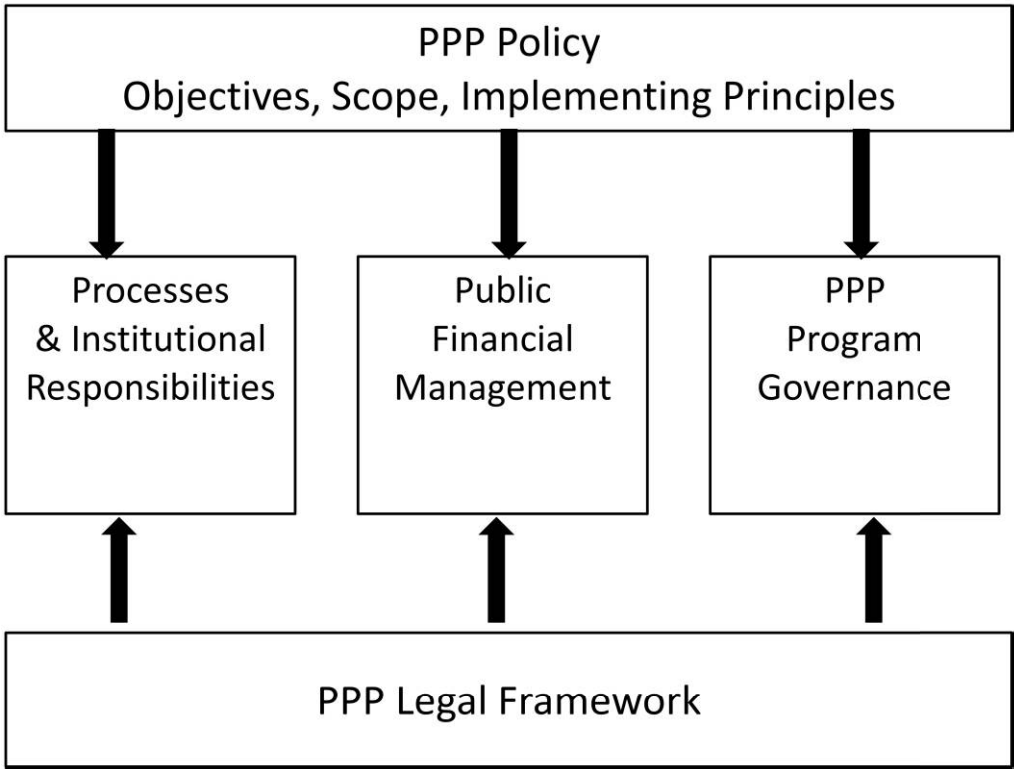

Figure 2. 3 : PPP Legal Framework
(Source : World Bank's PPP reference guide)

In India, there is no overreaching legal framework for PPPs at the national level. However, the Government of India has launched several institutional initiatives for PPPs, including:

- A committee of infrastructure chaired by the prime minister. Its functions are to initiate policies, develop structures for PPPs and oversee the progress of key infrastructure projects.

- A viability gap fund (VGF) and the India infrastructure finance company limited (IIFCL). These provide long term capital to help finance PPPs as well capacity building and other forms of assistance.
- An India infrastructure project development fund (IIPDF) within the department of economic affairs (DEA). Its role is to promote the development of credible and bankable PPP projects.
- Institutional structures, for example: a PPP cell within DE in the ministry of finance whose tasks are to organise activities promoting the use of PPPs and administer proposals; and an inter-ministerial PPP appraisal committee (PPPAC) charged with determining the requalification of bidders under PPP and preparing toolkits for model concession agreements. (ResearchReplublic, 2008) (Ministry of Finance)

Economic Survey 2014-15 has highlighted the flaws in existing design of PPP contracts such as focus on fiscal benefits rather than on efficient service provision, neglect of principles allocating risk to the entity best able to manage it, the default revenue stream based on directly collected user charges, no ex-ante structures for renegotiation etc. Stating that many infrastructure projects are today financially stressed and new projects are not able to attract sponsors, the survey has diagnosed that the current state of the public private partnership (PPP) model is due to poorly designed frameworks, which need restructuring. (Economic Survey, 2014-15)

Table-2.2 lists the major research papers, reports etc consulted for understanding PPPs and gaining an insight into the existing PPP frameworks.

TABLE-2.2: Summary of Literature Survey on 'What are PPPs and Existing Framework on PPP'

S.No	Author (s)	Title	Theme	Inference/Research gap
1	Dong (2010)	Improving Economic Efficiency of PPP for Infrastructure Development by Contractual	Role of contractual flexibility in making PPP in infrastructure effective.	Public-private partnerships (PPPs), as long-term contractual relationships between the public and private sector, are usually controlled by a rigid contractual structure

		Flexibility		
2	World bank (2014)	What are public-private partnerships	Definition, Understanding and Framework of PPP	There is no single PPP framework. Policy, legal framework, processes and institutional responsibilities, public financial management approach and governance are key components of a PPP framework
3	Virginia, et al. (2012)	Public-private partnerships	Understanding how PPP works	A PPP is an "off-balance sheet" method of financing the delivery of new or refurbished public sector assets
4	Research Republic (2008)	Developing India's Infrastructure through PPP : A resource Guide	Review of PPP implementation in India	While Government of India has launched several institutional initiatives for PPPs including a PPP cell in MoF, there is no overreaching legal framework for PPPs at the national level.
5	Economic Survey 2014-15 Ministry of Finance(2015)	Economic Survey 2014-15 Vol-I	Indian Economic survey	The survey has diagnosed that the current state of the public private partnership (PPP) model is due to poorly designed frameworks, which need restructuring

2.8 PUBLIC PRIVATE PARTNERSHIP (PPP) IN MRTS

Infrastructure projects in transport sector especially in rail based MRTS are larger and more complex in terms of the activities bundled into the contractual arrangements and the number of parties involved in transactions. For these reasons, PPP models in railways are still emerging due to complexities involved. Rail sector differs significantly from road in terms of

technical expertise and level of capital investment and hence road models cannot be directly applied for such projects. (Gangwar & Raghuram, 2013)

A PPP contract to provide transit service or project is a contract between a public sector entity and a private concessionaire where substantial financial, technical and operational risks are assumed by the private party. There could be a form of PPP contract where the entire cost of service is passed on to the users and yet another form where capital investment is made by the private concessionaire and government shares the cost of providing the service either wholly or partly. Since urban transport projects are infrastructure projects which create public goods, the government, in order to attract private investment may give one time grant. Apart from capital subsidy revenue subsidies, tax holidays etc may also be considered by the government. In another form of PPP arrangement, the transport infrastructure is created by public sector and operation and maintenance is handled by a private operator. In some cases government has handed over existing transport infrastructure to private operator for operation and maintenance under a long term contractual arrangement.

Phang has considered Hudson-Bergen LRT in the United States and Docklands LRT and Croydon Tram link in London as the successful LRT projects built on Design-Build-Finance-Operate (DBFO) PPP model. France has traditionally used public financing for metro construction while allowing private contractors into operation and maintenance. However, Toulouse, Grenoble and Strasbourg rail projects in France have been built on PPP framework. (Phang, 2009)

IFC in its report has presented four case studies of PPP in rail based mass transit system (Leber & Perrot, 2012):

- Seoul Metro Line 9 has been developed on a PPP framework and the private corporation handles operation and maintenance of 25.5 km subway line and 25 stations. Government awarded 30 years concession and also provided revenue support for first 15 years. It was expected that PPP framework will not only increase productivity but would also serve

as a benchmark for other metro lines built and operated by public agencies.

- Bangkok's skytrain is widely cited as a failed example of PPP urban transit system. Traffic projections were much higher than the actual ridership and the project ran into huge losses leading to default and business rehabilitation. Passengers complained of poor access to the system and lack of connectivity to other modes of transport. Ridership showed marked improvements once these issues were addressed.
- Stockholm Metro was run by public sector till 1990 when O&M contracts for three metro rail lines were awarded to private concessionaires. The prime objective was that private sector expertise will be able to achieve higher productivity and lower costs. .
- Sao Paulo's 12.8 Km yellow line was built by a private consortium at an investment $ 2 billion. A 30 year concession passed on the development and operation risk to the private operator while saving the state government's budgetary resources for other priority sectors.

Out of the sixteen light rails commissioned from 1994 to 2011 in Spain, only four have been procured through traditional procurement route, while the rest have been procured through different formulas of collaboration between the private and public sectors, mostly BOT basis (nine) but also for operation of existing infrastructure. (Carpintero & Barcham, 2012)

Farrell and Roumboutsos (2013) while presenting 24 cases of PPP in transport originating from 13 European countries have observed that rail networks are complex and require huge investment and therefore private investors have kept away from rail infrastructure. Government regulations and uncertainty about integration with other modes of transport further cloud viability of such projects. With the passage of time, complexity of urban transport projects increased on account of bundling of activities into the concession agreements and involvement of large number of parties in the transaction. (Farrel & Roumboutsos, 2013). "Transport PPPs require complex contracts underpinned by regulatory mechanisms in order to maintain performance and safety standards" (Jupe, 2009)

UK Govt's Department of Transport awarded a contract for supply and maintenance of 1140 coaches for Thameslink design and construction of two maintenance depots. A study of Thameslink Rolling Stock Project concludes that in a major infrastructure project coordination with multiple stakeholders is crucial for ensuring project delivery schedules and to embed contingency measures at the planning stage itself. Managing these partnerships through stakeholder engagement and communication is key to the success of major infrastructure projects. (Schmidt, 2014)

Beijing no. 4 metro line under PPP model was constructed by public sector and a joint venture of Hong Kong's MTR and China Capital Corporation was awarded the concession for 30 years for operation and maintenance. The tariff risk was shared between public and private by means of an arrangement based on 'shadow price' and shadow patronage'. The subsidy and revenue sharing arrangement ensured that the private sector partner was protected from subsequent drop in revenue on account of any policy change by the government at the same time ensuring public sector due in case of rise in ridership. The author is of the opinion that substantial social and financial benefits can be achieved by the public sector through PPP framework. (Chang, 2013)

A World Bank report on railway privatization in Australia and New Zealand has concluded that while privatization of rail sector has been by and large met expectations, PPP models have not fared so well. Rail privatization has been able to result in less burden on budgetary resources to finance capital investment in rail infrastructure. The population densities in these countries are very thinly distributed and do not offer volumes for any urban transit system. For this reason, the governments will have to continue to support the rail infrastructure and bear part of the financial responsibility. The study concludes that overall the impact privatization of rail network in these countries has been positive.

The concluding remarks made in this World Bank report with reference to two airport links in Australia–Melbourne and Sydney assumes special significance. "It is not clear that the projects would have fared any

better off, having avoided at least part of the up-front capital investment; once rail infrastructure investment is sunk the community will typically continue to benefit from the investment irrespective of the financial re-engineering that might be required behind the scenes to try and keep the project going. On the other hand, there is an opportunity cost if PPP structures are used to channel public money into uneconomic projects which might not otherwise have been built. Arguably repeated disappointments with PPP rail projects (such as the two airport links –Melbourne and Sydney) would push up the cost of capital for future PPP rail investments but ultimately it comes down to the specifics of that particular project and the private sector's understanding of, and ability to effectively price, the risks; and equally importantly, the public sector's willingness and ability to move more rigorously to evaluate such proposals." (Williams, Greig, & Wallis, 2005)

In India, three metro lines have been developed on PPP framework so far. While Mumbai metro one was the first project conceived on PPP mode, Delhi Airport Metro Express Line (DAME) became the first metro on PPP framework to become operational in 2011. Hyderabad is the third city to choose PPP framework for a three corridor metro project spanning over 72 Km thus becoming the first ever project in the world to have been attempted on PPP mode. Reliance led consortium walked out of the contract after two years and the line is now operated by DMRC. Mumbai metro one is operational but both public and private partners are locked in a legal battle over fare dispute. Hyderabad metro is progressing more or less on schedule and is slated to be operational by mid 2017. Indian experience with the three PPP metros has been dealt with in detail in next chapter.

Literature surveyed for studying public private partnerships in rail based MRTS is summarized in Table-2.3.

TABLE-2.3: Summary of Literature Survey on Public Private Partnership (PPP) In MRTS

S.No	Author (s)	Title	Theme	Inference/*Research gap*

1	Department of Economic Affairs, Ministry of Finance.(2010)	Approach Paper for Defining Public Private Partnerships-a Discussion Note	Umbrella definition of PPP	Giving background and various definitions of PPP suggests an umbrella definition of PPP
2	(DEA, 2011)	National PPP Policy- 2011 (Draft for Consultation)	Broad policy framework for implementing projects using PPP approach	The Policy aims to; i) Set out broad principles of PPP.ii) Provide a framework for identifying, structuring, awarding and managing PPP projects.iii) Delineate institutional architecture and mechanisms for implementing. PPP projects. iv) Standardize vital interpretations and PPP process. v) Identify next generation issues to upscale, broaden and expedite PPPs
3	Phang, S. Y. (2009)	Transformation of the Urban Rail Sector through PPP.	Aligning ADB's Transport Operations with Strategy 2020	Examines complexities involved and the trade offs in PPP decisions. Highlights role of Govt. and appropriately designed & regulated PPP strategies for ultimate benefit of commuters.
4	PricewaterhouseCooper (2007)	Infrastructure PPP Financing in India- a Report for World bank	Financing of Infrastructure Projects under PPP framework.	New sources of funding need to be developed on both the debt and equity side if the target for private investment in infrastructure is to be met.
5	Public Private Infrastructure Advisory Facility, World Bank	Developing a PPP framework-Policies and PPP units	A note on policy, legal, and institution framework for PPP programs.	The PPP policy, institutional responsibilities, and procedures constitute the substance of the PPP framework.
6	(Bernardino, 2010)	Applying Social Marginal Cost Pricing in Rail PPPs: Present State, Drawbacks and Ways Forward.	Application of (SMCP) in PPP's in the railway sector-theoretical analysis with the observation of	Examine in detail the practical applicability of social marginal cost pricing (SMCP) in railway PPPs from the perspectives of cost accounting and effectiveness of SMCP

			empirical results of a case study.	towards the allocative efficiency goal, addressing the likely drawbacks in conciliating the welfare objectives of SMCP with the objectives of project financing (cost recovery) and value for money that justify the realization of PPP's. Recommends splitting the operator remuneration and the track access charges.
7	(Deloitte, 2010)	Indian Infrastructure a Trillion Dollar opportunity	Highlights role of private sector and in turn private equity as an asset class in driving infrastructure	Achieving private sector investment target in the infrastructure sector during 12th FYP would largely depend on the Govt.'s ability to address regulatory uncertainty and clearance related issues. Govt. funding should be linked to effort of developing projects as PPP.
8	(Loo & Dennis, 2006)	Developing Metro Systems in China: Policy and Gaps	Policy issues and major challenges in developing metro systems in China	MRTS are not financially viable in developing countries but economically justifiable. Benefits associated with opportunity cost of the use of time are estimated to constitute 76% of the total economic return of metro system. In China, the technology gap, the financing gap and the affordability gap are major issues.
9	Leber & Perrot/IFC(2012)	Mass Rapid Transit – a Tool for Urban Expansion	Trends in PPP in Metro Systems	MRTS is a complex and capital intensive project. Governments are using varieties of PPP models to leverage resources and expertise. CSFs mentioned. Four MRTS examples-Seoul metro, Stockholm metro, Bangkok skytrain and Saul Paulo's Yellow line -success and failure with reasons in brief. ***Detailed analysis of***

				CSFs or success/failures not given.
10	(Borgo, 2012)	Rail concession models in Sub-Saharan Africa	Sub-Saharan Africa's experience in rail privatization	Most of the formerly state owned railway companies in Sub-Saharan Africa have been transferred to private operators under various forms of concession contract and today more than 70% of the railway networks are now in the hands of private operators.
11	(Gangwar & Raghuram, 2013)	Framework for structuring PPP framework for Railways	Potential of unbundling the railway system for the purpose of private sector participation.	The extent of bundling/unbundling in a railway project should be determined by the appetite of private sector, specialization requirements, availability of competence and need for competition. Horizontal and vertical interface issues between entities highlighted. While Delhi metro airport express cited as a case of interface failure, the article mainly focuses on Indian railway projects.
12	(Gravieta, 2008)	Global Lessons in PPP: Financing Policy Options to Mitigate Transport Project Risks in the Southeast Asian Region	Compares LRT-2 and LRT-3 built by public sector and under PPP model respectively and compares with LRT/metro of other countries.	Policies suggested for a financially viable transit system : i) strengthen public institutions for transit oriented development, ii)promote market driven transit projects, iii) maximize non-transit revenues with commercial development or utility systems to ensure financial liquidity of transit system, iv) good governance to prevent reverse privatization as experienced in Bangkok,

				Kualalumpur and Manila.
13	(US Department of Transport;, 2007)	Case Studies of Transport PPPs around the world	Strategies for overcoming institutional impediments	21 case studies covered mostly motorways and tunnels. Issues and strategies to deal with them suggested. Sydney airport rail link and Brisbane airport rail link covered.
14	COST (European Cooperation in the field of Scientific and Technical Research) (2013)	Public Private Partnerships in Transport : Trends and Theory	24 cases of PPP in transport originating from 13 European countries incld. Arlanda-Stockholm line (Sweden) and Fertagus line (Portugal)	Rail projects found it harder to attract private finance partly because of the scale of investment required, the complexity of rail networks, uncertainties surrounding the interface with rail services, and the high level of regulations. Over time infrastructure projects especially in the transport sector, have become larger and more complex in terms of activities "bundled" into the contractual arrangements, and the number of parties involved in transactions.
15	(Hensen, 2010)	Review of 15 heavy rail PPPs in UK, EU and Australia	Advocates sharing of tariff risk	PPP railway projects cannot refinance themselves from ticket revenues as the infrastructure investment costs are very high. A substantial part of investment costs needs to be financed by public sector funds to assure the economic viability. The more risk is transferred to the private sector, the higher the costs will be.
16	(Nilsson & etal, 2008)	The Arlanda Airport Rail Link: Lessons Learned from a Swedish Construction Contract	Addresses costs and benefits of giving a private company control over one section of otherwise	Highlights important aspects of contractual design, including the allocation of risk, creating commitment and controlling for possible abuse of monopoly position. Also illustrates problems in

			public network	ex post assessment of projects when information is not available and where only a small part of complete contract has lapsed.
17	(Papaioannou & etal, 2006)	Recent experience on success and Failure Stories from Funding Large Transportation Projects in Greece	Analyses the experience gained and lessons learnt from funding large transportation projects in Greece	Public departments will get a smaller share for fund scarcity reasons and the dependence on private sector will increase for such projects. Other recommendations include competitive and transparent procurement, mechanism to keep interface risk minimum, comprehensive project studies and well drafted contract defining risk allocation, prevailing legislation, technical standards etc
18	Agrawal &, Gomez (2012).	Delhi Airport Metro Express	A case study of Delhi airport metro express	Provides background and overview of Delhi airport metro express line built under PPP framework- a case for Harvard Kennedy School supported by World bank. ***Being a case study for discussion, only facts of the case presented without analysis.***
19	(Chaudhary & Others, 2011)	Airport Express Metro Line-Infrastructure Financing Project and Implementation through PPP	A case study for class discussion at the University of Western Ontario	A case study for class discussion at the University of Western Ontario ***Being a case study for discussion, only facts of the case presented without analysis.***
20	Singh, M. (2013).	Study of PPP projects of Reliance Delhi Metro Airport Line	A case Study	Interface issues between DMRC (public entity) and DAME (private entity) highlighted as a major reason for failure. Not enough evidence or logical inferences presented for given

				recommendations for future projects.
21	Chang,Z (2013)	PPP in China – A case of Beijing Line 4 Metro Line	Illustrates benefits, cost, opportunities and risks in PPP in China	Contract provided for a mechanism to determine subsidy and revenue sharing based on 'shadow price' and shadow patronage'. The shadow price is a technique used to isolate the private sector partner from possible social policies of the government. The paper reveals that the PPP model can bring substantial social and financial benefits to the public sector. Context: China. Author acknowledges reluctance of Chinese government officials to share information. ***Financial results compared are based on oral information collected during interviews***

2.9 CRITICAL SUCCESS FACTORS (CSFs)

The critical success factors were introduced by John F. Rockart and the MIT Sloan school of Management in 1979. Rockart traced his CSF work to its conceptual antecedent, 'success factors' introduced by D.Ronald Daniel in 1961and defined as "three to six factors that determine success….key jobs [that] must be done exceedingly well". (Gates, 2010)

The famous 80:20 rule traces its origin to the concept of critical success factors propounded by Rockart. According to the rule 80 percent of the rewards or results are achieved through only 20 percent of the efforts. The CSF methodology is the technique to identify these 20 percent key factors. (Kowssarie, 2001)

The CSF methodology is a procedure that attempts to make explicit those few key areas that dictate managerial success (Boyonton & Zmud,

1984). This method has been used as a management measure since the 1970s in financial services (Boynton and Zmud, 1984); information systems (Rockart, 1982; Gates, Linda Parker, 2010) and manufacturing industry (Mohr and Sekman, 1994), construction management (Tiong, 1996). (Hardcastle, Eswards, Akintoye, & Li, 2005)

Since late nineties, CSF methodology has been applied to PPP projects. Initially authors applied the methodology to assess CSFs of PPP projects in general. Ismail while presenting findings of application of CSFs to PPP project in Malaysia has cited works of Qiao et al., (2001) who applied the methodology to Build Own Operate Transfer (BOOT) projects in China. "Tiong (1996), Tiong and Alum (1997), Gupt and Norasimham (1998) studied various contracts and named 'right project identification', 'strength of consortium', 'financial package differentiation' and 'supportive and understanding community' as the key success factors." (Ismail & Ajija, 2013)

In 2005, Zhang conducted a research study through case studies, literature review, and interviews for identification and analysis of critical success factors (CSFs) for PPPs in general. He identified 47 CSFs and categorized them into five groups; 'economic viability', 'appropriate risk allocation through contractual arrangements', 'sound financial package', 'reliable concession consortium with strong technical strength', and 'favourable investment environment'. The authors also examined the relative significances of these CSFs through a questionnaire survey and did not find any significant difference between the ranking of these CSFs by respondents from the industrial sector and those from the academic sector. (Zhang X. , 2005).

While further research on CSF methodology continued in PPP projects in general, increasing number of authors applied this methodology to specific PPP projects.

Hardcastel,et al. and Li distilled nineteen CSFs based on literature survey out of which eighteen were applied to study PPP/PFI construction projects in UK construction and examined the relative importance of 18 potential critical success factors (CSF) for in the UK. They grouped these

CSFs into five groups applying factor analysis; effective procurement, project implement-ability, government guarantee, favourable economic conditions and available financial market. Their results show that the three most important factors are: 'a strong and good private consortium', 'appropriate risk allocation' and 'available financial market'. According to authors, "the five factor groupings represent the basic elements of CSFs for PPP/PFI project development and should always be considered by public sector sponsors in forming and shaping their PPP/PFI policy development and by private sector concessionaire in managing their projects". Respondents in UK did not consider 'political support' as a critical success factor and 'technology transfer' was found to be more relevant to projects in developing economies. (Hardcastle e. a., 2005) (Li, 2005).

In 2010, Chan, et al. published research conducted in 2007 following Li's questionnaire and set of 18 CSFs which were sent to respondents having some involvement with PPP projects in China and Hong Kong. The authors also applied factor analysis and grouped them under five underlying factors; 'stable micro economic environment', 'shared responsibility between public and private sectors', 'transparent and efficient procurement process', 'stable political and social environment' and 'judicious government control'. Authors compared their findings with those of Li and observed that although order of grouping of CSF was different between UK and China-Hong Kong, three groups shared similar theme and meaning. These common factors are 'stable micro economic environment ', 'transparent and efficient procurement processes and 'judicious government control'. (Chan, 2010)

Recently, Famakin, et al. carried out a study for assessment of CSF in construction projects in Nigeria. The authors identified 17 CSFs from literature survey and the opinion of consultants, contractors and government to assess relation of the critical success factors and benefits of PPP to stakeholders in a construction project. As per the findings of the study, the most important critical success factors for PPP in the Nigerian environment in order of importance are 'commitment of public/private sector', 'strong private consortium', 'multi-benefit objectives', 'good governance' and 'available

financial market'. (Famakin, 2014) In another research paper Dada, et.al. have analysed the perception of both the public and private sector respondents with reference to certain construction projects in Nigeria using critical success sub-factors (SSFs) identified earlier in another project, the authors studied whether there is agreement in rankings and whether perceptions of the SSFs differ between public and private sector. "The findings suggest that there are significant differences in the perceptions of public and private sector on rankings of SSFs. The perception gap has the potential of affecting the acceptability and performance of PPP projects in the country." (Dada, 2012)

Not much literature is available for application of CSF methodology to rail projects. However a research paper by Smith and Gannon published by University of Leeds is relevant. Authors used CSF methodology based on seven light rail transit cases including two tram links built in UK. Authors identified 23 CSFs and distilled them into seven broad headings applying Analytic Hierarchy Process (AHP) based on expert opinion survey. In the opinion of authors 'political support' is the most significant success factor for LRT projects which impacts the availability of finance to private sector for a rail project and also the interest that is levied by the lenders. Citing examples of different treatments meted out to different LRT and underground rail networks for exceeding affordability targets in 2004, the authors argue that some projects are politically more supported than others. "Two kinds of political support were identified by experts. Some PPP rail projects in the UK had 'political ticking over' support often, when elections were on the horizon and these projects never reached the stage of contract signature. However the projects that had genuine political support, despite consuming significant development funds and changing the original funding objectives, managed to reach contract signature." (Smith & Gannon, 2008)

Critical success factors (CSFs) identified through literature survey are tabulated in Table-2.4. These CSFs (referred to as micro factors) have been grouped under six macro factors and further divided into two types of factors-internal (i.e. related to a PPP project) and external (i.e. environmental) -as

shown in Table 2.5. A brief description of macro factors is given in the ensuing paragraphs.

Table2.4: Critical Success Factors in a PPP Project

Author/CSF	Commitment, Responsibility & Defined Roles of Partners	Good Consortium	Stake holders Consultation	Contract Compliance for Results	Contract Agreement	Cost-Benefit Assessment	Stable Macro Economic Environment	Financial Market-Availability	Good Governance	Govt Support & Guarantee	Institutional & Legal Framework	Multi Benefit Objectives	Socio-Political Environment	Competitive/Transparent procurement	Techno-Economic Feasibility of project	Capable & well organised public agency	Appropriate risk Allocation and sharing	Shared authority between public & private
Agrawal (2010)		x	x		x	x	x	x		x			x	x	x		x	
Alinaitwe (2013)	x	x	x	X		x	x	x	x	x	x			x	x	x	x	X
Chan,etal (2010)	x	x			x		x	x		x	x		x	x	x	x	X	
Cheung,er al. (2012)		x						x		X	X		X		x		X	
Farrel,et.al (2013)		X									X							
Dada, et al. (2012)		x	x		x		x	x		x			x		x		x	
Emmanuel (2013)		x					x	x	x	x	x			x		x	x	
Ernst & Young (2012)				X							x		x					
Famakin et al. (2014)	x	x					x	x	x		x	x	x	x	x	x	x	
Harcastle,et al.(2005)	x	x				x	x	x	x	x		x	x	x	x	x	x	X
Hwang,et al. (2012)	x	x			x						x			x		x	x	
Ismail (2013)	x	x					x	x	x	x	x	x	x	x	x		x	X
Li, et al. (2005)	x	x				x	x	x	x	x	x	x	x	x	x	x	x	X
Maseko (2014)		x	x	X			x				x	x	x	x	x		x	
Millones (2010)	x	x	x		x			x		x			x	x	x		x	
Smith (2008)		x	x	X	x			x					x	x	x	x		
US deptt trans (2007)	x		x	X	X								x		X		x	
Zhang (2005)	x	x						x		x				x	X		x	

Note: 1. Some of the critical success factors identified by researchers have been grouped e.g. 'Good Consortium' includes good, strong, efficient, sound, committed, innovative consortium into, 'Techno-Economic Feasibility' includes 'long term transport planning', 'profitability' etc

2. Technology transfer, Black Economic Empowerment (applicable to South Africa), identified by one or two researchers have been ignored because of irrelevance in Indian context.

Table-2.5 Type of Critical Success Factors, Macro and Micro Factors

Type of Factors	Macro Factors	Micro Factors Identified by Researchers
External Factors	Institutional legal framework	Institutional legal framework
	Socio-Political-Economic Environment	Political/social environment/ support
		Stable macro-economic environment
		Financial market availability
Internal Factors	Well Structured PPP Project	Capable & well organized public agency
		Multi benefit objectives
		Consultation with stake holders
		Contract compliance for results
		Techno-economic feasibility of project
		Thorough cost-benefit assessment
	Effective Procurement	Competitive and transparent procurement
		Strong consortium
	Risk Management	Govt. support & guarantee
		Appropriate risk Allocation and sharing
		Contract Agreement
	Mutual Trust	Commitment, responsibility and defined role of partners
		Shared authority between public and private
		Good governance

Institutional and Legal Framework. Strong institutional framework is required to provide effective legal and regulatory support to PPP contracts which is crucial for success of PPP programs in any country. "This institutional structure should aim at both facilitating PPP development and providing clear boundaries to protect the interests of all stakeholders. The institutional framework is crucial if the public sector is to change its role from that of a single provider of services to fulfilling the duties of an independent regulator and manager". (European Commission, 2003) The PPP policy, institutional responsibilities, and procedures constitute the substance of the PPP framework. Today, India has a mature PPP market thanks to a number of successful PPP projects in the recent past. India has established institutional

framework to formulate policies and procedures for PPP projects and the ecosystem is well supported by other players such as financial institutions, construction companies, real estate developers and lenders. In order to instill transparency in PPP, draft national policy envisages dispute resolution mechanism, mandatory disclosures and fair practices, and new market based products e.g. pre-bid rating. (Ernst & Young, 2012)

Socio-Political Economic Environment. In order to instill confidence in both local and foreign investors to invest in PPP projects, governments in developing nations should focus on creating stable socio-economic and financial environment in the country. Economic barriers such as non availability of local financial markets, inadequate foreign exchange or currency rate risk and environmental barriers like problems in land acquisition, corruption, lack of good governance impede PPP implementation. Similarly societal perception of PPP projects and private sector, fear of tariff increase, loss of dwelling unit or existing business act as social barriers to PPP implementation. (Babatunde & etal, 2014)

Well structured PPP project. PPP project has to be structured taking into account the applicable legal, regulatory and policy guidelines and requirements. Stake holders' engagement is essential to ensure that the project will be able to fulfill the long felt needs and to provide the intended service. Implementing agency would also have to be clear about the government's objective behind the project and will have to satisfy itself not only with the techno-commercial viability but also about the willingness and ability of the private sector players to undertake the project in PPP mode. The agency has to scope the project and its structure, establish a project management team, carry out project planning, techno- economic and VfM analysis, risk assessment, allocation and management, multi-stakeholder objectives, support required from government, role and responsibilities of the public agency etc. The agency should also finalize terms of contract, bid document, bid evaluation criteria, draft contract/concession agreement, service and output specification, mechanism for monitoring and control as well as for dispute resolution.[Based on a guidebook on PPP (ESCAP, 2011)]

Effective Procurement. Main objective of PPP procurement should be to promote fair competition through a transparent process so as to acquire a proposal that provides best value for money and meets government's objectives. The procurement process should be cost effective and should not take too much time to finalize. It should be a two way communication process with appropriate pre bid qualification to select good party/consortium with technical and financial capability to deliver the project. . [Based on a guidebook on PPP (ESCAP, 2011)]

Risk Management. A PPP project is exposed to several potential risks. It would be desirable to manage the project such that the risks are kept at a level acceptable to both public and private partners. Analysis of risk in a project, decisions as to which party is in the best position to bear the risk and strategies for risk mitigation are crucial for success of a PPP project.

Mutual Trust. 'Trust is the binding cement of all relationships'. A relationship based on trust will instill confidence among the parties involved, promote cooperation, reduce delays, unnecessary negotiations and need for monitoring resulting in improved efficiency and lower transaction costs. "It provides the basis for confidence that the obligations and commitments undertaken will be met. Its presence can promote co-operation and reduce transaction costs in relationships based on long term or repeated exchange. The great benefit of trust is that it is efficient; the more there is trust the less necessary it is to engage in detailed and expensive monitoring of performance".[(Reeves, 2008) quoting Walsh (1995)].While it is more of a cultural aspect of institutions and organizations, a thorough understanding of role and responsibility of partners, shared authority between public and private parties, commitment of both parties to the project and principles of good governance promote mutual trust.

There might be some overlap in micro factors and these will be revisited at the time of analysis of findings.

A summary of a few of the important research papers on the subject of critical success factors and application of CSF methodology to PPP projects are listed in Table-2.6.

Table- 2.6: Summary of Literature Survey on Critical Success Factors (CSFs) in a PPP Metro

S.No	Author (s)	Title	Theme	Inference/*Research gap*
1	Gates & Parker (2010)	Strategic Planning with CSFs and Future Scenarios	Strategic Planning Technique with CSFs and Future scenarios	Synthesizes documented theory and research in strategic planning, CSFs and future scenarios and proposes an integrated framework.
2	(Maseko, 2010)	Analysis of Critical Success Factors for PPP in infrastructure developments in South Africa	Analysis of CSFs to PPP projects in South Africa	20 CSFs identified through LS were ranked on the basis of opinion survey. Project techno-eco feasibility, strong contract management control for compliance and strong experienced private consortium were the most important CSFs. Ranking of CSFs based on opinion survey of 21 participants. Basis of recommendations made in the study has not been analyzed. ***Mutual relationship between CSFs has not been analyzed.***
3	Famakin,etal. (2014)	Assessment of Critical Success Factors and Benefits of PPP in Construction Projects	Analysis of CSFs in PPP projects in Nigeria	17 CSF were ranked through opinion survey. All CSFs were found important for PPP projects in Nigerian context. No significant difference between opinion of contractors, clients and consultants. No significant difference between CSFs at the formation and implementation stage. Context: PPP in construction projects in Nigeria. ***Mutual relationships between CSFs have not been analyzed.***

4	Millones,(2010)	Breaking Down Factors of PPP in Urban Rail	Analysis of CSFs in Urban Rail Projects in Latin America Rio-metro, Sau Paulo metro and subway network of Buenos Aires	Using literature survey and interview method the author analyzed CSFs, grouping them under 7 major factors. Influence of CSFs on success criteria was studied through case studies and recommendations proposed for Lima urban rail line 1. Author defines criteria for success of a contract success which focuses on evaluating the preparation phase of the project, procurement success which analyses the project through the implementation phase and durability success which evaluates the project through post implementation phase. Analysis and recommendations based on 8 interviews through open questions. ***Sample size too small.***
5	(Alinaitwe & Ayesiga, 2013)	Success Factors for the Implementation of PPP in the construction Industry in Uganda	CSF methodology applied to PPP projects in construction	Competitive procurement process, a well organized private sector, the availability of competent personnel to participate in PPP project implementation and good governance are the most critical success factors identified.
6	(Dada, 2012)	Analysis of Critical Success Sub-Factors for PPPs in Nigeria	Applied CSF methodology to critical success sub-factors(SSFs)	The findings suggest that there are significant differences in the perceptions of public and private sector on rankings of SSFs. The perception gap has the potential of affecting the acceptability and performance of PPP projects in the country. ***Does not suggest measures to bridge the perception gap.***
7	(Emmanuel, 2013)	CSFs Determining the Implementation of PPP	Applied CSF Methodology to Critical Success Factors to	For Nigeria to move to second level of PPP maturity, the author suggest, setting up dedicated PPP units by

		projects	Nigerian Projects	government, leveraging of funds through capital market and government's involvement in multiple projects to create the much needed market for PPP implementation.
8	(Helmy, 2011)	Investigating the CSFs for PPP Projects in Kuwait	Expert Interviews to identify CSFs to be implemented by Kuwait Govt. for realizing successful PPP projects	Despite good macro-economic condition, the underdeveloped financial market limits the availability of financing. Government guarantee, project implement-ability and effective procurement were other CSFs ranked high by interviewees. Author suggests that Kuwait government should have one common and well coordinated vision for implementing PPP projects as a part of the long term development plan rather than frequent introduction of separate long term plans for private sector and society. ***Sample size too small.***
9	(Agrawal R. , 2010)	Successful Delivery of PPPs for Infrastructure Development in India	Conducted opinion survey for ranking of 47 CSFs and sub factors	Concession agreement and short concession period ranked (a sub-factor of Financial Viability) as the top most CSFs. ***Weak linkage between findings and recommendations.***
10	Li, B. (2005).	Critical Success Factors for PPP/PFI Projects in the UK Construction Industry	CSF methodology through questionnaire and statistical analysis	Applied 18 potential critical success factors (CSF) for PPP project in UK grouping into five groups applying factor analysis. Three most important factors are; 'a strong and good private consortium', 'appropriate risk allocation' and 'available financial market'.
11	Hardcastle (2005)	Critical Success factors for PPP/PFI Projects in	CSF methodology through questionnaire and statistical	Presents details of factor analysis applied to 18 potential critical success factors (CSF) for PPP project in UK in the above

		the UK Construction Industry-a Factor Analysis Approach	analysis	study.
12	(Cheung & Others, A Comparative Study of CSF for PPP between mainland China and Hong Kong Special Administratio nn. Region, 2012)	A Comparative Study of CSF for PPP between mainland China and HK Special Admn Region	CSF methodology through questionnaire and statistical analysis	Using Li's 18 CSFs and Li's questionnaire authors observed that difference in 3 CSFs was statistically significant; appropriate risk allocation and risk sharing, available financial market and multi-benefit objectives. Author's explanation: HK does not consider multi-benefit objective very important and China has too many restrictions on financial market and is in need of a proven risk sharing mechanism.
13	(Cheung & Others, 2012)	Factors contributing to Successful PPP Projects-Comparing HK with Australia and UK	CSF methodology to PPP projects	Using Li's 18 CSFs and Li's questionnaire authors conducted opinion survey in HK and Australia and compared findings with those of earlier study at UK by Li. Top 5 CFS in HK are ; favourable legal framework, commitment and responsibility of public and private sectors, strong and good private consortium, stable micro condition and appropriate risk allocation. Top CSF was ranked of medium importance by other two groups implying that legal framework is well developed in UK and Australia. 2nd, 3rd and 5th CSF was ranked highly by all 3 groups indicating their importance in delivery of successful PPP irrespective of geographical location. 4th CSF, stable macro-economic environment was ranked low by other two groups as Australia and UK have well

				established stable macro-economic environment and HK has expressed dramatic changes since 1997.
14	Ismail & Azija (2013)	Critical Success Factors of PPP implementation in Malaysia	CSF methodology to PPP projects	Using Li's 18 CSFs and Li's questionnaire authors observed that majority of CSFs were ranked differently by public and private sector, however statistics revealed significant difference only in four CSFs between the two sectors. The difference in rankings between countries (compared with earlier studies using same CSFs and questionnaire in China, HK and Australia) reflect unique nature imply that the nature and characteristics of PPP vary between the country.

2.10 RISK ANALYSIS AND RISK MANAGEMENT IN PPP PROJECTS

A World Bank Resource for PPPs in Infrastructure list a number of key risks that need to be allocated and managed to ensure the successful financing of the project :

i. Construction and completion risk
ii. Operating risks
iii. Demand risk
iv. Force majeure and change in law
v. Political and regulatory risk and expropriation and nationalization risk
vi. Environmental risk
vii. Social risk
viii. Tenor and Refinancing Risk
ix. Currency exchange risk
x. Interest rate risk

These risks will need to be allocated with the party that is best placed to manage them in a cost effective way (this will not necessarily always be the private sector) (WB/PPPIRC, 2014).

A PPP toolkit for Improving PPP decision-making processes available on pppindia.com site of ministry of finance, GoI advocates that project risks should be identified at the pre-feasibility stage. "All possible risks as applicable to the particular project should be assessed and a recognized risk management technique should be applied The risk analysis should include an assessment of which party, public or private, is best able to bear each risk. This risk allocation is important for helping with the design of the particular PPP contractual structure that is best suited to the project. The party that is best able to bear the risk is the one that is in the best position to reduce the likelihood of the risk occurring and / or minimize the consequences of the risk. Three risk allocations have been considered possible; Retained risk - risks that will be retained by the public sponsor, transferable risk - risks that will be transferred to the private partner and shared risk – risks that both parties will bear, as agreed in the contract". (Ministry of Finance,GoI, 2011)

The private sector should be able to model the risks and evaluate the company's ability to measure the risk impact. "Private sector builds the risk into price bid and will pass it onto public sector in the form of bid. If the cost of the risks is acceptable to the public sector, a contract will be awarded. If the private sector's charge is considered too high, the public sector may need to go in the form of negotiation with the private sector and consider whether to accept higher risk cost, or share the risks, or retain the risk in the public sector". (Li B. , 2001)

Risk allocation or risk sharing between public and private sector is crucial for laying the foundation for success of a PPP project. Risk identification is the first step in this exercise. However according to Zhang, et al (2013), "more important purpose is to work out the hierarchical structure which can be able to articulate the internal and external relationships between project risk factors, making project participants identify the various source of risk factors and their relation." (Zhang H. , 2013)

Li, J, et al. Identified finalized a list of 23 risk factors with the help of five experts out of 42 identified initially in a Chinese expressway project. These risk factors were grouped into seven categories; planning, tendering,

financing, design, construction, operation which are by and large generic to PPP projects. The factors were ranked using fuzzy AHP. The top five risk factors are; i) planning deficiency, ii) low project residual value after 30 years of operation when project is returned to government, iii) lack of qualified bidders, iv) design deficiency and v) long project approval time. The risks at financing stage and operation stage were ranked mid-level and low level respectively. Author's explanation for the former is that "Chinese government's capital requirements for private companies are very strict and there are limited financing options and the latter is that experts were optimistic about future market as it was the first express way or they lack experience in managing such projects". (Li, Patrick, & Xou, 2011)

There are many methods for identification, but a study by Li, et al. proposed a meta classification approach on the basis of three levels of risk factors for PPP/PFI projects (Li B. , 2001). The three levels comprise; macro level risks, meso level risks and micro level risks which authors defined as below:.

Macro level risks are sourced exogenously, i.e. they are external to the project or beyond the system boundaries of the project. The risks at this level are most often associated with political and legal conditions, economic conditions, social conditions and weather.

Meso level PPP risks arise endogenously, i.e. internally at the project level through the processes of the project itself. These represent implementation problem, and involve issues such as project demand/usage, location, design and construction, operational requirements and technology.

Micro level of PPP risks is more difficult to define, but represents the risks present in the stakeholder relationships formed in the project procurement process, and which arise mainly through the inherent differences between the public and private sectors in ethos and contract management approach. The public sector has social responsibility, while the private sector is mostly profit driven.

Insight gained from literature survey on risk analysis and risk management has contributed to the study in carrying out a detailed analysis of how various risks in the three PPP metros in India have been allocated and addressed in the concession agreement. This analysis has been presented in next chapter with a comparison showing different ownership structures adopted for implementation of metro projects in India and to what extent these ownership structures affect in taking the project 'off public balance sheet'

Table-2.7 gives the main authors consulted for risk analysis and risk management in PPP projects apart from World Bank documents already referred above.

Table-2.7 Summary of Literature Survey on Risk Analysis and Risk Management in PPP Projects

S.No	Author (s)	Title	Theme	Inference/*Research gap*
1	Li, B. (2001).	Risk Analysis and Allocation in Public Private Partnership Projects.	Risk analysis	Private sector builds the risk into price bid and will pass it onto public sector in the form of bid. If the cost of the risks is acceptable to the public sector, a contract will be awarded. The public sector may need to negotiate and consider whether to accept higher risk cost, or share the risks, or retain the risk in the public sector
2	Zhang, H. (2013l).	ISM-HHM based Risk Analysis for Public Private Partnership Projects	Risk analysis	Risk allocation or risk sharing between public and private sector is crucial for laying the foundation for success of a PPP project. More important is to work out the hierarchical structure which can articulate the internal and external relationships between project risk factors, making project participants identify the various source of risk factors and their relation

3	Li, J. (2011)	Fuzzy AHP Based Risk Methodology for PPP projects	Risk analysis	The top five risk factors are; 1) planning deficiency,2) low project residual value after 30 years of operation when project is returned to government,3)lack of qualified bidders, 4) design deficiency and 5) long project approval time

2.11 WHAT DEFINES SUCCESS OF A PPP METRO PROJECT?

Before identifying critical success factors that influence the success of a PPP metro project, we need to define what constitutes success. KPMG studied 19 cases of urban transport; many of them rail projects in 13 different locations in 19 case studies. The research team analysed how the identified factors contributed to the success of the project across three dimensions: financial success, policy success and durability success. (KPMG, 2010)

Earlier in response to a commission from KPMG, Allport, et al. from London School of Economics worked on evidenced based study on "how to define success of transport projects, and how important to success is having good funding and procurement strategies in place at an early stage". The study comprised of 19 cases of urban transport in 13 different locations, many of them rail projects. The research team analyzed how the identified factors contributed to the success of the project across three dimensions: financial success, policy success and durability success. (Allport, 2008) The criteria and factors used have been later documented in a report by KPMG. ***Financial success:*** What are the outcomes in financial terms vis a vis the forecasts made at the beginning of the project? If the outcomes are comparable of better than the forecasts, the project is said to be successful. ***Policy success***: This comprises of expected or projected outcomes in terms of economic, social, development and environmental impacts versus the actual outcomes. ***Durability success:*** How the project or business is able to sustain its service delivery in the long run while maintaining the policy objectives decided at the start of the project defines delivery success? Durability success will also

determine the suitability of the process followed in project development to be used for future similar projects. (KPMG, 2010)

World Bank in a report to determine the nature of the contribution made by eight PPP units around the world to successful PPPs has defined a successful PPP unit as "a PPP unit that contributed to the implementation of a successful program" (World Bank, 2007). A successful PPP programme has been defined as one which meets the following criteria:

- Delivers the required services.
- Offers Value for Money (VfM). For arriving at value for money for the public service provided under PPP program, lifetime costs including the cost of risk bearing are calculated on net present value basis
- The PPP program follows good governance principles including transparent and competitive procurement, fiscal prudence and complies with the legal and regulatory provisions applicable to the industry to which the PPP belongs.

Apart from quantitative factors, there could be a number of qualitative objectives for PPP projects. In such situations, the qualitative assessment under value for money analysis assumes equal or more importance than the quantitative or cost factors. Multiple criteria analysis may be used to evaluate options based on numerous criteria. (US Department of Transport, 2012). Qualitative assessment under VfM will identify factors which influence the project's Viability,

While public agency's ability to form a complete contract will affect the viability, performance will be largely governed by innovation and risk sharing arrangements and achievability is a factor of capability of both the public authority and the private concessionaire to deliver the project.

According to European Commission, a VfM assessment requires two key elements; financial comparator and non-monetary comparison. For monetary comparison cost of public sector procurement is compared with the cost of the PPP procurement and the resultant savings are expressed in terms of discounted cash flows over the life of the PPP contract. Qualitative factors

are those factors that are difficult to quantify but are significantly valuable to government and the users or general public. Project quality and the speed of delivery, quality of operation and maintenance, user satisfaction etc. are some of the non monetary factors used for VfM analysis.(European Commission, 2003)

According to Aziz, UK and British Columbia's service based approach (qualitative assessment); governments seek to achieve best value for taxpayer's money by transparent, competitive procurement that would achieve the best VfM. This includes being reasonable in risk allocation where government may retain the demand risk, using private finance as an incentive for better performance, and compensating contractors based on their performance. VfM analysis is performed by comparing the project under both PPP procurement and under public sector traditional delivery, referred to as public sector comparator. (Aziz, 2007)

United Kingdom and British Columbia's service based approach also called public sector comparator (qualitative assessment) analyses the time and cost savings in delivery of a transit service through transparent and competitive procurement of a PPP project. Performance based contracts are entered into with appropriate risk sharing arrangements (such as demand risk). VfM analysis is performed by comparing the project under both PPP procurement and traditional public sector delivery. (Aziz, 2007)

Kušljić conducted opinion survey to find out the success criteria from public sector client's perspective and observed that required service definition, usage effectiveness, economical effectiveness, client satisfaction, end user satisfaction, specification achievement and long term development of public service are the seven most important criteria. (Kušljić & Marenjak, 2013). Millones, (2010), derived his criteria from the work of KPMG while studying PPP projects in urban rail in Latin America. He argued that the term 'financial success' used in KPMG study is basically to ascertain the economic viability at the preparation phase of the project. The second criteria relate to procurement success which analyses success through the implementation phase and the third criteria refers to durability success which evaluates the

project through post implementation phase. Thus in order to match these three aspects with the three stages of the project, he renamed these terms and defined success according to 'contract success' which focuses on evaluating the preparation phase of the project, 'implementation success' which analyses the project through the implementation phase and 'post implementation success' which evaluates the project through post implementation phase. (Millones, 2010)

We evaluate success of a scheme from a viewpoint of the promoter of the scheme (generally a public authority). In such an evaluation, objective is not to ascertain whether the project was the best that could have been identified. A PPP project's success is rather assessed against its objectives; to what extent the project has been able to achieve its stated objectives. Both evidence based assessment and stakeholder perceptions form part of such an evaluation. (Allport, 2008). Based on literature survey, the criteria of success for a PPP metro can be tabulated in Table-. 2.8

The success at each stage of the project is influenced by a number of factors that influence these criteria to deliver a successful PPP project. The performance indicators will be further validated during first phase of the study (Objective-1)

Table 2.8: Success Criteria in a PPP Project

Success Criteria	**Performance Indicators**
Contract Success	Quality and completeness of the contract Appropriate risk sharing and risk allocation Selection of concessionaire and contract agreement Financial closure within stipulated time
Implementation Success	Timely project delivery Project completion within budget Scope of the project as per contract Quality of construction

Post Implementation Success	Ridership recovery in short and long term Last mile connectivity Service quality in O&M User satisfaction

A summary of some of the important research papers on the subject of 'What defines success in a PPP Project' is given in Table-2.9.

Table-2.9 Summary of Literature Survey on What Defines Success of a PPP Metro Project?

S.No	Author (s)	Title	Theme	Inference/*Research gap*
1	KPMG. (2010).	Success and Failures in Urban Transport Infrastructure Projects. KPMG International	How to define success in a PPP project	Bases on a study of 19 cases of urban transport, many of them rail projects in 13 different locations in 19 case studies, the research team analyzed how the identified factors contributed to the success of the project across three dimensions: financial success, policy success and durability success
2	Kušljić & Marenjak (2013)	Critical PPP/PFI Project Success Criteria For Public Sector Clients	Opinion survey to rank most important criteria for success of a PPP project from Public sector perspective	Factor analysis of rankings revealed service realisation, public reputation, public contribution, political reputation and project delivery as the most are the most important success criteria. ***Only criteria from public sector perspective have been identified.***
3	US Department of Transport. (2012)	Value for Money Assessment for PPPs-a primer	Addresses Value for Money for PPPs	Analyses both quantitative and qualitative success criteria. Some of the objectives for PPP projects are more qualitative than quantitative. Thus for those objectives, the qualitative assessment is given equal or more importance relative to the cost factors. Multiple criteria analysis may be used to evaluate options

				based on numerous criteria.
4	European Commission. (2003).	Guidelines for Successful PPPs	Policy Guideline for European region	A VfM assessment requires two key elements; financial comparator for monetary comparison and non-monetary comparison i.e., comparison of all factors that are difficult to quantify but their value to government and the wider public is significant e.g., speed of project delivery, quality of service etc.
5	Aziz (2007)	Successful Delivery of Public Private Partnerships in Infrastructure Development	Quantitative and qualitative assessment of success of a PPP project	In UK and British Columbia's service based approach (qualitative assessment), governments seek to achieve best value for taxpayer's money by transparent, competitive procurement that would achieve the best VfM. This includes being reasonable in risk allocation retaining the demand risk, using private finance as an incentive for better performance, and compensating contractors based on their performance. Summarises principles which would characterise the success of a PPP program according to degree of achievement and understanding of these principles.
6	Allport, R. (2008)	Success and Failures in Urban Transport Infrastructure Projects	How to define success in a PPP project	Author worked with KPMG and researchers from London School of Economics on evidenced based study on "how to define success of transport projects, and

				how important to success is having good funding and procurement strategies in place at an early stage".

2.12 INDIAN EXPERIENCE WITH PPP METROS

If we exclude Kolkata metro which progressed at snail's pace from 1972 to nearly the end of the century, Delhi metro is the first metro paving the way for emergence of metro rail in modern India. DMRC which is a 50: 50 SPV between central and state government has set a trend for all future metros. However private investment has been made in the implementation of the following metros in India:

- Delhi Airport Metro Express
- Gurgaon Rapid Metro
- Hyderabad Metro
- Mumbai Metro

Gurgaon metro being a totally private project has not been included in the study. Various contract and project documents, reports etc. were studied for getting a perspective on the background that led to development of the other three metros on PPP framework, problems faced during interaction and lessons learnt. Semi-structured interviews with concerned government and private officials who were associated with these projects at various stages helped in supplementing the information gathered from documents and available literature. Considering that a critical appraisal of Indian experience with PPP metro deserves to be dealt with in detail to get a thorough understanding of practical issues and reality, a separate chapter has been devoted to this part of explorative and qualitative research with field study conducted on Hyderabad PPP metro forming yet another chapter.

2.13 SAP-LAP ANALYSIS

SAP-LAP framework is a technique which can be used for case study based research for better insight. (Sushil, 2000a) (Sushil, 2000b). Three basic entities in any context, viz. a "situation" to be managed, an "actor" or group of actors who manage or deal with the situation and a "process" or processes that

are deployed for desirable outcomes. Actor has the freedom of choice to exercise in a given situation. SAP analysis leads to LAP i.e. learning, action and performance (Figure-2.4). SAP-LAP framework can be applied successfully to both generic and specific model for managerial inquiry. Both qualitative and quantitative methods can be used to develop these models.

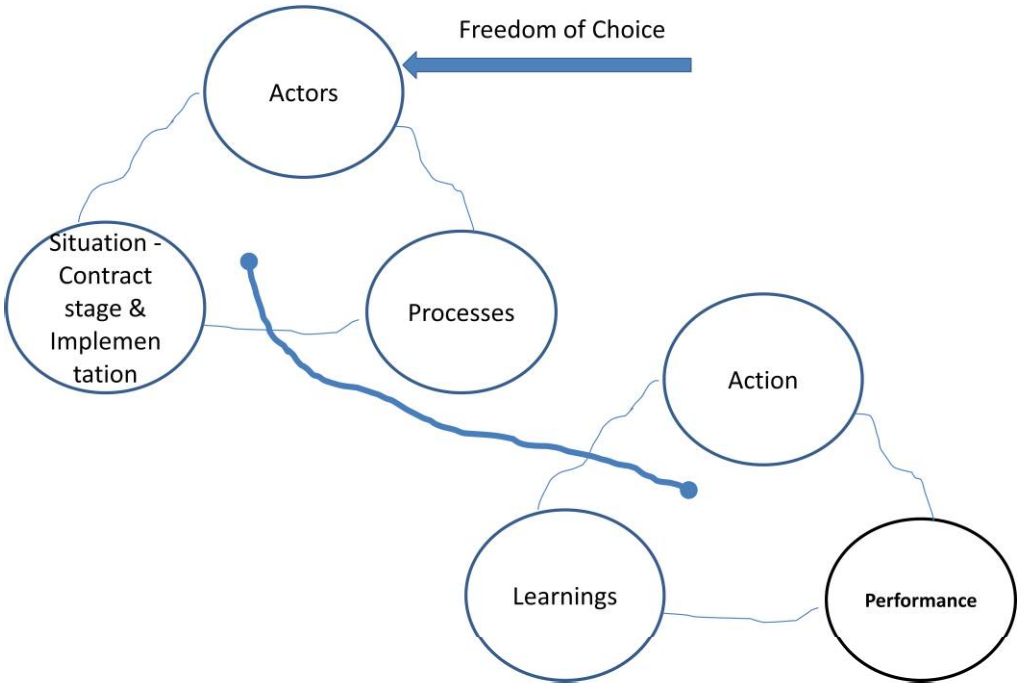

Figure 2. 4 : SAP-LAP Model of Enquiry

Source: Sushil (200,a,b)

SAP-LAP framework has been widely applied by various researchers in analysing various management problems related to strategy, supply chain, performance management, e-governance and other organisational issues. (Sushil, 2001) (Yadav & Sushil, 2014) (Nasim & Sushil, 2014) (Kabra & Ramesh, 2015) (Goel, Dwivedi, & Sherry, 2012). Recently, SAP-LAP framework has also been attempted to theory building e.g. as a supporting framework for building a theory of flexible systems management (Sushil, 2016) and more recently in the Context of disaster management (Sushil, 2017).A summary of literature surveyed to study SAP-LAP methodology and its application is presented in Table-2.1

2.13.1 *SAP-LAP LINKAGES FRAMEWORK*

The SAP (situation, actor, process) framework was elaborated to include LAP (learning, action, performance) resulting in a systematic framework integrating analysis (SAP) with synthesis (LAP). The SAP-LAP linkages framework is an integrated framework that captures the interplay among different components of SAP-LAP. The SAP-LAP linkages framework consists of the following steps:

i. Step 1 Conceptualise SAP-LAP framework
ii. Step 2 Define clearly the SAP-LAP elements
iii. Step 3 Map the elements in assessment matrix on a suitable scale
iv. Step 4 Construct self-interaction matrices for SAP constituents; binary and interpretive
v. Step 5 Build cross-interaction matrices
vi. Step 6 Interpretation of the interplay between various elements leads to LAP synthesis

Figure 2.5 explains the SAP-LAP framework. "Situation to be managed representing 'what' is existing. • An 'actor' or a group of actors 'who' deal with the existing situation. • A 'process' or processes that are handled by actors giving 'how' the situation is being managed. • 'Learning' from analysis of situation, actor and process results in 'why' the situation occurred in its current form. • 'Action(s)' emerging out of reflection of learning to plan 'when' and 'where' these are to be implemented, relating with 'who' would be responsible and 'how' it will be carried out. • The actions result into 'performance' as intended 'what', which gives feedback for further learning" (Sushil, 2017)

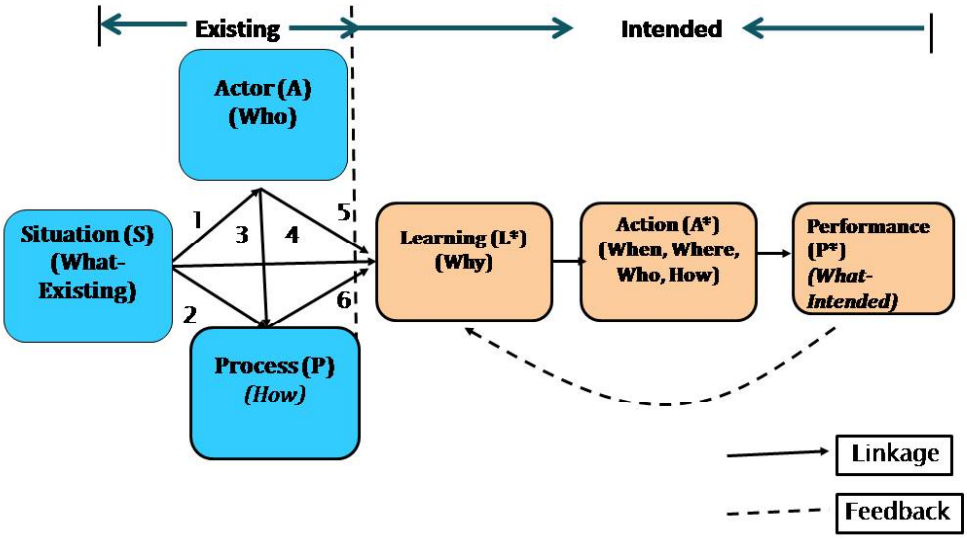

Figure 2. 5 ; SAP-LAP Analysis and Linkages,
Source : Sushil, 2017

Table-2.10 Summary of Literature Survey on SAP-LAP Analysis and Linkages

S.No	Author (s)	Title	Theme	Inference/*Research gap*
1	Sushil. (2001) Sushil. (2000b) Sushil. (2009)	SAP-LAP Framework, SAP-LAP Models of Enquiry, Situation-actor-process options: Mapping and Enhancing Flexibility	SAP-LAP framework has been advocated for better insight through case research	The SAP-LAP framework consists of three entities in any context, viz. a situation to be dealt with, an "actor" or group of actors who deal with it and a "process" or processes that recreate the situation. In this framework, freedom of choice lies with the actor. A synthesis of SAP leads to LAP which deals with learning, action and performance.
2	Goel, S, et.al (2012)	Critical Factors for Successful Implementation of E-governance- A Case Study of HUDA	Application of SAP-LAP in study of e-governance implementation at	A case of e-governance implementation at Haryana Urban Development Authority (HUDA). case study of eHUDA program has

			HUDA	been conducted using Dynamic SAP-LAP framework
3	Kabra,G. & Ramesh, A. (2015)	Analyzing ICT Issues in Humanitarian Supply Chain Management : A SAP LAP Linkages Framework	Application of SAP-LAP in analysis of ICT in HSCM	The developed SAP-LAP linkages framework provides early insights about the use of ICT and suggests ways of how this can be improved in Humanitarian supply chain management (HSCM) in India
4	Nasim, S., & Sushil. (2014)	Flexible Strategy Framework for Managing Continuity and Change in e-government.	Application of SAP LAP to management of continuity and change	Application of SAP-LAP in managing continuity and change in e-government
5	Yadav, N., & Sushil. (2014).	Theoretical roots of flexible strategy game-card: An evolving Strategic Performance Management System	Application of SAP-LAP to performance management system.	Application of SAP-LAP to performance management system.
6	Singh, N., & Shalender, K. (2014)	Success of Tata Nano through marketing flexibility: A SAP–LAP matrices and linkages approach.	Application of SAP-LAP to marketing of Tata Nano	Application of SAP-LAP to marketing of Tata Nano.
7	Sushil, 2017	"Theory building using SAP-LAP linkages: an application in the context of disaster management"	Application of SAP-LAP to theory building	Development of a theoretical framework for disaster management using SAP-LAP methodology

2.14 RESEARCH GAP

Much of the literature cited above identified and analysed critical success factors of PPP projects in Europe, Australia, South East Asia (Hong Kong, Malaysia, Singapore, Thailand) and Africa. The literature is not

available where mutual relationship of CSFs has been studied. Further, barring few studies, not much research, even outside India, has been done to identify critical success factors in public private partnership projects in urban transport especially rail based urban mass transit systems. Hardly any scholars have studied the same in Indian context. In fact literature is not available on any evidenced based study for enabling factors for successful public private partnerships in rail based urban mass transit systems in India.

In short, ***available literature does not provide insight for developing understanding on factors responsible for the success of public private partnerships in rail based urban mass transit systems in India.***

It is, therefore, believed that the proposed study will help in bridging this gap that has been observed in literature.

2.15 RESEARCH PROBLEM

From the review of literature it is learnt that i) MRTS is a complex and capital intensive project and governments the world over are using varieties of PPP models to leverage resources and expertise. ii) MRTS are not financially viable in developing countries but economically justifiable. iii) PPP railway projects cannot refinance themselves from ticket revenues as the infrastructure investment costs are very high and a substantial part of investment costs need to be financed either by public sector funds or through non-transit revenues with commercial development or utility systems to ensure financial liquidity of transit system. iv) critical success factors in PPP projects can vary from country to country implying that the nature and characteristics of PPP vary between the countries. v) perception gap between public and private sector on rankings of success factors in impacting PPP projects has the potential of affecting the acceptability and performance of PPP projects vi) CSFs in construction PPP projects have been extensively researched but studies on CSFs in MRTS are rarely observed even outside India. vii) No evidence based study is available on CSFs in PPP in MRTS projects in India.

Problem Statement: Although many studies have dealt with PPP in MRTS projects there is a lack of conceptual clarity on the factors that are critical in

PPP of rail based MRTS, their significance and the difference in perceptions (among the public and private stake holders) on the way they impact the success of the PPP model in the rail based MRTS projects in India.

2.16 CONCLUDING REMARKS

It may be noted from the literature review, discussed above, that it is not exhaustive and relies on relevant and select articles/research work in the field, but is sufficient enough to indicate key research variables and gaps for further work in the area.

Literature Review clearly indicates that a metro project is a complex project involving huge capital investment and long gestation periods. In view of the societal need for such projects to improve urban mobility, there have been attempts to utilize private investment and expertise to develop these projects 'off balance sheet' keeping precious budgetary resources for other priority sectors. Being a public utility project, fare for metro rides have to be kept within the affordability of urban poor and this puts metro projects unviable on the basis of ticket revenue. Financial viability of a metro project therefore depends to a larger extent on non-fare box revenues based on land monetization and commercial activities. This brings in a lot of complexity into long term contractual arrangements if the metro is to be developed on a PPP framework. Eighteen critical success factors are identified based on earlier work done by researchers mainly on construction projects as a very few studies are available in the context of a PPP metro. CSFs in PPP projects are contextual and vary from country to country. Different stakeholders hold different perceptions on the significance of various CSFs and their impact on the success of a PPP metro. Documents and reports surveyed as a part of literature survey also highlight the need for expediting metro construction in Indian cities and the need to find innovative ways to finance such projects.

Literature supports the fact that a PPP metro's success hinges on both internal as well as external factors such as institutional legal framework and socio-political-economic environment. Among internal factors; how well the PPP project is structured, transparent and competitive procurement process, proper risk allocation and management and mutual trust are the key variables.

Next chapter utilizes insight gained from literature survey on risk analysis and risk management and presents a detailed appraisal of three PPP metros in India with the type of ownership structures adopted and allocation and management of various types of risks. Survey of SAP-LAP concept and its practical application has helped in design of a field study on Hyderabad PPP metro presented in a separate chapter.

The findings of literature review has helped in identifying key research variables and a design of the study in terms of key variables, hypotheses and methodology is presented in Chapter-4.