

**TRANSPORT INFRASTRUCTURE PROJECT  
PLANNING PROCESS AND CAPITAL DEPLOYMENT  
EFFICACY IMPLICATIONS:  
EVIDENCE FROM SRI LANKA**

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Degree of Master of Philosophy

Department of Transport and Logistics Management

University of Moratuwa

Sri Lanka

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Thesis submitted in partial fulfilment of the requirements for the  
Degree Master of Philosophy

Department of Transport and Logistics Management

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Sri Lanka

August 2021

## **Declaration of Originality**

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# **Transport infrastructure project planning process and capital deployment efficacy implications: evidence from Sri Lanka**

## **Abstract**

Public sector investments contribute to economic growth and enhance the productivity of a country. According to the Central Bank annual report 2020, the Government of Sri Lanka spends around 30% of total annual expenditure on capital investments. The project planning process plays a crucial role in selecting projects and allocating resources with optimum capital efficiency. However, public investment planning in Sri Lanka does not consider returns on investment or technical specifications, resulting in low value for the cost. It also lacks expert consultations or in-depth evaluations of project need. As a result, implementors often fail to adhere to the process of selecting capital-efficient ventures.

It is important to comprehensively evaluate projects at the planning stage and select the most cost-efficient options. This analysis of the current project planning process in Sri Lanka is undertaken based on selected case studies of road and rail transport infrastructure investments. Sri Lanka allocates a share of its public capital investment for land transport infrastructure projects. This research aims to examine the planning process for public sector capital investment projects, identify its implications for capital efficiency and propose efficiency improvements to Sri Lanka's public sector capital investments.

Standard operating practices in Australia, Canada, Germany, Hong Kong, India, and Vietnam were compared with Sri Lanka. This comparison revealed that Sri Lanka's public project planning process does not provide standard operating practices for initial screening of projects, clientele analysis, probabilistic risk analysis, or post-project evaluation.

Context analysis from rail and road infrastructure investment projects revealed that most projects in Sri Lanka do not follow the current project planning process. Instead, project proponents bypass the process and seek direct Cabinet approval. On average, projects that receive such direct approval have higher investment costs associated with them. In-depth interviews with industry experts revealed that the causes of capital deployment inefficiencies were the unclear institutional role entrusted by the Department of National Planning, political influence, lack of transparency throughout the process, and gaps in the operation manual.

Upon summarising all gaps and identified issues, the study proposes appropriate mitigation measures. These measures recommend developing an Act of Parliament to introduce an authoritative body to implement the planning process and adopt centralised guideline with Standard Operating Practices. The proposed centralised guideline was validated through two rounds of expert consultations. Future research could evaluate the proposed centralised guideline by applying them to specific projects and expanding their application to encompass irrigation, port, and airport infrastructure investments.

**Keywords:** Public investment, capital efficiency, project planning process, transport infrastructure

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## **LIST OF ABBREVIATIONS**

ADB - Asian Development Bank  
BCR - Benefit-Cost Ratio  
BOQ – Bill of Quantity  
CECB - Central Engineering Consultancy Bureau  
DP – Decision Points  
DPR-Detailed Project Report  
FEDD - Front-End Detail Design  
FR - Financial Regulations  
GDP - Gross Domestic Production  
GOSL – Government of Sri Lanka  
ICOR - Incremental Capital Output Ratio  
IFI – International Financial Institution  
IMF - International Monetary Fund  
IP – Investment Productivity  
IPD - Initial Project Description  
IRCON - IRCON International Limited India  
JICA - Japanese International Corporation Agency  
KPI – Key Performance Indicators  
LCC – Life Cycle Costing  
LKR – Sri Lankan Rupee  
NPAA - National Project Appraisal Authority  
NPD - National Planning Department  
OM – Operation Manual  
PAC - Project Appraisal Committee  
PIM – Public Investment Management  
PP - Project Proponent  
RDA – Road Development Authority  
ROCE - Return on Capital Employed  
ROCKS – Road Cost Knowledge System  
SD - Standard Deviations  
SLR - Sri Lanka Railway Department  
SOP - Standard operating practice  
USD – United States Dollar  
VE – Value Engineering  
WB - World Bank

Exchange rate (2019) - USD 1 = LKR 178.78 (Central Bank of Sri Lanka [1])

## **CHAPTER 01: INTRODUCTION**

### **1.1 Background**

Efficiently functioning, financially secured, and timely investments improve citizens' quality of life and enhance a country's economic productivity [2]. Capital investment productivity is considered a valuable measure of the economic growth of a country, where labour and capital are two key resources utilised for capital investments [3], [4]. In light of the above, significant capital investments are required for an economy to maintain the expected growth and fulfil the increasing demands of a growing population [5], [6]. Many public sector capital investments are meant for large-scale ventures. Governments initiate numerous measures to achieve the expected economic growth by setting macroeconomic policies and providing capital investments in various sectors, including education, health, defence, and infrastructure [7].

Some economies achieve the expected economic growth within the projected time frame, while others dismally fall short of expectations [8]. Literature reveals that the main reason for the decline in the expected economic growth is due to inefficiencies in public investment management: poor project appraisal, faulty project selection, rampant corruption, and an apparent lack of thorough monitoring. These negative aspects indicate that public investments are naturally prone to overuse of resources, and some could even be termed a criminal waste of public capital investments [9]. On average, one-third of all capital investments are squandered due to inherent inefficiencies in governance practices. This is due to inadequate practices in planning, appraisal, selection, and capital allocation, which are expected to manage public investments [10].

Considering above, it is evident that the public sector capital investment project planning process plays a crucial role in determining the most vital and viable projects to be implemented in a particular country. As the International Monetary Fund (IMF) (2020) notes, most developing economies struggle with project planning, appraisal, selection, and capital management issues [10]. These economies urgently need to

reconsider the capital project management process to meet the expected economic growth [11].

## **1.2 Introduction to Sri Lankan Context**

Sri Lanka is a developing economy that has not achieved the expected productivity levels from capital investments during the past years [12]. Therefore, it is pertinent to identify the reasons for the inability of realising the anticipated growth within Sri Lanka; for this, the current project management process must be re-assessed, and more appropriate systems need to be introduced to improve capital deployment efficacy [8], [13]. According to the Central Bank Annual Report 2020 [14], Sri Lankan Government has spent around 30% on capital investments out of total expenditure in recent past years. In Sri Lanka, private and public sectors are involved in capital investments [12], [15]. The private sector contributes to a significant proportion of capital investments than the public sector [1], [16]. As the motive of the private sector is to generate profit, they always try to invest in projects which assure quick returns or rich dividends. On the other hand, public sector capital investments are meant to upgrade social infrastructure for the benefits of the public. These projects are funded from tax revenue or external funds [7], [16]. Therefore, public sector capital investments do not directly evaluate the profitability of investments [10]. Due to this situation, the possibility of misappropriating public investments is higher than the private sector [17]. Therefore, it is vital to investigate the capital allocation efficacy of public sector capital investments in Sri Lanka to raise the economy of the country.

In view of this, rail and road infrastructure investments were selected for detailed investigations in the study considering recently completed projects, which revealed the actual practice in the public sector capital investment project planning process [9], [18]. Rail and road infrastructure investment projects are typically national or provincial-level improvements, almost entirely funded by the public sector within Sri Lanka [19]. The primary purpose of these projects is to provide the essential infrastructure through speedy and convenient transport systems. Such transport networks would meet the growing demand from passengers, facilitate the fast-forwarding of agricultural products and industrial outputs [19]. Transport

infrastructure investments have long-term impact on the country's economic growth by increasing Gross Domestic Product (GDP) and reducing the country's unemployment rate through enhanced accessibility and mobility [20]. Given that these findings are vital for the country's economic development, all economies tend to allocate adequate funds for investment in transport infrastructure. The Government of Sri Lanka (GOSL) currently receives financial assistance and loans for capital investments. These are extended by International Financial Institutions (IFIs) such as World Bank (WB), Asian Development Bank (ADB), Japanese International Corporation Agency (JICA), and Republic of India and People's Republic of China through their lending authorities and banks. Loan interest rates, terms and conditions, and contracts would vary according to the policies of the lending agency [21]–[23]. Loans are repaid from economic benefits generated through such investments.

The GOSL allocates around 35% of the total capital budget for rail and road infrastructure investments each year [24]–[26]. As shown in Figure 1.1 (data is given in Appendix – I), government spending on rail and road infrastructure investments has steadily grown from 2017 onwards [27]. Both foreign and domestic investors have allocated equal amounts to rail and road projects after 2017. Public sector rail and road transport infrastructure in Sri Lanka has recently experienced a construction boom. Therefore, this sector is vital important to be selected for this study to examine the project planning process in Sri Lanka.

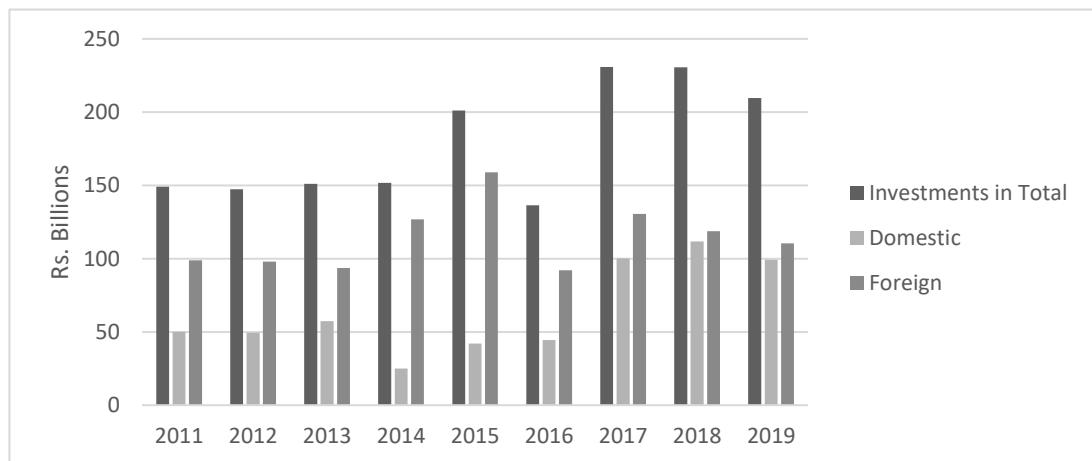


Figure 1.1: Budgeted investment on rail and road infrastructure

Source: Author

### **1.3 Significance of the Study**

This research becomes necessitated with the above mentioned pressures and challenges, particularly in improving the capital deployment efficacy of the public sector capital investment projects. Therefore, the study suggests an approach to enhance capital efficacy in public sector capital investments.

Operation Manual (OM) is a guideline developed and issued by the National Planning Department (NPD), including the Standard Operating Practices (SOPs) for Project Proponent (PP) to follow in the public sector capital investment project planning process within Sri Lanka. PPs are the people who suggest projects and project needs to the NPD. Projects and project needs are originated and sponsored by a particular ministry or department. They are also responsible for originating projects for statutory bodies or public enterprises within its ministerial responsibilities [28]. The prevailing OM requires the PP to conduct the need analysis, alternative analysis, and feasibility study and submit the final document to the NPD to evaluate the project's viability. For PP to perform all these SOPs, it involves considerable effort and expenditure. Ultimately, all these efforts may be useless due to the lack of proper screening of the projects at the NPD. Moreover, some projects are directly approved by the Cabinet of Ministers without appropriate analysis. Therefore, it is crucial to identify loopholes in the project planning process to suggest remedial measures and overcome procedural gaps to ensure efficient resource allocation in public sector capital investment projects.

Analysis was conducted to evaluate both transcribed and practically followed SOPs with respect to the Sri Lanka public sector capital investment project planning process. The gaps in the transcribed SOPs in the OM and actual implementation were identified by comparing them with SOPs of the selected countries. The research also examined a selected set of past rail and road investments projects and possible effects on the investment cost. Such analysis would fathom the possibility of increasing capital efficacy. This research aims to identify implications in the public sector capital investment project planning process and suggest strategic interventions to improve the process.

## **1.4 Scope**

The scope of this research is limited to the project planning process used for public infrastructure investments in Sri Lanka. Planning phases covered by this research include the initial stage, pre-feasibility, feasibility, and Front-End Detail Design (FEDD) and screening of projects at NPD. For the empirical investigation, the study focuses on rail and road infrastructure investment projects in Sri Lanka.

By considering the scope and knowledge above, the following research questions (RQ) were raised.

RQ 1: What are the standard operating practices used in the public sector capital investment projects?

RQ 2: What are the gaps and issues in the current public sector capital investment project planning process within Sri Lanka?

RQ 3: What actions can be suggested to reduce issues and gaps in the project planning process for public sector capital investments?

## **1.5 Research Objectives**

RO 1: Review standard operating practices used in the public sector capital project planning process.

RO 2: Identify gaps and issues in the project planning process followed in Sri Lanka for public sector capital investments.

RO 3: Suggest actions to reduce gaps and issues in the project planning process for public sector capital investments within Sri Lanka.

## **1.6 Limitations**

The following limitations restrict the research scope and quality:

1. This research is conducted in the Sri Lankan context. The applicability of suggested SOPs needs to be evaluated by applying to the public sector capital

investment project planning process, which will take at least three to five years. Due to the limited time for the analysis, the actual application of the proposed centralised guideline is validated from the expert's view.

2. This study discusses explicitly about SOPs that can be applied to large scale and mega-scale new infrastructure investment planning and decision making (total estimated cost more than Rs.1 billion) rail and road infrastructure investments. Improvement, replacement/rehabilitation, and maintenance of investments were not considered under this research.
3. SOPs were reviewed from laid down legal procedures of selected countries. The study assumed that all projects used these SOPs as those are enacted procedures.
4. Project benefits and their impact on capital efficiency were not discussed under this research.

## **1.7 Thesis Organisation**

This thesis consists of five further chapters: literature review, methodology, findings, and conclusion. Figure 1.2 discusses the flow of the thesis.

The present chapter introduces the research, its background, motivation, objectives, deliverables, and overall organisation as this thesis suggests a novel integrated approach to minimise implications in capital deployment efficacy.

*Chapter Two* is a comprehensive literature review on the definition of capital efficacy, measures used to evaluate capital efficacy, and the project planning process. In the current project planning process in Sri Lanka, Financial Regulations (FR) and their evolution are also considered.

*Chapter Three* summarises the methodology applied for the analysis. It provides an insight to the methods of data collection and methods applied to achieve the objectives in the two analysis chapters.

*Chapters Four and Five* present the details on the objectives of the study and its aim. The content is based on the deliverables of the research, issues in the current planning process and suggestions.

Of these, the *fourth chapter* focuses on a country-wise analysis of public sector capital investment project planning processes to identify gaps in the current project planning process by comparing them with the SOPs of Sri Lanka. Then issues in the current project planning process are determined by applying secondary and primary data. Gaps and issues in the current planning processes are summarised in this chapter.

*Chapter Five* suggests improvements to the current project planning and screening process by introducing more appropriate institutional arrangements, a centralised guideline including SOPs for project planning, and a transparent decision-making procedure.

The *final chapter* concludes the thesis based on the achievement of objectives, research limitations, recommendations based on its findings and suggestions for further research.

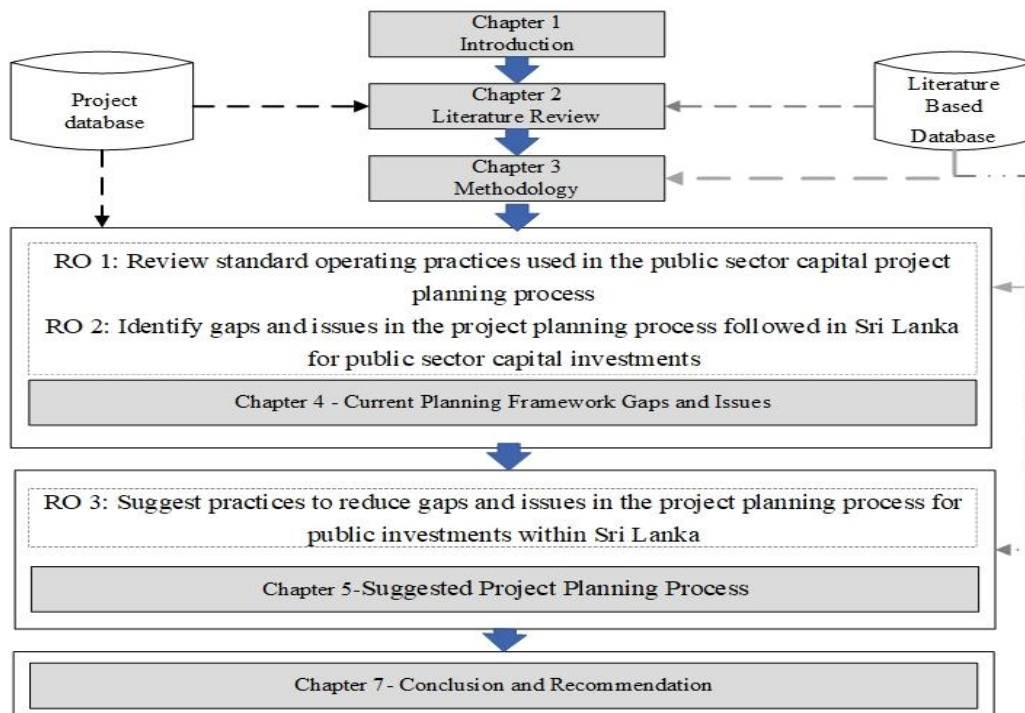


Figure 1.2: Integration of objectives and thesis flow

Source: Author

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1 Introduction**

This literature review consists of three sections. The first section reviews capital efficiency, its measures, and the causes of inefficiency. The second section studies the importance of planning and the planned standard steps of public sector capital investment projects. The third section covers the public capital investment project planning process and its evolution in Sri Lanka. These three sections establish the core foundation for this research and provide important contextual information on the research gaps.

### **2.2 Public Sector Capital Investments**

Public sector involvement in capital investments and its impact on economic growth are discussed in academic literature since the early 19<sup>th</sup> century. Keynes (1936) examined the importance of public sector capital investments and how it contributes to the economic development in the literature [29]. During the post-war period, infrastructure investments were heavily dependent on public spending, leading to aggregate economic growth led by agricultural and industrial sectors. Arrow & Kurz (1970) and Aschauer (1989) found that infrastructure investments in countries have led to significant economic growth from 1970-1980 [30], [31]. Further, Rodrigue (2009) confirmed that United States highway investments between 1954 and 2001 led to six-fold gains in economic productivity [32]. To add to that Barro (1990), Aschauer (1989), and Fosu et al. (2011) found that there is a positive relationship between public investment and economic growth [30], [33], [34]. However research has shown that public capital exceeds a certain threshold of debt financing, economic growth becomes negative; at this point, public capital provision adversely affects economic growth [35].

In light of the above, many developing economies' public sector was encouraged to undertake capital investments in the latter part of the 19<sup>th</sup> century. The expectation was that they would improve the economic growth of their country [13]. Most investments were loans and foreign investments, which ultimately impacted its financial stability

due to failure to unlock the expected economic growth rate. As explained by many authors, resources invested by the public sector were wasted and corruptly misdirected [36]–[38]. This outcome is common to all kinds of public investments, due to lack of profit motive. Private-sector capital investments are well utilized due to their profit-orientation. Therefore, capital allocation to public sector capital investments is widely discussed in the literature to improve their efficiency [39].

### **2.2.1 Capital efficiency**

The concept of capital efficiency is widely researched in the literature on infrastructure investments from standpoints of capital allocation and economic growth [40]–[42]. According to Berg et al. (2019) capital efficiency, is enhanced by selecting the most desirable projects to invest in the long run because economic growth and investment planning are interconnected [43]. Such projects maximise benefits to citizens by enhancing public welfare and standard of living. Further it reduces corruption and improves the quality of infrastructure [44], [45]. Pritchett (2000) emphasises that efficient capital allocation of the government reflects the growth of a country. Therefore, capital efficiency ensures that the economy takes full advantage of opportunities to enhance economic and financial gain [11].

Literature reveals two key reasons for capital deployment inefficiency: a) lack of application of best practices in project planning for complex and large-scale projects (particularly at project selection and evaluation stages) [46]–[48]; and b) planning errors, external environmental factors, and scope changes while projects are in progress [49], [50]. The IMF emphasises that countries with relatively low efficiency in public investment should raise the quality of investments by improving their project management processes [10]. Since decision making in the project planning process plays a crucial role in efficient capital allocation and management [51]. PricewaterhouseCoopers (PwC) (2016) study finds that capital efficiency requires integration with efficient project management practices to optimise project output [43], [47], [52], [53].

### 2.2.1.1 Capital efficiency ratio

Different functions are used to calculate capital efficiency in a country, sector, and project. Incremental Capital Output Ratio (ICOR) is a general calculation related to the country's economic growth, which measures the impact of the country's capital investments on its overall output [54]. ICOR, Return on Capital Employed (ROCE), capital productivity, and Benefit-Cost Ratio (BCR) are the leading indicators identified in the literature that reflects capital efficiency. These are indicated in Table 2.1.

Table 2.1: Capital efficiency ratio

| Ratio                                                                                             | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | References      |
|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Country</b>                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |
| <b>ICOR =</b><br>$\frac{\text{Annual capital investment}}{\text{Annual increase in GDP}}$         | <ul style="list-style-type: none"> <li>• Inverse measurement of the capital efficiency of a country that calculates the amount of investment required to generate each additional GDP.</li> <li>• Reduced ICOR would indicate increased investment productivity.</li> <li>• Used to estimate the broad requirements of capital formation to attain a particular rate of growth, given the present macroeconomic level or to derive the growth rate once the resources are given.</li> </ul> | [8], [54], [55] |
| <b>Organisation/Sector</b>                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |
| <b>ROCE =</b><br>$\frac{\text{Net Operating Profit After Tax}}{\text{Invested Capital}}$          | <ul style="list-style-type: none"> <li>• The rate of return the business is generating compared to the capital employed to generate those returns.</li> </ul>                                                                                                                                                                                                                                                                                                                               | [46], [56]      |
| <b>Capital productivity =</b><br>$\frac{\text{Average revenue}}{\text{Average capital employed}}$ | <ul style="list-style-type: none"> <li>• A company's ability to use the capital employed in the business to generate revenue.</li> </ul>                                                                                                                                                                                                                                                                                                                                                    | [43]            |
| <b>Project</b>                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                 |
| <b>BCR =</b><br>$\frac{\text{Benefit of the investment}}{\text{Cost of the investment}}$          | <ul style="list-style-type: none"> <li>• Summarise the overall relationship between the relative costs and benefits of a proposed project.</li> </ul>                                                                                                                                                                                                                                                                                                                                       | [57], [58]      |

Source: Author

Return on Capital Employed (ROCE) is a widely used measurement within organisations to measure the capital efficacy of an organisation. ROCE discusses how well an organisation can generate benefits given its portfolio of investments [46]. A higher ROCE will increase the efficiency of capital investments.

Benefit-Cost Ratio (BCR) can be considered the primary version of the capital efficiency ratio. It is widely used as a project selection strategy when various projects

are evaluated [59]. This could be achieved by maximising the benefits generated by a specific investment or reducing the overall cost of investment.

A country's capital efficiency could be mirrored through the inverse of ICOR: the proportion of investment to growth. Also, the inverse of ICOR is called Investment Productivity (IP). In late 1990s, ICOR was used to estimate the productivity of capital investments to reach the targeted level of income in the economy. Since then, many attempts have been focused on analysing the relationship between ICOR and per capita income, as well as the economic growth [8], [54]. Therefore, higher the IP, higher the productivity of capital investment of a country [55]. If ICOR is less than three, it is a positive indicator of a country's capital usage efficiency [8], [54], [60]. Further, several other input factors can affect capital efficiency [8], [54], [61], such as government effectiveness [62], quality of infrastructure [43], corruption [4], governance [40].

### **2.3 Efficient Capital Allocation for Infrastructure Investments**

The public sector involves in infrastructure investment projects to enhance the economic growth and social welfare of a county. For an economy to grow and sustain itself, the public sector must invest in cost-effective projects [63], [64]. This is due to, public sector capital investment projects often consist high risks and uncertainty [65], [66]. Furthermore, the project scope varies significantly according to the type of project, extent of availability of information and governing authority [67], [68]. Therefore, capital efficiency improvements in public sector capital investments are discussed using two approaches: (1) researching to identify causes for capital deployment inefficiencies of public sector capital investments and (2) proposing proactive and corrective actions to reduce inefficiencies [69].

#### **2.3.1 Causes for capital deployment inefficiency**

Accordingly, in-depth quantitative and qualitative analyses have been carried out at projects, sector, country, and regional levels to study the causes of capital deployment inefficiency [21], [67], [70]. Causes that are widely discussed in the literature are scope changes, procurement system issues, negative macroeconomic environmental factors, lack of a knowledge base within the organisation, planning and designing errors,

insufficient risk management practices, lack of technical know-how, lack of transparency of the processes, and absence of control and governance [71]–[73]. Causes salient to the project planning phase may differ from those affecting during the construction phase. These causes may be interdependent or independent of each other [57], [58]. Consequently, investigating the causes of inefficiency helps policymakers and researchers to identify possible solutions to manage capital efficiently [44], [74].

Analysis of causes of inefficiency using the Road Cost Knowledge System (ROCKS) database further discussed the impact on capital efficiency of projects.

### 2.3.2 Ranking factors using Pareto analysis

379 road and rail projects' causes of inefficiency from the ROCKS database of ADB and WB were applied to rank the factors affecting capital efficiency [75], [76]. These information was ranked in a Pareto analysis (Figure 2.1- data for the figure given in Appendix - II) [72], [77] from the most common to the least common causes.

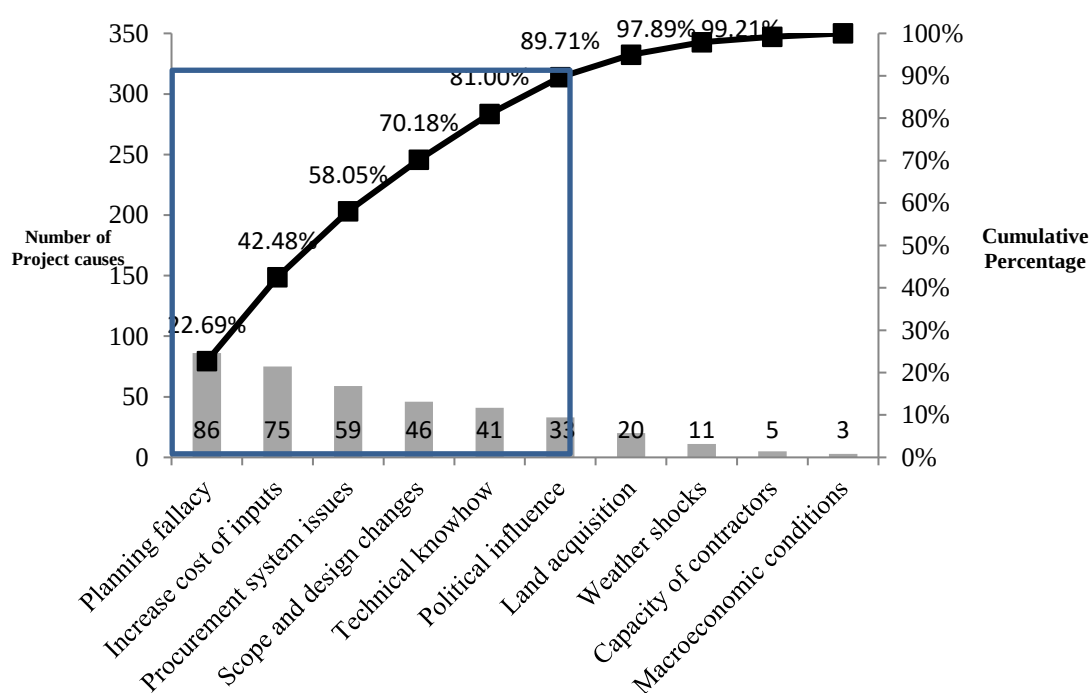


Figure 2.1: Pareto chart of causes impacted on capital inefficiencies

Source: Author

Bars (in Figure 2.1) denote the number of projects affected by each factor. The percentage of projects under each cause is calculated to rank causes. Figure 2.1 illustrates the results of the analysis of the ROCKS database. Causes related to 1) planning fallacies; 2) increased cost of inputs; 3) procurement system issues; 4) scope and design changes, and 5) technical know-how are identified as critical causes impacted for ROCKS database projects[78].

Investigating different stages of the project life cycle and identifying possible causes of capital inefficiencies is essential to mitigate inefficiencies proactively. Hence, different stages of the project life cycle are observed to identify factors causing capital inefficiencies.

Discussions on the causes of inefficiency are summarised below:

#### **2.3.2.2 Factors affecting project planning:**

In the planning stage, a project concept is devised, in-depth risk analysis is performed, and the scope and design of the project are developed [79]. The stakeholders have high level of influence, and the owner exercises high control at this stage, given that careful planning is required to complete the project [80]. Literature reveals that the leading causes of inefficiency during the planning stage are planning fallacies and lack of technical know-how [48], [81].

- (a) *Planning fallacies*: Planning fallacies occur due to use of secondary data from different sources for forecasting and inaccurate estimations are being made due to human error and lack of experience [82]. These errors lead decision-makers to inaccurately estimate benefits and costs [48], [83]. Public sector capital investments are more vulnerable to planning fallacies at the point of project screening [84], [85]. However, the literature suggests that these errors are minimised when computer-aided forecasting techniques are used, or highly trained professionals are entrusted with the task. Moreover, the planners can also undertake external reviews and audits of pre-planning documents to minimise these types of errors [80].

- (b) *Lack of technical know-how*: Drastic changes in design can ultimately lead to cost escalations in construction [49]. Generally, project designers need to understand the complexity of the project. If experts cannot be found in-house, alternative approaches are used to prepare accurate designs, such as sub-contracting and collaborating with an experienced organisation [86], [87]. These approaches were possible with the selection of different project delivery methods. Moreover, cost variations, changes in project scope, land acquisition, resettlement, and infrastructure are attributed to the lack of experience and absence of lessons-learned data [77], [88].

### **2.3.2.3 Causes related to contract awarding stage:**

Contract awarding stage is more time-consuming than other stages. The major phases are tendering and bidder selection [89]. Incompetence in this stage leads to incomplete contracts, asymmetric information on bidders, and poor bidder evaluation [90], [91]. Therefore, investigations into the technical expertise of the bidder and their financial capabilities allow for better selection [92].

- (a) *Governance practices*: Governing parties' influence in other words, political influence on planning transport infrastructure are encountered during project approval and related decision making [44], [93]. As per the survey conducted by the Association of Chartered Certified Accountants (ACCA) (2019), the influence exerted by politicians cause biased decisions 93% of the time [79]. Countries with high levels of corruption tend to invest less in education and health [16].
- (b) *Poor procurement practices*: Single criteria based bidder selection is a conventional contractor selection procedure. It focuses on either cost, quality, or schedule when selecting a contractor [91], [94]. However, factors such as the resources of the contractor (in terms of highly qualified people and equipment), success rate, previous experiences, human management practices, and safety practices should be evaluated [95], [96]. Moreover, the lack of transparency in developing countries' bidder selection processes impacts in poor capital efficiency [88], [97].

#### **2.3.2.4 Causes related to constructing and project closure stages:**

The construction stage involves the management of inputs, finances, and reserves [98]. Generally, political influence and owner control are lower in this stage of the project [96], but costs and risks are high.

- (a) *The fluctuating cost of material and labour:* Increases in the cost of construction material, equipment and labour are the most common causes that reduce the capital efficiency of a project. These arise due to inflation, supply and demand conditions for construction material, extensions in contract, and scope creeping [99], [100]. In addition, if a country does not have enough funds, inputs, or knowledge to carry out a project, they have to procure foreign expertise. This requires even more funds [36], [68]. Projects funded by foreign loans or depend on foreign resources are severely affected by exchange rate fluctuations. Hence, the currency exchange rate is an essential consideration in foreign loan projects. Foreign loan projects also have a higher investment cost than those funded by local authorities and the government [101].
- (b) *Scope changes/change orders:* Scope changes occur due to poor planning and management practices [19]. The planned scope baseline changes due to amendments suggested during construction; these sequentially influence the cost and schedule baselines of the project [102].
- (c) *Lack of risk planning, risk response, and acts of God:* The risk management and response plans are essential for rail and road infrastructure projects, given their complexity and cost [15]. Uncontrollable and unpredictable disasters (acts of God) may consume more than contingency and management reserves, change project baselines, and impact capital efficiency of the project.

The factors mentioned above affect the capital efficiency of the project. These were analysed using responses from questionnaire survey with 83 engineers who worked in the government rail and road sectors in Sri Lanka. Figure 2.2 indicates findings from the analysis.

In the study, the Likert scale was applied as the common scale to measure the causes of capital inefficiency. The (1-5) scale was used to rank each cause and calculate the average of each cause [103]. Pareto analysis is a statistical technique applied to evaluate decision-makers critical action or task, which has the highest impact on the outcome. Pareto analysis revealed the following:

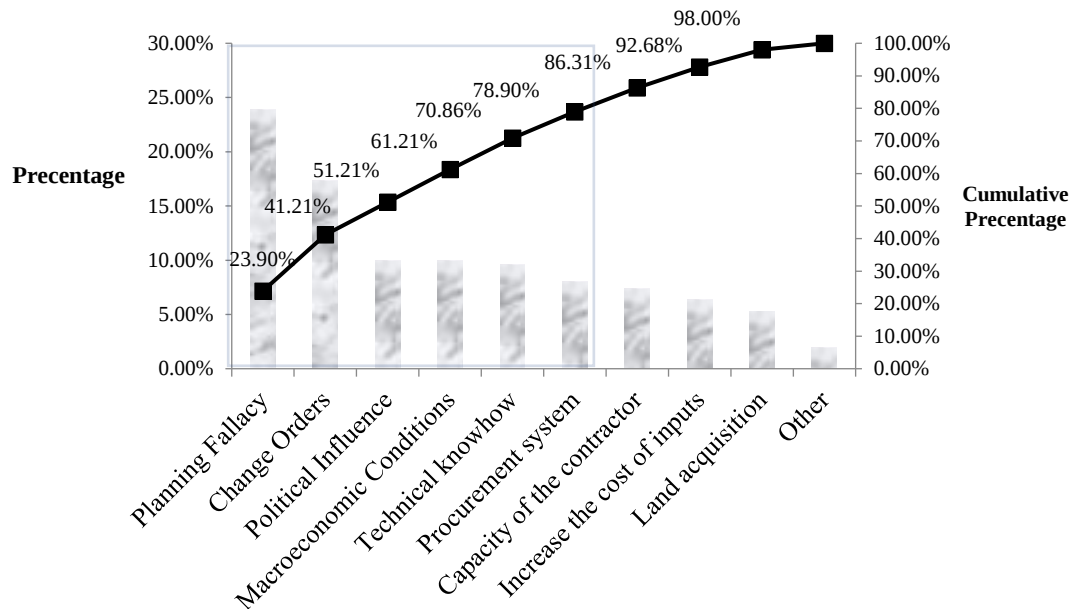


Figure 2.2: Pareto chart for the capital inefficiencies findings from Sri Lanka  
Source: Author, [104]

Figure 2.2 reflects this Pareto analysis and indicates causes of capital inefficiency, ranked from highest to lowest. As per the 80/20 rule, planning fallacy, change orders, political influence, macroeconomic conditions, technical know-how, and procurement system critically impacted the capital inefficiencies [104]. Further, findings reveal that planning fallacy, change orders, and technological know-how affects capital efficiency during the planning stage and contributes to 50% of inefficiencies. Thus, the above analysis emphasises the criticality of the study in the government project planning process within Sri Lanka.

The research conducted by the Joint Legislative Audit and Review Commission (JLARC) in Virginia (USA) and Terrill (Australia) and Cavalier et al. (Europe) found that project assessment in the planning phase could influence the making of accurate decisions on project investment than planning without inspection [69], [105].

Therefore, where planning is lacking, capital efficiency is more likely to shrink during construction and subsequent phases [69]. Moreover, researchers discuss scoping changes and forecasting errors as the two common weaknesses in the design and construction phases directly linked with planning phase inefficiencies [49], [105].

### 2.3.3 Proactive action to improve capital deployment efficiency

There are many practices used in infrastructure investment to reduce inefficiency in projects. These are applied in different stages of the project life cycle to increase overall project efficiency [106], [107]. A majority of those practices are involved in the planning stage to minimise the cost of investment during the construction phase of the project [108], [109]. Project planning occurs from initiating a project, which focuses on idea generation up to the end of feasibility with a project's design. According to the Construction Industry Institute (CII), project planning develops sufficient strategic information for owners to address the risks of a project to allocate adequate resources to maximise the chance of success [110], [111]. As a value addition, the decision-maker can take a broader view of their role in the future.

Table 2.2: Benefits of project planning at the planning phase of the project life cycle

| <b>Benefits of planning</b>                                   | <b>References</b>              |
|---------------------------------------------------------------|--------------------------------|
| Efficient resource allocations for the projects               | [56], [112]–[114]              |
| Eliminate or reduce insecurity of the cost of investment      | [43], [85], [115]              |
| Risk management and contingency planning                      | [15], [19], [66], [116], [117] |
| Get a better awareness of the project scope and objectives    | [13], [118]–[121]              |
| Enhance the efficiency of the operation through better design | [120], [122]–[126]             |
| Identify tasks dependency of the project                      | [39], [60], [83], [127]        |
| Facilitate communication to identify the exact need           | [37], [128]–[130]              |

Source: Author

Choosing the best option from a broader range of choices depends on the quality of decisions in project planning [131]. Some projects conduct comprehensive surveys, soil testing, creating prototypes etc. which require considerable funds at the planning stage [110]. Therefore the project is conceptualised through information gathering, scope definition, reviewing internal factors, and identifying design requirements [132]. Findings are incorporated in the project appraisal, which uses economic models and benefit-cost -analysis to select an appropriate project from different alternatives [133].

The final solution is selected if it appears to be a reasonable response serving the public need and the decision is superior to the alternatives [134], [135]. Therefore, benefits from project planning are discussed in above Table 2.2.

## **2.4 Project Planning Process**

The planning process has traditionally been a topic of interest among academics and practitioners in project management due to its impact on performance during execution. Understanding the complexities of modern planning requires to analyse its history. The planning process did not utilise a theoretical background and has been evolved through trial and error led by practitioners [21], [39], [48], [136]. The government project planning process is a complex, dynamic and socio-technical process generally performed through a combination of government, bureaucratic planning agencies on rail, road, water, and energy utility facilitation organisations [137]–[139].

Evidence of project planning was seen in ancient Egypt and Greece. At that time, this was part of infrastructure planning [140]. Project planning evolves with infrastructure planning while paying more attention to architecture, engineering, surveying with the influence of economic, geographical, social and design aspects [141], [142].

### **2.4.1 Evolution of the project planning process**

In the 20<sup>th</sup>-century, project planning practices applied to a centralised and expert-driven system. This type of planning is called rational planning, which involves goal setting, identifying alternatives, evaluating project economic and social needs, and implementing decisions [143]. These steps were widespread among western society in project planning and public policy fields. Experts were involved with quantitative analysis on all relevant factors to determine the best option by solving complex project planning problems [144], [145].

In the second half of the century, planning moved into more socially and politically oriented planning practices. However, project planning practices did not follow the same steps. Therefore, the rational, centralised expert-driven system is applied in the

old rational technocratic model. Critiques to rational planning are its applicability to the current complex social systems. In addition, planners attempted to represent a decision innately politically biased as rational to mislead the public [146].

Many authors [107], [134], [136], [140], [141], [146]–[150] argue that public policy planning requires a shift from the general orientation of project planning away from political, architecture and engineering perspectives and towards economic, sociological, financial, and environmental considerations. Different approaches are suggested in the literature to solve the challenges related to rational planning. These traditions are called under the names presented as incremental, transactive, advocacy, and radical planning. Some authors used slightly distinct tags, but the common thread across these different planning methods emphasised are flexibility, decentralisation, and community consultation. Therefore, planning traditions moved towards the sociocratic approach from the rational approach. Table 2.3 discusses the differences between the two main planning approaches.

Table 2.3: Difference between Technocratic and Sociocratic planning

|                          | <b>Technocratic planning</b> | <b>Sociocratic planning</b> |
|--------------------------|------------------------------|-----------------------------|
| Planning subject         | Monolithic                   | Coalition                   |
| Role experts             | Linchpin                     | One out of many             |
| Centralisation decision  | Great                        | Small                       |
| Plan as product          | Dominant                     | Relative                    |
| Form of plan             | Blueprint                    | Indicative                  |
| Measure of effectiveness | Conformance                  | Performance                 |
| Scope                    | Comprehensive                | Selective                   |
| Notation of rationality  | Absolute                     | Contextual                  |
| Planning process         | Linear                       | Cyclical                    |

Source: Adapted from [134], [151]

Project planning has evolved with different planning traditions. The steps of project planning may differ, but their main purpose is to make better implementation decisions. Project planning improves the probability of project success, but projects without planning are likely to fail and become unsustainable. Therefore, planning is an important aspect to consider during infrastructure investments once project baselines such as cost baseline, schedule baseline, and scope are decided [152]. Detailed cost estimation is performed based on design and schedule, known as budgeted cost [79]. The budgeted cost of construction is estimated at the latter part of

the planning stage. The estimate consists of the cost of material, labour, technical equipment, and maintaining safety and meeting by-law requirements onsite [153]. Potential risks and uncertainties associated with project execution are considered in these estimates, and contingency and management reserves are created accordingly [133]. The most significant hurdle is to keep complex projects within budget as estimated in the planning phase. Therefore, project planning is a set of actions applied today to control future decisions to gain an efficient capital investment [154]. Thus, poor decision making and estimates during project planning contribute to project failure [15], [47], [56].

Planning in public investments of a country plays a critical role in selecting a project that gains high economic returns versus the ideological preferences of political leaders and citizens [128]. The selection of the project for implementation depends on the dominant role and availability of the resources. Therefore the challenge is to identify the most appropriate public investment concerning efficiency and value for money while minimising the need for borrowing, which may impose a burden on future citizens [54], [155]. Some economies use centralised plans, while some are using the decentralised planning system for public project planning. Both developing and developed economies face the challenge of selecting the most appropriate project that yields high returns rather than wastefully managing the public resources [15].

#### **2.4.2 Project planning process and capital efficacy**

The success of planning is influenced by the government policy that sets out the structure, commitment, and jurisdiction of infrastructure-related departments [21], [156], [157]. The common issues raised in the planning process are difficulties for planners to design an effective plan that incorporates a detailed analysis of different options due to lack of time, corruption, sub optimised decisions, the intellectual capacity of the planners, the fluctuating nature of the social requirements, and changes made to regulation during the planning process. Table 2.4 discusses the factors which impact on capital efficacy of a project planning process.

Table 2.4: Elements to enhance capital efficiency from the project planning process

| <b>Factors</b>                                                | <b>References</b>         |
|---------------------------------------------------------------|---------------------------|
| Improve the transparency of decisions                         | [79], [158], [159]        |
| Clear accountability of the responsibility of decision-makers | [15], [160], [161]        |
| Enhance the risk management                                   | [103], [162], [163]       |
| Enhance the use of technology for design and operation        | [164]–[166]               |
| Increase the consideration on local implementation            | [35], [117], [167]        |
| Increase the economic and social gain on investments          | [129], [168]–[170]        |
| Linkage to the development strategy                           | [15], [171], [172]        |
| Consistency in project study on feasibility and screening     | [15], [152], [173]        |
| Independent review of the project                             | [174]–[176]               |
| Clear authoritative role in screening projects                | [15], [93], [109], [113]  |
| Legislative backing                                           | [88], [105], [171], [177] |
| Transparent disclosure of the basis for selection             | [44], [178]–[184]         |

Source: Author

### 2.4.3 Steps of a project planning process

This section presents the meaning and steps of the planning process. A planning process helps planners to navigate the step-by-step actions they are to perform. To assist planners in navigating the modern planning environment in the broader academic field of planning, many authors are concerned about creating a planning process [154], [185], [186]. One well-known explanation is in the Public Investment Management (PIM) introduced by the WB [187], [188], which was developed comparing previous processes and consultation with experts. The PIM suggested the whole process of project management. Planning phase steps in this process: need identification, pre-feasibility, feasibility, and Front-End Detailed Design (FEDD). Each phase has its input, activities, deliverables, and milestones to achieve and are discussed in Figure 2.3 [158], [185]. This planning approach expands rational planning process steps applicable to public sector capital investment project plans.

#### 2.4.3.1 Need identification

As the first step of planning, the need identification is used to define the current problem. Therefore, several initiatives are taken at the need identification stage to analyse the situation, such as preliminary recognition of the issue, quantify the impact of not addressing the problem, identify strategic importance and the expected outcome [108], [189], [190].

|              | Need Identification                                                                                                                            | Pre-Feasibility                                                                                                                                                    | Feasibility                                                                                                                                                                                       | Front End Detail Design                                                                  |
|--------------|------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Input        | <ul style="list-style-type: none"> <li>Preliminary recognition of the problem</li> </ul>                                                       | <ul style="list-style-type: none"> <li>Identify different alternatives to satisfy need</li> </ul>                                                                  | <ul style="list-style-type: none"> <li>Facts to evaluate selected alternatives</li> </ul>                                                                                                         | <ul style="list-style-type: none"> <li>Design requirements</li> </ul>                    |
| Process      | <ul style="list-style-type: none"> <li>Analysis on problem and identify the requirement</li> <li>Develop the concept of the project</li> </ul> | <ul style="list-style-type: none"> <li>Evaluate alternatives and identify most preferable options</li> <li>Preliminary analysis on the selected options</li> </ul> | <ul style="list-style-type: none"> <li>Evaluate economic, environmental, and social feasibility</li> <li>Evaluate financing options</li> <li>Evaluate risk analysis and project design</li> </ul> | <ul style="list-style-type: none"> <li>Develop the design and cost estimation</li> </ul> |
| Deliverables | <ul style="list-style-type: none"> <li>Concept of the project</li> </ul>                                                                       | <ul style="list-style-type: none"> <li>Select best alternative/s</li> </ul>                                                                                        | <ul style="list-style-type: none"> <li>Baseline schedule, design and plan to implement</li> </ul>                                                                                                 | <ul style="list-style-type: none"> <li>Design and estimation</li> </ul>                  |
| Milestone    | <ul style="list-style-type: none"> <li>Approve to move into pre-feasibility stage</li> </ul>                                                   | <ul style="list-style-type: none"> <li>Approve to move into feasibility stage</li> </ul>                                                                           | <ul style="list-style-type: none"> <li>Approve to develop detail designs</li> </ul>                                                                                                               | <ul style="list-style-type: none"> <li>Approve to call for tenders</li> </ul>            |

Figure 2.3: PIM Planning Process

Source: Author

### 2.4.3.2 Pre-feasibility

In pre-feasibility, the best idea is chosen among several ideas. The pre-feasibility study is an initial study that is undertaken to decide, analyse, and select the best option [79], [191]–[193]. Different alternatives are identified to satisfy the need in this phase, and those are evaluated to select the most technically and financially feasible option [194]–[196]. This stage helps explore each scenario profoundly and identify the best option [189], [195], [197].

### 2.4.3.3 Feasibility

If the selected alternative is considered feasible, it is recommended to continue the study on the feasibility of the project scenario chosen [79], [124], [198]. Detailed analysis of economic, environmental, social and technical feasibility are the main requirements at this stage [79], [124], [198], which presents enough information to determine whether the approval should be given for the project to move into the engineering and construction stage [185], [199], [200].

#### **2.4.3.4 Front end detail design**

Front End Detail Design (FEDD) is the primary design used to analyse project specifications at the planning phase. In most of the processes, FEDD is conducted along with the feasibility study. In this phase, the project cost is calculated, and if it deviates 20% or more from the project estimate, the proponent has to re-assess feasibility and get approval [188]. Value engineering (VE) is a concept that enables the evaluation of cost-effective management strategy for designs by selecting better alternative technologies and methods to reduce the overall cost without compensating safety, quality, and required functional performances [161], [201]. VE can start at any stage of the project life cycle [156]. However, if VE is applied during the project's planning phase, before funding commitments and system/design approvals, project output will be much better [109], [201]–[203].

### **2.5 Sri Lanka Public Sector Capital Investment Project Planning Process**

This section traces the evolution of the project planning process of Sri Lanka and the steps adopted in different periods. At the end of the section, the current transcribed project planning process for public sector capital investment is discussed.

#### **2.5.1 The policy of the public sector capital investment project planning process in Sri Lanka**

Public sector capital investment in project planning and development are complex because of their multifaceted nature spanning regulations, land acquisitions, resource extractions, and allocations. The public sector capital investment project planning process in Sri Lanka is an administrative function that requires compliance with specific steps.

Financial Regulations (FR) of the Government of Sri Lanka is a document used to describe the step-by-step process for project screening and approval by NPD [28]. Detailed steps of the planning process were given in the Branford University report, which is not available for review and reference. According to the FR, the NPD role is discussed as follow:

The main decision points (DPs) used by NPD for project screening and approval are portrayed in Figure 2.4. The Project planning process begins from originating projects/project ideas from the PP. These projects are prioritised according to sectoral plans, objectives, availability of resources, and government investment priorities. Selected projects face several DPs to evaluate before they are included in the public investment programme [28].

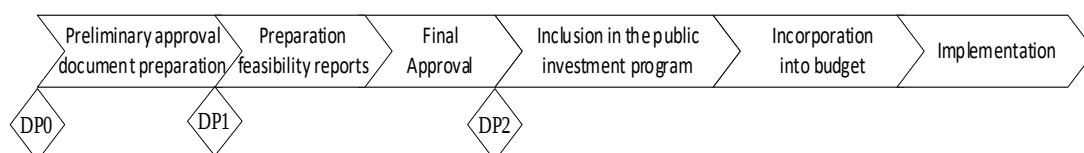


Figure 2.4: FR Project planning process

Source: Author

The main decision points (DPs) are:

DP0: Projects and project ideas generally originate from PP within a line ministry. It is the responsibility of the line ministry to oversee and guide PP in preparing and developing the project.

DP1: According to the country's need, the initial project proposal and preliminary approval documents are prepared by PP and submitted to NPD. NPD approves smaller-scale projects and already approved sectoral plan projects and send the approval to the line ministry. These projects can be implemented by the PP. With regard to the large-scale projects, NPD does its analysis and submits it to the Committee of Development Secretaries for preliminary approval. Once NPD and the Committee of Development Secretaries recommend the project, comments are sent to the line ministry. Then line ministry asks the PP to conduct the feasibility study for the project.

DP2: The feasibility study report is submitted to NPD for the final screening. First, NPD evaluates the project, and then the final approval for the project is granted by the Cabinet of Ministers, along with the recommendations from a Committee of Development Secretaries. Once final permission is granted from the Cabinet, the project will be included in the public investment programme.

It is essential to undergo DP1 and DP2 before projects enter the public investment programme. Considering the complexity of the project, each DP is evaluated by several independent bodies, such as NPD, the Committee of Development Secretaries, and finally, the Cabinet of Ministers.

### **2.5.2 Changes to the OM**

This planning process has changed over time and transformed, leading to both advantages and disadvantages. Figure 2.5 demonstrates the evolution of the project planning process concerning the preparation, review, coordination, and final approval. The two-decade time horizon was adopted to discuss evolution due to the unavailability of documents about the planning process followed before 1995.

In 1995, a three-stepped project planning process was adopted [204], reviewing the project at three decision points: concept paper stage, pre-feasibility stage, and detailed feasibility stage with technical review. The final feasibility report was evaluated and recommended by the technical evaluation committee and project clearance committee before seeking approval from NPD.

The steps of the process changed after 2001, based on the technical assistance received from the United Nations Development Programme. Therefore, the three-stepped model has paved the way to a two-stepped model, with PPs are requested to submit pre-feasibility and feasibility study reports together. In the meantime, the planning techniques report recommended, NPD should undertake a clientele analysis on ongoing and suggested projects before the approval of the concept paper [205].

The project planning process underwent a significant change after 2018 with the introduction of the current OM [206]. This includes guidelines to prioritise projects, project risk analysis and mitigatory methods. Moreover, the previous two-step model became a single-step model for project screening. Therefore, PP had to submit a concept paper, a pre-feasibility study, and a feasibility study together for screening at the NPD.

The main differences between these project planning processes are illustrated in Figure 2.5, which demonstrates changes in the project planning process. The evolution of the planning process is discussed below:

|                                                        | Project Planning Process<br>1995                                                                                                                                                                       | Project Planning Process<br>2001                                                                                                  | Project Planning Process<br>2018                                                                                                         |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Number of Decision Points (DP)</b>                  | Decision Points<br>3                                                                                                                                                                                   | Decision Points<br>2                                                                                                              | Decision Points<br>1                                                                                                                     |
| <b>Documents used to review the project at each DP</b> | <ul style="list-style-type: none"> <li>• DP 1 - Concept Paper</li> <li>• DP 2 - Pre-feasibility Report</li> <li>• DP 3 - Feasibility Report</li> </ul>                                                 | <ul style="list-style-type: none"> <li>• DP 1 - Concept paper</li> <li>• DP 2 - Per-feasibility and Feasibility Report</li> </ul> | <ul style="list-style-type: none"> <li>• DP 1 - Concept paper, pre-feasibility and feasibility report including risk analysis</li> </ul> |
| <b>Organizations involved in appraise at each DP</b>   | <ul style="list-style-type: none"> <li>• DP 1 – NPD</li> <li>• DP 2 – NPD and Environmental authority</li> <li>• DP 3 – NPD, Technical Evaluation Committee and Project Clearance committee</li> </ul> | <ul style="list-style-type: none"> <li>• DP 1 – NPD</li> <li>• DP 2 – NPD and Environmental Authority</li> </ul>                  | <ul style="list-style-type: none"> <li>• DP 1 – NPD and Environmental Authority</li> </ul>                                               |
| <b>Final Approval</b>                                  | Cabinet Approves                                                                                                                                                                                       | Cabinet approves                                                                                                                  | Cabinet Approves                                                                                                                         |

Figure 2.5: Evolution of Project planning process

Source: Author

Documents required for the review at each DP: The process used in 1995 had three DPs; the concept paper, pre-feasibility report, and detailed feasibility report were evaluated consequently at each DP. From 2001 onwards, the process had two decision points; the concept paper to be submitted to NPD, and if accepted, the pre-feasibility and feasibility studies to be conducted. In 2018, this changed to one DP, involving the concept, pre-feasibility, feasibility, and final report submitted to NPD for evaluation.

Organisations involved in appraisal at each DP: In 1995, review and approval of the projects were conducted by four parties: NPD, Central Environmental Authority, technical evaluation committee, and project clearance committee. After 2001, two parties were involved in the appraisal: NPD and Central Environmental Authority.

Final approval: Once NPD recommended the project, the PP would develop the Cabinet Paper and seek Cabinet approval. Upon the Cabinet's approval, the project may enter into the national budget.

### **2.5.3 Current planning process**

Efficient capital allocation is critical for a developing economy like Sri Lanka, as many large-scale infrastructure investments are implemented with the support of foreign loans [207]. In Sri Lanka, public investment planning is a decentralised process. The planning process begins with a bottom-up approach: line agencies develop draft plans and based on that, its line ministries develop a consolidated plan [208]. The budgeting department consolidates plans of all ministries and develops the national strategy to allocate capital for projects. In Sri Lanka, two parties engage in project planning, PP or the body that suggests the project and the NPD or body that screens and recommends projects. PP follows the steps of the planning process. NPD appraises projects whose total estimated cost is greater than 10 million. Projects less than 10 million can be implemented with the approval of the secretary of the relevant line ministry [209].

The PP uses OM in fulfilling its planning work and Circular No. NMPEA 02/2019 discussed the role of NPD in the current project planning process. This process was developed recently by the NPD to improve decision making while removing ambiguities [209].

The process map used for the project management process is included in Figure 2.6, and the main DPs in the stage of the planning phase are discussed based on the findings of the OM [206].

#### **2.5.3.1 The planning phase consists of two stages**

Stage 1 – Project identification and developing the project report

The study on the project is conducted to identify project needs and feasibility. The PP carries out the economic, social, financial, and environmental feasibility studies of the project. Finally, these outcomes are communicated to the NPD as a project report. This report is used for project screening at the NPD. If the project aligns with the current strategic development targets, NPD recommends that PP develop the cabinet paper and get approval for the project.

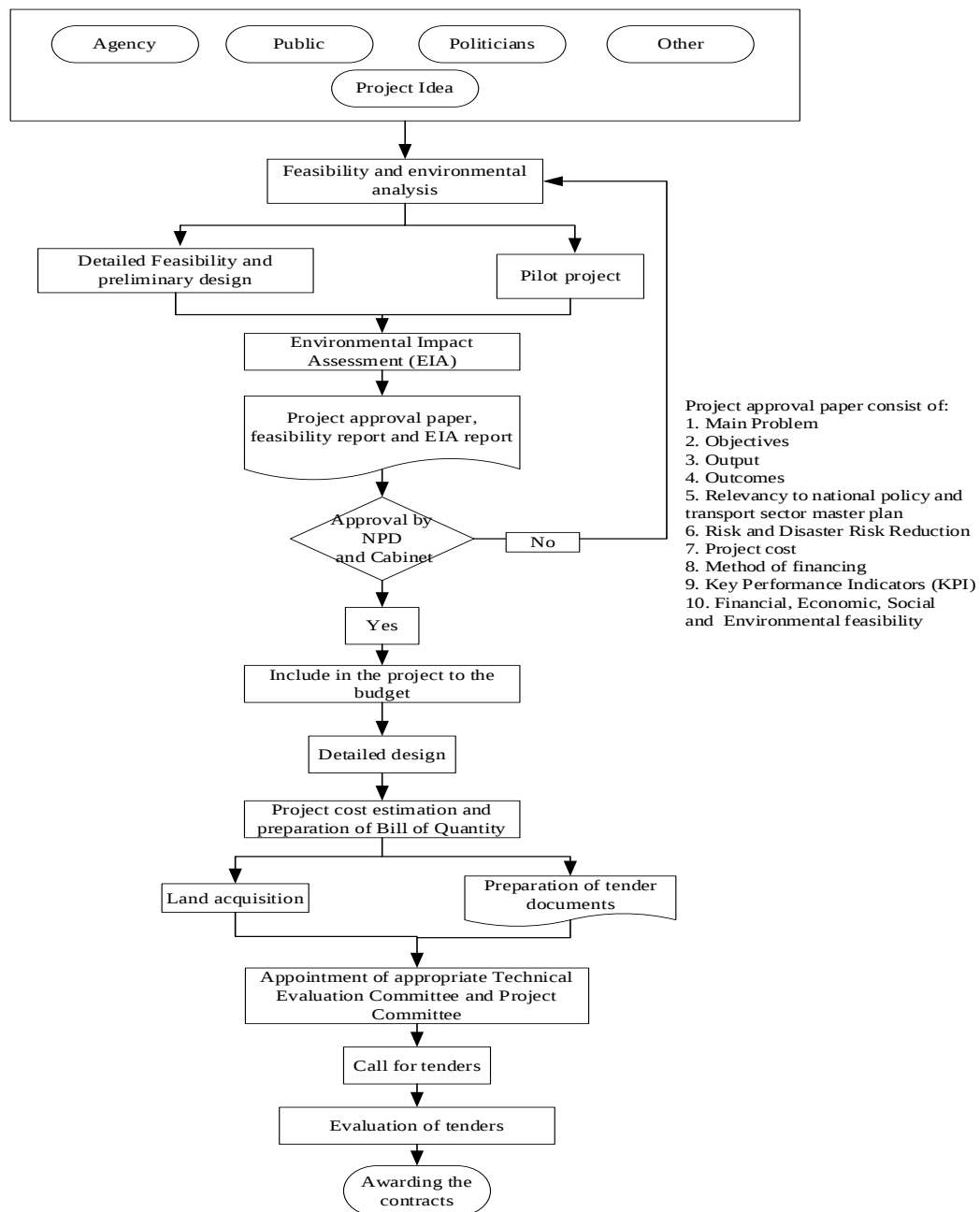


Figure 2.6: Current project management process

Source: Author

## Stage 2 – Cabinet approval

Once the cabinet approval is received for the project, it may enter into the national budget. Projects must be submitted by the line ministry in time to the Department of National Budget to ensure budgetary provisions.

### 2.5.3.2 Current project planning process comparison with FR

Comparison between the current project planning and screening process (OM and Circular No. NMPEA 02/2019) [206], [209] with the FR [28] project planning and screening process is discussed in Table 2.5. The difference between processes reveals rituals included in the FR 35 and FR 36, which are currently not considered in the planning process.

Table 2.5: Comparison of steps of FR35 and FR36 with the current planning process

| Step of the planning process                | FR 35 and FR36 [28]                                                                                                                                                              | The project planning process [206], [209]                                                                                  |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary approval for feasibility</b> | -PP conducts need analysis<br>-Preliminary approval is required to move to feasibility state<br>-Approved by a Committee of Development Secretaries after reviewing NPD comments | -Step is not available in the process                                                                                      |
| <b>Feasibility</b>                          | -PP conducts feasibility and compiles a report to NPD<br>-NPD will prepare a report on the project and submit it to the Committee of Development Secretaries for approval        | -PP conducts need analysis, alternative analysis, and feasibility and submits reports to NPD<br>- NPD approves the project |
| <b>Cabinet approvals</b>                    | -Project has received approval from the Committee of Development Secretaries, and forwarded to the Cabinet approval                                                              | - Once approved by NPD<br>- PP develops cabinet paper and seeks approval                                                   |
| <b>Call for tenders</b>                     | -Yes, the lowest bidder wins the contract                                                                                                                                        | -Yes, the lowest bidder wins the contract                                                                                  |

Source: Author

The project planning process of Sri Lanka has undergone several changes in the last two decades. These changes have a significant impact on the decision making in public infrastructure investments within Sri Lanka. In early 90s, the process under FR for project planning and the current planning process showed drastic changes in decision-making, as explained in Figure 2.5. At present, NPD approves the project in a single decision point with the involvement of the internal staff of NPD [206], [209]. Two decades back in Sri Lanka, a Committee of Development Secretaries gave recommendations for project approval, and projects were screened at a minimum of two junctures [28].

Furthermore, with changes in the procurement guidelines in 2006 [208], decisions were taken to give the provision to award projects to a single contractor by approving

the project from the Cabinet without following the NPD guidelines. This decision was another turning point in project planning [208], [209]. Still, this procedure is continuing for direct contracting projects [207]. This situation is further confirmed by Gunaruwan (2016) on analysis of road rehabilitation and development projects undertaken by the Road Development Authority (RDA). This study explains that the capital efficiency of the invested road projects is diminishing drastically due to the dilution of the project planning processes [55]. Different influential causes are ranging from ignorance to political influence that impacts capital inefficiencies at the planning phase [12].

## **2.6 Research Gap**

Public investments are likely to experience losses and wastage of resources: one-third of capital spent on public infrastructure is lost due to inefficiencies in project management practices [35]. Inefficiencies are closely related to poor project planning, weak evaluation and allocation of resources, and unclear role of institutions and frameworks. Estimates from the IMF [19], [47] state that, on average, more than half of the inefficiencies in the planning stage can be reduced by introducing a robust system of checks and balances at the planning phase. This statement has widely acknowledged the need to analyse project planning process shortcomings and develop a healthier planning process for public investments. India and Vietnam are developing economies that recently assessed their rituals to improve the planning process, thereby increasing capital deployment efficacy of public investments [12], [49], [188].

Sri Lanka conducted an assessment led by the University of Moratuwa focusing on the transport sector in 2000 [194] and another in 2001 with technical assistance from the United Nations Development Programme [205]. Both evaluated the project management process and recommended improvements. Recent research on road transport infrastructure investments in Sri Lanka by Kumarage (2014) and Gunaruwan (2016) emphasise that inefficient capital allocation on expressway and road investments leads to a debt trap [55], [210]. Further discussed the need to re-assess the current project planning, appraisal, and management process to accomplish the vision of turning Sri Lanka into a regional hub.

Based on the review of literature, the following gap was identified:

***Sri Lanka lacks a rational project planning and screening process for public sector capital investment projects:*** Project planning processes are generally used by the transport, electricity, water, and education sectors. These processes include fundamental steps such as need analysis, scope definition, options analysis, design evaluation, and decision on project implementation, which are generally consistent with the rational planning tradition [82], [162], [211]. It has been recognised that planning is often rational and objective; however, it is subjective and can be affected through various political and social dimensions, and planning is prone to unavoidable issues.

Literature reveals several studies that tried to identify possible reasons for capital deployment inefficiencies within Sri Lanka. Most of these were conducted as reviews of the projects after completion. There is limited research conducted to analyse project planning and organisational arrangements. Therefore, there is little focus on improving capital efficiency by reducing inefficiencies in the public investment project planning process [12], [212]. According to studies in Sri Lanka [55], [210], there is less focus on resource utilisation, technical specifications, or value for money at the stage of planning. As a result, Sri Lanka has failed to achieve expected rates of economic growth. Sri Lanka must devise a better project planning process to enhance the capital deployment efficiency in public sector capital investment projects [55]. Therefore, there is a need to analyse the current planning process to identify gaps, issues, and suggest actions to improve planning decisions. Based on the above discussion and given the present context, a need for proposing a rational project planning process for public investment has emerged.

## **2.7 Summary**

This chapter discussed findings on capital efficacy and measures of capital efficacy, followed by a description of planning processes, their steps, and related rituals in project selection. Finally, the discussion focused on the evolution of the planning process in Sri Lanka and the research gap.

## CHAPTER 03: METHODOLOGY

### 3.1 Introduction

Project planning process is critical to the success of public investments, particularly at the early stages of the project life cycle. As discussed in the literature review, Sri Lanka's public sector capital investment project planning process has indicated several shortfalls, and it is necessary to address the current problem. This chapter discusses the methods and steps to address the implications in the project planning process.

This study was conducted in two phases.

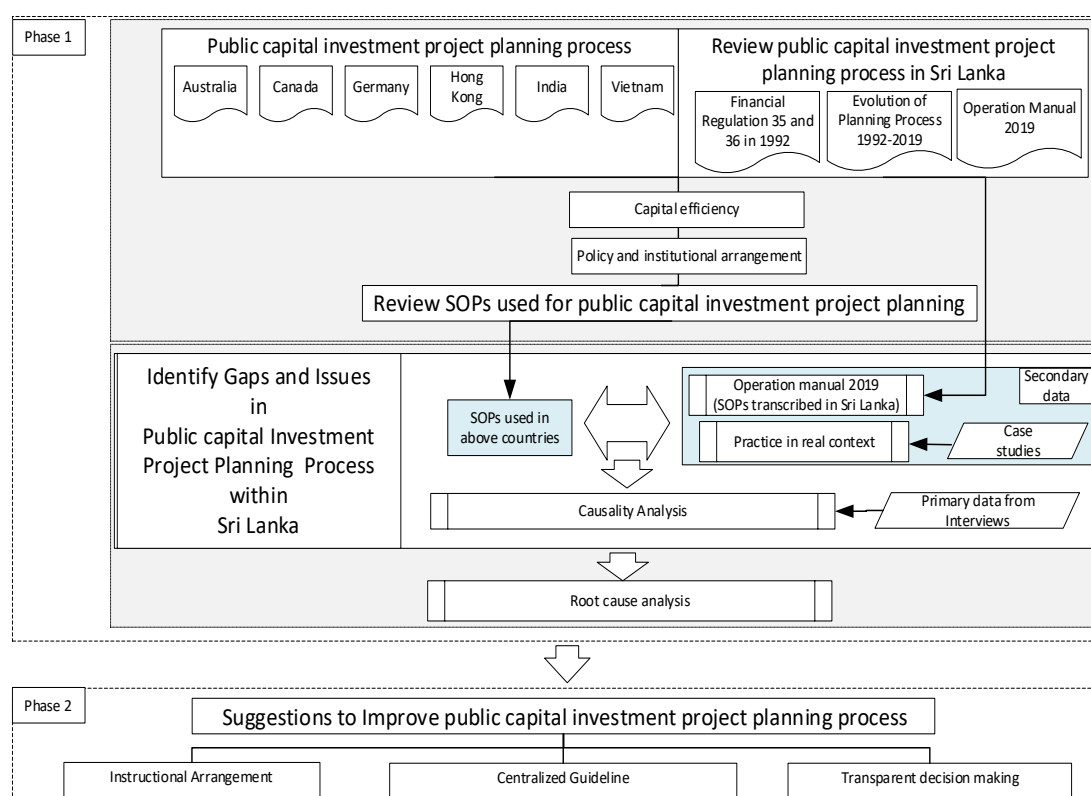


Figure 3.1: Framework of research

Source: Author

Figure 3.1 illustrates relationships among the two phases of the study. Detailed explanations of methods and procedures used to achieve sub-objectives of the research are provided in relevant chapters. This chapter summarises the methods used to achieve the main objectives.

Phase 1: This phase focuses on meeting the first and second objectives of the research: SOPs used in the public sector capital investment project planning process were reviewed, and implications in the current method in Sri Lanka were analysed. This phase used deductive reasoning [15], [142] to address the above objectives.

Phase 2: This phase focuses on the third objective of the research by proposing an integrated approach to improve the public sector capital investment project planning process. This suggested framework is intended to minimise gaps and issues in the project planning process from phase 1. Therefore, this phase used inductive reasoning [23], [82], [213].

### **3.2 Phase 1: SOPs, Gaps, and Issues in the Current Project Planning Process**

This section applies an in-depth comparison of Sri Lanka's project planning process for public sector capital investments with SOPs. Both primary data (in-depth interviews) and secondary data (reports and case studies) were collected for analysis. Secondary data were used to analyse Sri Lanka's project planning process against SOPs [39], [93], [214], [215]. Primary data were used to analyse causes that impacted the project planning process in a real context within Sri Lanka. Therefore, the output of the phase showcased an analysis of the current project planning process using SOPs, case studies and interviews.

This study was undertaken in the following steps:

- (i) Cross country comparison on capital efficiency and institutional arrangement for public sector capital investments to identify the current position of Sri Lanka
- (ii) Review SOPs used in selected countries for the public sector capital investments project planning processes
- (iii) Comparison of SOPs with the project planning process used in Sri Lanka to identify gaps in the transcribed planning process and actual practices.
- (iv) Identify issues in the project planning process based on the findings from interviews.

Detailed steps of the analysis are discussed as follows:

### **3.2.1 Cross country comparison on the capital efficiency and institutional arrangement**

Cross country comparison directs a country to reinforce its public infrastructure investment planning process through comparison of planning processes [43]. The comparison was conducted by analysing project planning processes that are currently function in Canada, Australia, Hong Kong, Germany, India, Vietnam, and Sri Lanka. Sri Lanka focuses on economic, social and environmental aspects in the public sector capital investments and recently emphasises the importance of sustainability and governance procedures in capital investments [12], [171], [216].

The above selected countries were chosen due to the success of efficient capital allocation in capital investment. Further, India and Vietnam updated the procedures in the recent past [188], [189]. In addition, many countries periodically review their planning processes to improve the decision making and capital allocation efficiency [189]. A study of planning processes adopted in different regions of the world found that countries in a given region are likely to adopt similar planning processes [58], [74], [81], [217]. European countries prioritise governance procedures [39], [62]; North American countries embrace sustainability from a life-cycle perspective [218], [219]; and Oceania and Asian countries focus on economic, social, and environmental concerns in the planning stage [182], [220], [221]. Based on the availability of data for detailed analysis, in Canada, Australia, Hong Kong, Germany, India, and Vietnam are selected. These selected countries represent at least one country from each region to benchmark project planning processes with Sri Lanka.

Following steps were undertaken in this section to identify the current position of Sri Lanka based on the capital efficiency and institutional arrangements.

Step 1: Rank capital efficacy of countries using ICOR - Country's rank indicates how efficient they are in allocating their capital investments to achieve the productivity.

Step 2: Review policy documents and institutional arrangements for project planning in each country – Selected country's policy documents and the institutional body responsible for planning and project evaluation were identified from the literature.

### **3.2.2 Review SOPs used for the public capital investment project planning process**

The countries selected for this study are representing all regions in the world. Most of these countries have project planning procedures interrelated and integrated [15], [151]. SOPs used in selected countries (Canada, Australia, Hong Kong, Germany, India, and Vietnam) were collected for comparison purposes. Once SOPs used for project planning processes were identified from the legislation, guidelines, and industry-standard documents, they were tabulated according to the applicable stage: need identification, pre-feasibility, or feasibility stage. These reviewed SOPs were used to identify gaps and issues in the public sector capital investment project planning process in Sri Lanka.

### **3.2.3 Analysis of project planning process within Sri Lanka**

1. Secondary data
  - a. Comparison of SOPs with OM
  - b. Case study analysis:
    - i. Comparison of SOPs with steps used in case studies
    - ii. Cost of investment
2. Primary data
  - a. Interviews for causality analysis

Why-Why analysis was conducted based on findings to identify root causes.

#### **3.2.3.1 Identify gaps in OM and practical applications when compared with SOPs**

Step 1: Rate OM (introduced in 2019 by NPD) by comparing with identified SOPs was used to identify gaps in the transcribed project planning process.

Step 2: Case study analysis was used to evaluate real context, using cases of rail and road infrastructure investments. Differences in application were rated by comparing actual practice with SOPs.

Step 3: The gaps in OM and actual practice were discussed in-detail, based on findings from three stages of planning: need identification, pre-feasibility, and feasibility.

### **3.2.3.2 Analysis of cost of investment**

Rail and road transport infrastructure investment projects were analysed, with a questionnaire survey for each selected case. Data on rail and road transport infrastructure investment projects in Sri Lanka were collected from the Department of National Planning (NPD), Road Development Authority (RDA), Sri Lanka Railway Department (SLR), Central Engineering Consultancy Bureau (CECB), and annual budget reports.

Further information was collected, including the total cost of investment, type of infrastructure (rail, road etc.), geographical location, and procurement method. Project initiation documents/concept paper, cost breakdown reports, progress reports and questionnaires, were used for further information collection and evaluation. Based on the findings, the cost savings of selected projects were calculated by comparing these with projects that duly followed the planning steps. Table 3.1 discusses the projects used for analysis and data collection sources.

Table 3.1: Sources used for the data collection on each project

| <b>Project</b>                                              | <b>Data collection sources</b>                      |
|-------------------------------------------------------------|-----------------------------------------------------|
| Matara – Beliatta railway track construction                | Ministry of Transport Management, SLR, NPD and CECB |
| Matara- Beliatta signalling                                 | SLR, NPD and CECB                                   |
| Extension of Southern expressway                            | RDA and NPD                                         |
| Railway track reconstruction- Northern line railway project | SLR and NPD                                         |
| Railway track -Northern line railway signalling project     | SLR and NPD                                         |

### 3.2.3.3 Causality analysis

Causality analysis [213], [222], [223] was conducted to identify issues affecting the public sector capital investment project planning process. In-depth interviews were conducted with 20 key experts who were involved in project planning. Responses were solicited from individuals having at least ten (10) years of experience in public sector capital investment projects. Table 3.2 indicates those industry experts.

Table 3.2: List of interviewees for the identification of implications

|    | Position of the interviewees                     | Organisation                                                      |
|----|--------------------------------------------------|-------------------------------------------------------------------|
| 1  | Director                                         | NPD                                                               |
| 2  | Assistant Director                               | NPD                                                               |
| 3  | Assistant Director                               | NPD                                                               |
| 4  | Project Director                                 | Ministry of Transport Management                                  |
| 5  | Director Planning                                | RDA                                                               |
| 6  | Planning Engineer                                | RDA                                                               |
| 7  | Chief Engineer of Civil Work                     | SLR                                                               |
| 8  | Chief Engineer- Signal and Telecommunication     | SLR                                                               |
| 9  | Engineer Planning - Civil Work                   | SLR                                                               |
| 10 | Engineer Planning – Signal and Telecommunication | SLR                                                               |
| 11 | Chief Engineer                                   | CECB                                                              |
| 12 | Engineer Planning – Civil Work                   | CECB                                                              |
| 13 | Transport Specialist                             | ADB                                                               |
| 14 | Engineer Planning                                | JICA                                                              |
| 15 | Senior Professor, Transport Economics            | Academics                                                         |
| 16 | Program Director, Public Policy                  | Academic                                                          |
| 17 | Procurement and infrastructure specialist        | Department of information technology management, Finance ministry |
| 18 | Director Legal                                   | Department of legal affairs, Finance Ministry                     |
| 19 | Legal officer                                    | Department of legal affairs, Finance ministry                     |
| 20 | Assistant director                               | Department of trade and investment policy, Finance Ministry       |

Questions posed to respondents were grouped under three main themes:

1. What are the practices used in the current project planning process?
2. Who is involved in each practice/action?
3. What are the issues in the current project planning process?

#### 3.1 Issues related to OM

#### 3.2 Issues related to the application of the project planning process

The interviews were conducted using open-ended questions to allow respondents to answer questions with sufficient flexibility while covering relevant information. This is a more holistic approach to understand the causes affecting capital projects. Finally, the identified causes were categorised.

Qualitative data were collected from the causality analysis. This type of data often consists of in-depth information and is generally presented in the form of words. Qualitative data analysis is arranging data systematically to increase the understanding of the context of analysis in depth. NVivo software was used for qualitative data analysis by coding and categorising factors into different groups [224]–[226].

NVivo was introduced in 1999. In many types of research, NVivo was applied to analyse the issues, causes and gaps [225]–[227] in the education system, teaching pattern, supply chain and medical studies. The primary purpose of this type of analysis is to identify the causes which cannot be identified from the quantitative analysis since these data are related to human psychology and behaviours [224], [226], [228].

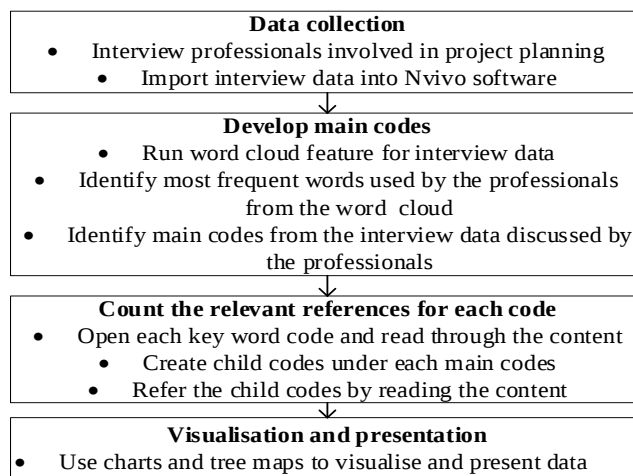


Figure 3. 2: Steps of analysing interview data using NVivo software

Source: Author

This research used the NVivo (12) trial version to analyse the qualitative data collected from the 20 professionals to identify the main issues in the project planning process. NVivo supports the development of codes from data and identifies the main causes affecting the planning process. Figure 3.2 are described the steps of the analysis using NVivo software.

### **3.2.4 Analysis of root causes of the issues in the project planning process**

Causes derived from the gaps and issues analysis were further discussed, with suggestions to reduce their implications. The Why-Why analysis [38], [69] was applied to uncover the root of the problem: an in-depth analysis of the issues and gaps directed to investigate root causes and find suggestions for improvements.

## **3.3 Phase 2: Suggestions to Improve the Public Sector Capital Investment Project Planning Process**

At this phase, steps were suggested to improve the current planning process based on findings from the analysis of gaps and issues. The proposed centralised guideline with SOPs was validated through industry consultation. This section adopts inductive reasoning [23], [82], [213] to propose a project planning process for public sector capital investments in Sri Lanka.

Suggestions for improvements are discussed in three aspects:

1. Institutional arrangement
2. Centralised Guideline
3. Transparent decision making

### **3.3.1 Improving institutional arrangement**

A clear institutional role is vital to perform the activities as an independent body. Based on the root cause analysis, suggestions were presented to improve the institutional arrangement.

### **3.3.2 Improvements to the centralised guideline**

The centralised guideline was formulated by suggesting SOPs and reducing gaps in the current planning process. The SOPs of the process are discussed in Figure 3.3. Eight (8) structured interviews were conducted with senior staff members of public organisations involved in the capital project planning process to validate the proposed centralised guideline. Interviewees were selected based on their experiences and

knowledge on project planning process. All interviewees were among those who performed the first interview on causality analysis. The list of interviewees is shown in Table 3.3.

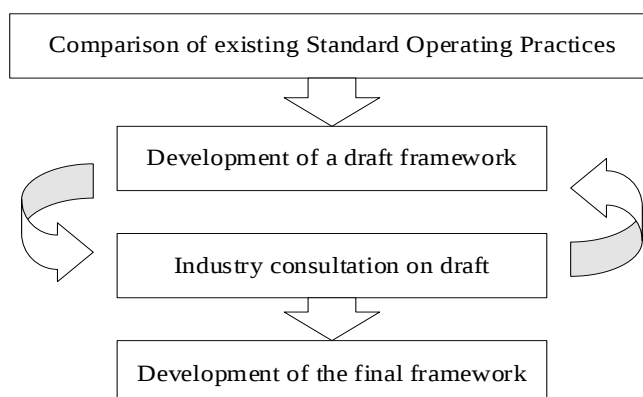


Figure 3. 3: Action to develop the proposed project planning process

Source: Author

Table 3.3: List of interviewees suggested framework evaluation

|   | Position of the interviewee                      | Organisation |
|---|--------------------------------------------------|--------------|
| 1 | Director                                         | NPD          |
| 2 | Assistant Director                               | NPD          |
| 3 | Assistant Director                               | NPD          |
| 4 | Director planning                                | RDA          |
| 5 | Chief Engineer Civil work                        | SLR          |
| 6 | Chief Engineer- Signal and Telecommunication     | SLR          |
| 7 | Engineer Planning – Signal and Telecommunication | SLR          |
| 8 | Chief Engineer                                   | CECB         |

The questionnaire developed for the interview is attached in Appendix - III. Findings from the questionnaire were used to improve the proposed centralised guideline. Following the consultation of industry experts, the final version of the centralised guideline was created. The proposed centralised guideline is elaborated in Chapter 05.

### 3.3.3 Improving transparency in decision making

Transparent decision making assesses how efficiently and meaningfully the government allocates public money for capital project investments. After the root cause analysis of implications, suggestions were incorporated to improve the transparency of decisions by proposing practices to the guideline.

## **CHAPTER 4: IDENTIFYING GAPS AND ISSUES IN THE CURRENT PROJECT PLANNING PROCESS**

### **4.1 Introduction**

The planning process is a crucial determinant of the feasibility and cost-efficiency of a project [131]. This chapter aims to review the SOPs of public sector capital investment project planning processes and identify gaps and issues in Sri Lanka's project planning process. The following steps were taken to achieve these objectives:

1. Ascertain and review SOPs of public sector capital investment project planning process and conduct cross-country comparison to evaluate Sri Lanka's performance.
2. Analyse the use of SOPs in OM and evaluate selected case studies from transport infrastructure investments in Sri Lanka. Identify gaps in OM and actual practice relative to SOPs.
3. Determine the factors affecting the project planning process from the interviews with industry professionals to identify the project planning process issues.
4. Identify root causes of project planning process issues by applying Why-Why analysis.

### **4.2 Cross–Country Comparison**

#### **4.2.1 Capital efficiency of the selected countries**

The capital efficacy of a country is crucial to sustain the productivity of its economy. The countries considered for the study (Australia, Canada, Germany, Hong Kong, India, Vietnam, and Sri Lanka) were first ranked according to ICOR. Due to the paucity of Germany, Canada and Australia data, ICOR values recorded in 2012-2013 were used [60], [61]. Data on India, Vietnam, Hong Kong [8], [61], and Sri Lanka [180] were from 2016-2017.

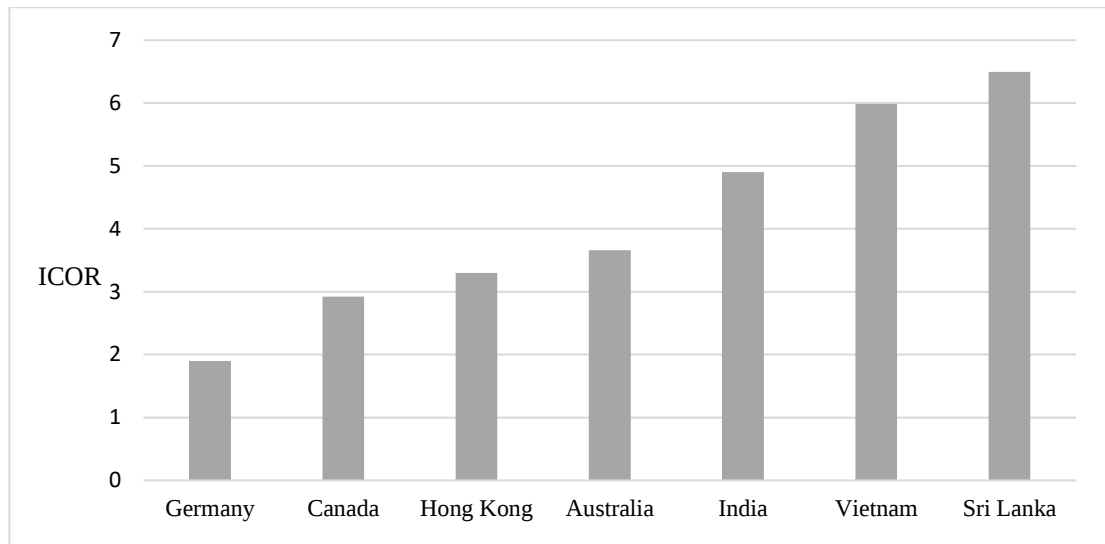


Figure 4.1: Incremental Capital Output Ratio

Source: Author

As indicated in Figure 4.1 (data given in Appendix – IV), Sri Lanka had the highest ICOR, meaning that its capital productivity was the lowest among the selected countries. Hence Sri Lanka is ranked as the most inefficient country among chosen countries. This confirms the need to reform Sri Lanka’s public sector capital investment project planning process to ensure the efficiency of the capital allocation [151], [181].

This comparison also calls for a closer examination of the procedure to manage capital investment in Sri Lanka. Capital investments in other countries are made by both the private and public sectors, with relatively low investments by the public sector [8], [215]. Furthermore, public investments are more likely to be affected by inefficiencies than private investments. The public sectors of these countries focus on communities' welfare and social development; profitability is not a priority. Sometimes, public investments may not realise profits even in the long run. The private sector is profit-oriented and unwilling to invest in any project without a worthwhile return on investment [229], thus becoming “capital efficient”.

Due to the above analysis of public and private sector investments, the following assumption was made for further analysis:

- Inefficiencies in capital investment of each country are higher in the public sector than in the private sector.

Based on the above assumption, public capital investment processes used in six other countries were chosen. Identified SOPs from these six countries were used to compare Sri Lanka's project planning process.

### **4.3 Cross–Country Comparison on Project Planning Processes**

This section discusses the policy documents underlying the planning process, institutional arrangements for project appraisal and SOPs used in different countries to plan public investments process.

#### **4.3.1 Policy documents and institutional arrangements for project appraisal**

Various SOPs are used in different countries for efficient resource allocation [230]. SOPs used for project planning were identified from literature [231]; these procedures were identified from Acts, Ordinances, Memorandum, or circulars.

As indicates in Table 4.1, project planning procedures adopted in Canada, Germany, Hong Kong, Australia, and Vietnam refer to an “Enactment” (Act of Parliament) which provides the guideline for their public sector capital investment project planning processes. An Act is a form of a legal instrument with the authoritative power to work as an independent body [232]. The final decision on project approval is granted by an independent body appointed through this “Act”. Due to this, decision biases and political impacts of the decision are kept at a minimum and any contravention of provisions in the Act could give rise to lawsuits. India and Sri Lanka follow memoranda and circulars for public investment decision making. These documents (circulars, memorandum, regulations, etc.) are issued by the government from time to time and are subjected to change [15], [233].

Legal frameworks used in selected countries for public investments are discussed in Table 4.1.

Table 4.1: Legal frameworks used in different countries for public investments

| Country   | Document/s used for the public sector capital investment projects plan, appraisal, and approval                                                                                                                        | Institution for project appraisal                        | References         |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------|
| Canada    | Impact Assessment Act (2009)                                                                                                                                                                                           | Impact Assessment Agency, Canada                         | [234]              |
| Germany   | Planning and construction law (2014)                                                                                                                                                                                   | Minister for regional planning, building and development | [235]              |
| Hong Kong | Town Planning (Amendment) Ordinance (2004)                                                                                                                                                                             | Town Planning Board                                      | [236]              |
| Australia | Infrastructure Australia Act No. 47, 2016                                                                                                                                                                              | Board of Infrastructure Australia                        | [237]              |
| India     | Appraisal and Approval of Public Funded Schemes and Projects (except matters required to be placed before Cabinet Committee on Security) - Office Memorandum No. 24(35)/PF-II/2012 dated 05.08.2016                    | Public Investment Board                                  | [238]              |
| Sri Lanka | Documents directed for development project planning for public investment - Circular No. NMPEA 02/2019, Financial regulations of the government of the democratic socialist republic of Sri Lanka (1992) and OM (2019) | NPD under the Ministry of Finance                        | [28], [206], [209] |
| Vietnam   | Law on Public Investment (2014)                                                                                                                                                                                        | State Council for the Appraisal of Projects              | [239]              |

Source: Author

#### 4.3.2 SOP used in different countries

Data on public sector capital investment project planning processes were collected from Canada, Hong Kong, Germany, Australia, India, and Vietnam using Acts, ordinances or memorandum indicated in Table 4.1.

Activities of the SOPs related to input, process, and deliverables are discussed in Table 4.2. The project planning process comprehensiveness of Australia, Canada, Germany, Hong Kong, India, Vietnam, and Sri Lanka are ranked. As shown in Figure 2.3, WB PIM process planning phase steps were used as the basis to identify SOPs used in selected countries.

Table 4.2: SOPs used in different countries

| Stage               | Step                                                                                                        | SOP                                                                                                                                                                            |
|---------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Need identification | <b>Input</b><br>1.Preliminary recognition of the problem/need from:                                         | 1.1. Forecasting                                                                                                                                                               |
|                     |                                                                                                             | 1.2. Root cause analysis                                                                                                                                                       |
|                     | <b>Process</b><br>1.Analysis of the problem/need and identifying the real requirement:                      | 1.1 Analysis of strategic importance                                                                                                                                           |
|                     |                                                                                                             | 1.2 Quantify the cost of impact over time by not addressing problem/need                                                                                                       |
|                     |                                                                                                             | 1.3 Identification of all stakeholders affected by problem/need                                                                                                                |
|                     |                                                                                                             | 1.4 Identify goals and objectives                                                                                                                                              |
|                     |                                                                                                             | 1.5 Identify output, outcome                                                                                                                                                   |
|                     | <b>Deliverables</b><br>1.Develop the Initial Project Description (IPD) of the project and rank the need:    | 1.1 Evaluate whether project need is consistent with the strategic importance, goals and objectives of the sector and country strategy and rank the importance of the project  |
|                     |                                                                                                             | 1.2 Cross-sectional/clientele analysis to identify conflicting issues with other projects                                                                                      |
|                     |                                                                                                             | 1.3 Public consultation on the project by publishing the project need                                                                                                          |
|                     |                                                                                                             | 1.4 Approve the project to move into the next stage                                                                                                                            |
| Pre-feasibility     | <b>Input</b><br>1.Different alternative identification                                                      | 1.1 Identify capital and non-capital alternatives from the demand and supply-side                                                                                              |
|                     |                                                                                                             | 1.2 Identify long term, medium-term and short-term planning to achieve the need                                                                                                |
|                     | <b>Process</b><br>1.Evaluate the alternatives and identify the most preferable option                       | 1.1 Cost-benefit analysis                                                                                                                                                      |
|                     |                                                                                                             | 1.2 Cost-effective analysis                                                                                                                                                    |
|                     |                                                                                                             | 1.3 Multi-criteria analysis                                                                                                                                                    |
|                     | 2.Further analysis of shortlisted options                                                                   | 2.1 Economic, social, and environmental feasibility on the selected options                                                                                                    |
|                     |                                                                                                             | 2.2 Analysis of land availability                                                                                                                                              |
|                     |                                                                                                             | 2.3 Analysis of primary design for selected alternatives                                                                                                                       |
|                     |                                                                                                             | 2.4 Analysis of project risk                                                                                                                                                   |
|                     | <b>Deliverables</b><br>1.Select the best alternative/s                                                      | 1.1 Choose the highest net benefit option/s.                                                                                                                                   |
|                     |                                                                                                             | 1.2 Ensure that the options are not removed due to personal preferences, perceived political difficulties or in any way that prevents genuine consideration of certain options |
|                     |                                                                                                             | 1.3 Independent appraisal of alternatives that are identified to satisfy the need to evaluate the strategic importance of the selected option                                  |
| Feasibility         | <b>Input</b><br>1.Further analysis of selected option                                                       | 1.1 Develop a base case related to the pre-feasibility selected option                                                                                                         |
|                     |                                                                                                             |                                                                                                                                                                                |
|                     | <b>Process</b><br>1. Evaluate detailed economic, environmental, and social feasibility of selected option/s | 1.1 Evaluate detailed economic, environmental, and social feasibility of selected option/s                                                                                     |
|                     |                                                                                                             | 1.2 Sensitivity analysis                                                                                                                                                       |
|                     | 2. Risk assessment and action plan to manage and mitigate risk (stage may differ from country to country)   | 2.1 Identify the major risk of the project involving the stakeholders                                                                                                          |
|                     |                                                                                                             | 2.2 Identify the risk involved with the general public                                                                                                                         |
|                     |                                                                                                             | 2.3 Analysis of risk due to climate changes and disasters (earth slip, flood etc.)                                                                                             |

| Stage | Step                                                                  | SOP                                                                              |
|-------|-----------------------------------------------------------------------|----------------------------------------------------------------------------------|
|       |                                                                       | 2.4 Calculate probabilistic based risk on project cost                           |
|       | 3. Evaluate the risk of different financing options (value for money) | 3.1 Evaluate the risk of different financing options (value for money)           |
|       |                                                                       | 3.2 Preference to the local investors                                            |
|       | 4. Evaluate project design and operation plan                         | 4.1 Technical evaluation committee for detailed investigation on design and cost |
|       |                                                                       | 4.2 Evaluate governance structure and operation plan after implementation        |
|       | <b>Deliverables</b><br>1. Approval to develop the detailed design     | 1.1 In-house experts evaluate and approve                                        |
|       |                                                                       | 1.2 Analyse and approve the project by a committee of experts                    |

Source: Author

Each activity was rated based on the comprehensiveness of the OM. The following scale was used to rank the SOPs in Table 4.2:

|                       |   |     |
|-----------------------|---|-----|
| No consideration      | - | 0   |
| Partial Consideration | - | 2.5 |
| Full consideration    | - | 5   |

Analysis of the planning processes of the countries appears in Appendix V. Figure 4.2 indicates the average rating of SOPs in planning processes in each of the seven countries.

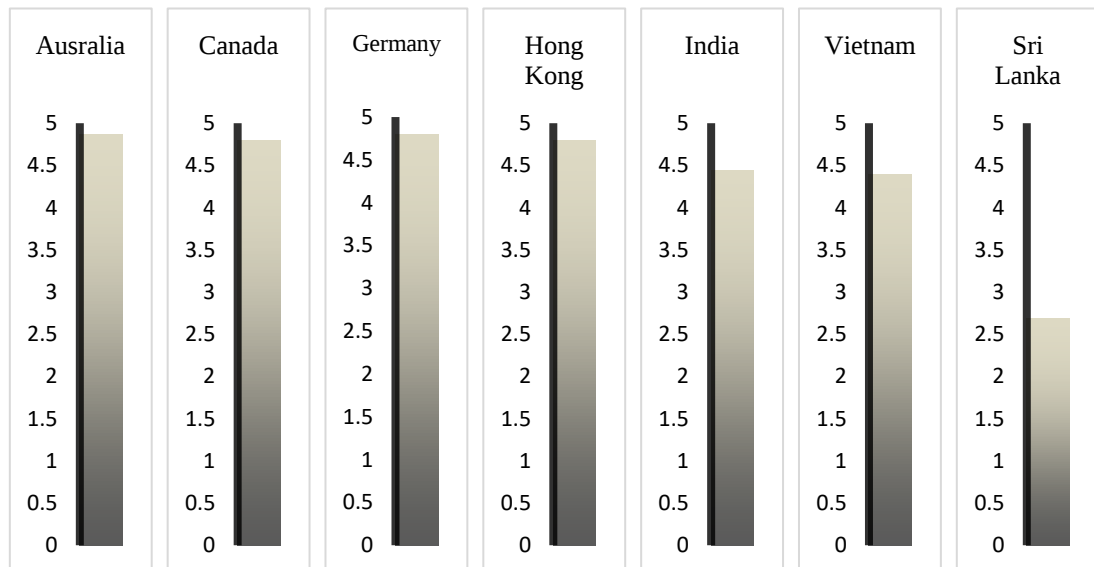


Figure 4.2: Average rating for the comprehensiveness of SOPs

Source: Author

According to Figure 4.2, average rates in Australia, Canada, Germany, and Hong Kong exceed 4.8 and has minor variations against SOPs. India and Vietnam are placed at the same average rate (4.4) because India and Vietnam do not require approval when moving from need identification to pre-feasibility. In both countries, the project problem identification stage and pre-feasibility assessment are conducted together, and the project report is sent to an authoritative body for screening and approval. Moreover, both countries do not apply probabilistic risk assessment for project costs relating to material, labour, and overheads.

In Sri Lanka, the average value is (2.7), and its comparison with SOPs are indicated in Table 4.2, where the country falls short of some SOPs in the OM. According to NPD and PPs, the OM is used as a guideline at the planning phase. It is also essential to understand the extent SOPs are applied in actual practice. However, there is no method to directly evaluate the application of SOPs in real practice for selected countries. This is due to the unavailability of data related to real projects. All guidelines are introduced under the countries' legislation; hence it is assumed that the SOPs stated in the guideline reflect the actual practice in each country which is practiced by the public sector project planners.

A detailed discussion was conducted on the public sector capital investment project planning process used within Sri Lanka by comparing SOPs with the OM and the actual practice.

### **4.3.3 Assessment of the application of SOPs in Sri Lanka**

SOPs used in different countries (Australia, Canada, Germany, Hong Kong, India and Vietnam) were tabulated in Table 4.3. Sri Lanka's use of SOPs in the real context (RC) was assessed. RC means, the actual practice of the project planning process applied within Sri Lanka. Written guidance is extracted from the updated OM (2019) [206] and RC was gauged by analysing past projects data. Details of real context analysis are shown in Appendix VI.

The projects used to evaluate the real context is discussed in Table 4.3:

Table 4.3: Projects implemented between 2008-2018

| Project                                    | Funding source      | Stage                            |                 |                                            |                          |
|--------------------------------------------|---------------------|----------------------------------|-----------------|--------------------------------------------|--------------------------|
|                                            |                     | Problem Identification           | Pre-feasibility | Feasibility                                | Final approval           |
| Southern Expressway                        | ADB and JICA        | Yes                              | Yes             | Yes                                        | The Ministers of Cabinet |
| Extension of Southern Expressway           | China Exim Bank     | Yes (just an indication of need) | No              | Conducted 2009 but for a different terrain | The Ministers of Cabinet |
| Port access elevated highway               | ADB and JICA        | Yes                              | Yes             | Yes                                        | The Ministers of Cabinet |
| Matara-Beliatta railway track construction | China Exim Bank     | Yes                              | No              | Yes (not available in NPD)                 | The Ministers of Cabinet |
| Matara-Beliatta railway track signalling   | China Exim Bank     | Yes                              | No              | No                                         | The Ministers of Cabinet |
| Reconstruction of Northern railway track   | Government of India | Yes                              | No              | Yes                                        | The Ministers of Cabinet |
| Northern railway track signalling          | Government of India | Yes                              | No              | No                                         | The Ministers of Cabinet |

Source: Author

Details of the analysis of SOPs are provided in Appendix - VI. Due to the unavailability of feasibility reports for some selected projects, it is difficult to assess the actual situation of the planning process. As a result, details were gathered by interviewing NPD, project directors, and the planning department of the related agency. Most of the projects have got direct approval from the Cabinet instead of following the SOPs of the OM. Therefore, NPD did not have any detailed reports on such projects.

Each SOP of OM and RC was rated based on the rate and icon (Figure 4.3):

| Definition            | Rate | Icon                                                                                  |
|-----------------------|------|---------------------------------------------------------------------------------------|
| No consideration      | 0    |  |
| Partial consideration | 2.5  |  |
| Full consideration    | 5    |  |

Figure 4.3: Rate and Icon to assess SOPs

Source: Author

Findings based on the SOPs are discussed in three different stages: need identification, pre-feasibility, and FEDD and feasibility. Analysis related to the three stages appears in Figures 4.4 – 4.6.

Need identification stage of OM and RC are as mentioned below:

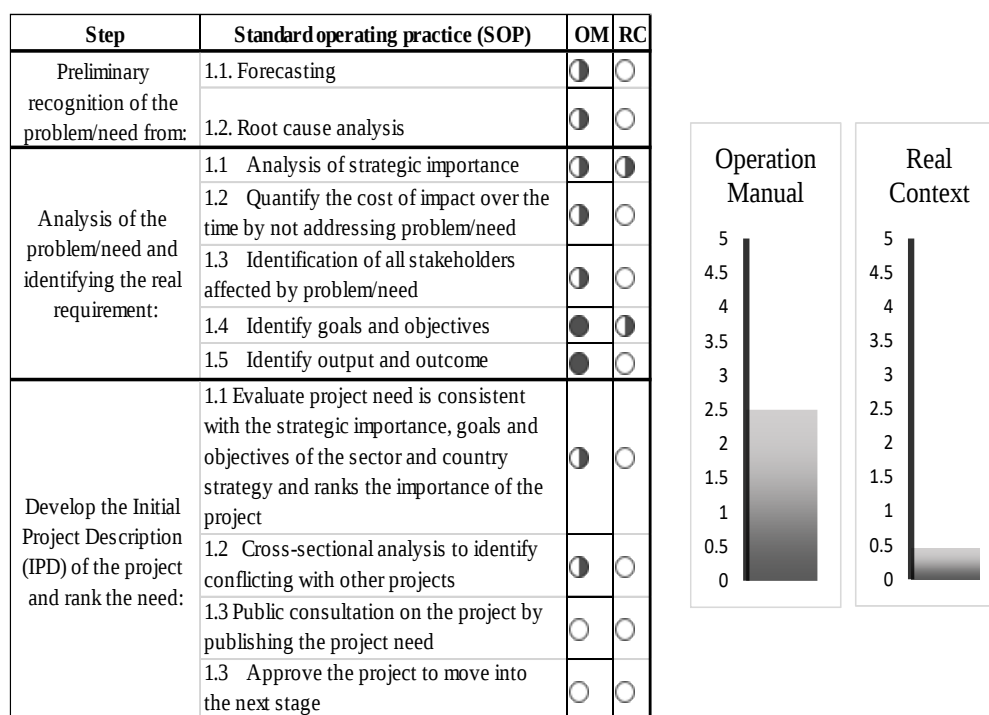


Figure 4.4: SOPs applied in the OM, and real context for need identification stage  
Source: Author

For the need identification stage, the average rating is 2.5 when SOPs (Table 4.2) are compared with the OM. The main gaps in the OM are:

1. According to the OM, need identification methods are not clearly defined. In Australia, need identification is conducted through forecasting and root cause analysis, and legislation discusses methods of examining the need in detail by explaining different techniques with examples. However, in Sri Lanka, the OM has indicated analysis methods without detailed explanations.
2. Under the OM, it is not required to analyse the impact of not satisfying the project need. In Canada, in the initial stage, PP quantifies the effect of not addressing the project need.

3. After the need analysis, projects are submitted to the government authority for screening and prioritising projects according to the sector and the country strategy [93], [205]. However, this does not happen in Sri Lanka at the stage of need identification. This phase aims to eliminate weak strategic cases and poorly developed rationales [15]. Project appraisal at the need identification stage was introduced in 1995 but is not in practice. Canada and Australia use this SOP to screen projects and eliminate unnecessary projects. On average, 5% - 7% of the projects are rejected at this stage [11], [240].
4. According to the OM, it is suggested that the PP undertakes cross-sectional analysis. Nevertheless, PP does not have access to all data on planned and suggested projects. In Canada, Hong Kong, and India, the project screening authority performs cross-sectional analysis (clientele analysis). Thus, maintaining a centralised and up to date database of past, present, suggested, and ongoing projects across the country to apply in the analysis [77].
5. Public consultation for the project is not discussed under the OM in Sri Lanka. In Germany, Hong Kong, Canada, and India, public consultation is conducted at each stage to reduce the disastrous impact of halting a project during construction. Stakeholder (including ultimate beneficiaries) involvement during the development of the project is an ideal practice that increases the transparency of decision-making. Failure to do this will harm implementation and operation [115], [162].

The real application of SOPs in Sri Lanka was rated on average of 0.45. Some projects are following the SOPs of need identification, and some are not. Therefore, it indicated a partial consideration for most of the SOPs in the real context.

1. Needs identification stage is mainly used to identify the requirement for the project. RDA uses STADA software to forecast future needs, but there is no system for forecasting at SLR. Sometimes, SLR uses root cause analysis to identify the problem, but most projects were suggested by funding organisation.
2. Due to top-level government influences, some projects are included in the budget without evaluating the absolute requirement of the country. At the need

identification stage, strategic importance, economic impact, project output and outcome were not considered in these projects [51], [241].

Pre-feasibility stage of OM and RC are as follows:

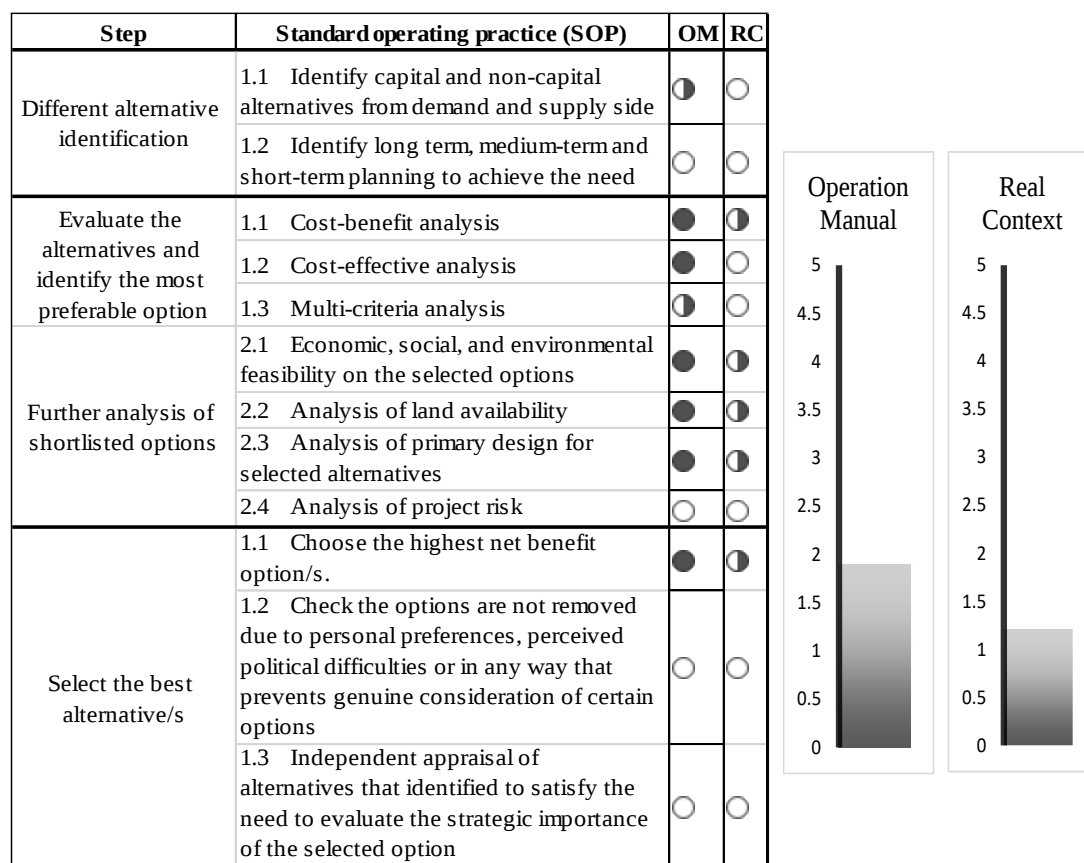


Figure 4.5: SOPs applied in the OM and the real context in the Pre-feasibility stage  
Source: Author

For the pre-feasibility stage, the average rating is 2.9 when SOPs (Table 4.2) are compared with the OM. Following aspects have not been covered in the OM:

1. All possible alternatives for the need may not be recognised based on the OM. This is due to the lack of detailed guidance in the manual for identifying all possible alternatives. In Australia, Canada, Hong Kong, and India, OM directs PP to determine different options, both with cost incurring and not incurring options. After selecting the best alternatives, they develop short-term, medium-term, and long-term plans to meet the expected need [221].

2. Analysis of the risks of different alternatives has not been addressed in the current OM. This risk analysis is conducted in Australia, Canada, and Hong Kong to evaluate the alternatives and choose the best alternative. Fundamental analysis of risk for the different alternatives directs the PP to select the preferable option to address the need.
3. At the end of the pre-feasibility study, project appraisal is mandatory in Australia, Canada, Hong Kong, India, Vietnam, and Germany but not in Sri Lanka. This appraisal decides whether the project should progress further. Since the feasibility study requires a large sum of money, it may further waste funds if it proceeds without an approval [42].
4. According to the FR, the pre-feasibility study requires approval from NPD for a feasibility study to proceed with and different funding sources should be explored. However, according to the OM, the projects are submitted to NPD after the feasibility study, including the funding source. Therefore, OM and FR guide PP differently, which sub-optimises the objective of project screening at NPD.

The real application of SOPs (Table 4.2) in Sri Lanka scored an average of 1.04 for the selected projects. The main practical implications are as follows:

1. Most project directors said that they identified the alternatives. However, when discussing the details of SOPs in the alternative analysis, it was identified that they had not followed all steps under SOPs. This indicates that alternative identification was conducted according to the preference of the PP.
2. During the project screening, NPD is not conducting an in-depth evaluation on removing the alternatives and benchmark cost with international projects. Hence, the quality of the project screening at NPD is questionable.

SOPs comparison in Feasibility stage with OM and RC are as follows:

The average rating is 2.6 when comparing OM with SOPs (Table 4.2) for the feasibility stage as discussed in figure 4.6.

| Step                                                                                                   | Standard operating practice (SOP)                                                          | OM | RC |
|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----|----|
| Further analysis of selected option                                                                    | 1.1 Develop a base case related to the pre-feasibility selected option                     | ●  | ●  |
| Evaluate detailed economic, environmental, and social feasibility of selected option/s                 | 1.1 Evaluate detailed economic, environmental, and social feasibility of selected option/s | ●  | ●  |
|                                                                                                        | 1.2 Sensitivity analysis                                                                   | ●  | ●  |
| Risk assessment and action plan to manage and mitigate risk (stage may differ from country to country) | 2.1 Identify the major risk of the project involve with stakeholders                       | ●  | ○  |
|                                                                                                        | 2.2 Identify the risk involved with the general public                                     | ○  | ○  |
|                                                                                                        | 2.3 Analysis of risk due to climate changes and disasters (earth slip, flood etc.)         | ●  | ○  |
|                                                                                                        | 2.4 Calculate probabilistic based risk on project cost                                     | ○  | ○  |
| Evaluate the risk of different financing options (value for money)                                     | 3.1 Evaluate the risk of different financing options (value for money)                     | ●  | ○  |
|                                                                                                        | 3.2 Preference to the local investors                                                      | ○  | ○  |
| Evaluate project design and operation plan                                                             | 4.1 Technical evaluation committee for detail investigation on design and cost             | ●  | ●  |
|                                                                                                        | 4.2 Evaluate governance structure and operation plan after implementation                  | ●  | ○  |
| Approval to develop the detailed design                                                                | 1.1 In-house experts evaluate and approve                                                  | ●  | ●  |
|                                                                                                        | 1.2 Analyze and approve the project by a committee of experts                              | ○  | ○  |

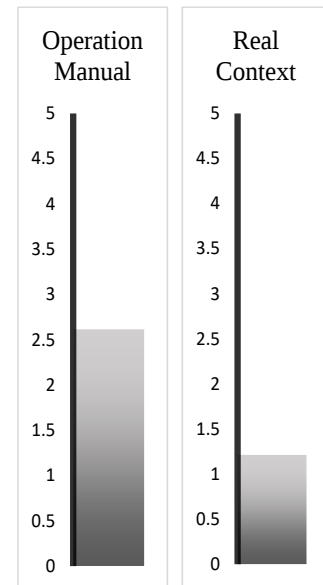


Figure 4.6: SOP applied in the OM and the real context in the feasibility stage

Source: Author

Following aspects need to be considered for further development of the manual:

1. Involving the public to identify issues in the project at an early stage is widely discussed in Germany, Hong Kong, Canada. However, in Sri Lanka, this is not addressed in the OM. This is also having an impact on risk management and contingency planning during the project implementation.
2. Risk assessment on climate changes and disaster risk management is limited within Sri Lanka. This needs to be addressed in-depth as it is required for land allocation and contingency planning during construction and implementation. Conducting probabilistic risk assessment at the planning stage is a practice in Australia, Canada, Germany, and Hong Kong to manage the project during the construction stage. This approach is used for better predictions of the cost of investment and to increase the accuracy of contingency planning [192], [242].

Sensitivity analysis and risk assessment are discussed in the OM, but probabilistic risk assessment does not get due attention.

3. India developed a structure for Detailed Project Reports (DPR) to be adopted when submitting project feasibility reports [236]. According to Indian guidelines, the Ministry would first set requirements to develop DPR such as, terms of references, economic, social, environmental viability conditions, a DPR checklist, etc. [245]. Then, the consultant is bound to develop a DPR including all criteria stipulated by the Ministry.

The list of details to address in the DPR as per the Office Memorandum No. 24(35)/PF-II/2012 dated 05.08.2016 on “Appraisal and Approval of Project Funded Schemes and Projects” are as follows [236]:

- a) Problem to be addressed through the project
- b) Proposed development objectives to be achieved
- c) Analysis of alternative strategies to achieve the objectives
- d) Stakeholder analysis to identify target beneficiaries
- e) Legal framework and strength and weaknesses on a legal framework to achieve the objectives
- f) Environment impact assessment
- g) Evaluation of technology options
- h) Cost estimates of the project and time frame
- i) Identification and assessment of risk
- j) Develop Key Performance Indicators to measure the success of the project objectives

Once DPR is compiled, the Ministry could submit it to Public Investment Board for project evaluation.

4. In Sri Lanka, recommendations for project approval are given by the NPD, according to circular 02/2019, and the Cabinet gives the final approval. In Hong Kong, India, Germany, the final approval decision is made by an independent committee consisting of experts related to the project field. This reduces biases in project selection. In India, the Public Investment Board, the project approving authority for large and mega-scale projects (projects more than USD 100 million), consists of seven (7) members to evaluate project DPR. Out of these seven members, three (3) members represent the department of expenditure and line ministry. The rest of the members are from National Institution for Transforming India Aayog, the budget division, other related ministries' representatives, and scientific advisors related to the project [238]. Germany uses external consultants to appraise the project, and Canada chooses specialists to appraise projects after training and testing [243].
5. In other countries, after the reviews, the committee approves the project. The committee and appraisal organisation are responsible for the decision. If there is any issue related to the project screening or process of screening, anyone can take legal action against the organisation's decision [188]. Nevertheless, in Sri Lanka, NPD is not liable for the decisions on project screening and recommendations for approval. The Cabinet gives final approval of the project.

The real application of SOPs (Table 4.2) in Sri Lanka got an average rating of 1.42 for the selected projects at the feasibility stage. Because some of the projects follow SOPs of the feasibility stage and single contractor (direct contracting) projects have obtained direct Cabinet approval without following SOPs of the OM. As these projects follow the procurement manual (2006) [244], project approval has been taken directly from the Cabinet.

In the real context, some projects follow all SOPs. For example, the port access elevated highway project followed all SOPs in project planning, whereas the extension of the southern expressway project did not. The application of different SOPs is mainly due to the influence of the funding source. If the project is funded by the government, ADB, or JICA, it is mandatory to follow SOPs. However, if the project is funded by

direct financing from China or India, there is no requirement to follow the planning procedure [55].

Further analysis of the investment costs of selected projects helped to assess the monetary impact of not following the project planning process.

#### **4.4 Detailed Investigations of the Cost of the Investment of Selected Projects from the Case Study Analysis**

Case studies were selected to analyse the cost of the investments: considering rail and road infrastructure investment projects.

##### **4.4.1 Case study 1 - Extension of Southern expressway – Beliatta to Wetiya**

The extension of the Southern Expressway was completed in 2020. This project was divided into four main sectors, including the section from Beliatta to Wetiya. The length of this section is 26 kilometres, and USD 308 million was spent on construction. The average cost per kilometre was USD 11.85million, funded by the China Exim Bank and constructed by a contractor from China. This project was handed over to contractors as a direct contracting project [245]. Details of the planning process of the project are illustrated in Table 4.4.

Table 4.4: Project planning process main steps used for case study 1

| Activity                    | Yes | No | Description                                                               |
|-----------------------------|-----|----|---------------------------------------------------------------------------|
| Need analysis               | Yes |    |                                                                           |
| Initial Project Description | Yes |    |                                                                           |
| Pre-feasibility study       |     | No |                                                                           |
| Alternative analysis        |     | No |                                                                           |
| Feasibility                 | Yes |    | 2009 from University of Moratuwa – Different terrain within the same area |
| Detailed design             | Yes |    | Road Development Authority                                                |
| Detailed estimation         | Yes |    | Road Development Authority                                                |
| Funding                     |     |    | China Exim Bank                                                           |
| Construction                |     |    | China State Construction Engineering Corporation Ltd                      |

Source: Author

In 2009 the University of Moratuwa conducted a feasibility study for the extension of the Southern Expressway. This study was conducted for different terrain, but due to

changes in the airport location and other facility locations, the actual project terrain changed. As per the conclusions of the feasibility study, the project was not feasible due to low demand [199].

*Suggested application:*

As per the feasibility study analysis conducted by the University of Moratuwa [199], the cost per km was USD 4.14 million (2017 standard price). This value was calculated based on the actual construction cost incurred for the Southern expressway.

Table 4.5: Cost analysis based on the average cost of construction

| Description                      | Cost of investment per km (2017) | Feasibility study conducted by the University of Moratuwa cost of investment | Average cost savings |
|----------------------------------|----------------------------------|------------------------------------------------------------------------------|----------------------|
| Investment value (USD mn per km) | 11.85                            | 4.14                                                                         | 7.71                 |

Source: Author

Calculations of Table 4.5 are based on the findings of the mean construction cost of the expressway. As this project was a direct contracting project, the cost of investment was high. Average savings if the project followed SOPs of competitive bidding:

$$\begin{aligned}
 \text{Average savings per kilometre as a percentage of actual cost} &= \frac{\text{Actual cost per km} - \text{Average cost per km}}{\text{Actual cost per km}} \\
 &= \frac{(11.85 - 4.14)}{11.85} \times 100 \\
 &= 65.06\%
 \end{aligned}$$

An analysis of the estimated investment cost per kilometre showed that the saving is 65.06% of the investment per kilometre. Therefore, it reconfirms the necessity to introduce SOPs in the planning process to compare the investment cost with similar local and international projects.

#### 4.4.2 Case Study 2- Matara-Beliatta new railway track construction project

The per-kilometre construction cost of railway tracks varies with the number of tracks, and gauge [246]. The Department of Railways acquired 1,141 plots of land for the

laying of the railway lines during 2010. This track is a broad-gauge single-track line with a length of 27 kilometres, a 600m-long tunnel, two bridges of 1.04 kilometres and 1.5 kilometres length, and viaducts. This track construction was a direct contract project awarded to China National Machinery Imports and Exports as a general contractor. The project received USD 278.2 million [150] from the Export-Import Bank of China (China Exim), and a lump sum (fixed price) project was signed between the Government of Sri Lanka and China Exim Bank. Sri Lanka spent about USD 10.31 million per kilometre on average for construction from Matara to Beliatta. Table 4.6 discusses the main steps of the planning process related to the project.

Table 4.6: Project planning process main steps used for case study 2

| Activity                    | Yes | No | Description                                               |
|-----------------------------|-----|----|-----------------------------------------------------------|
| Needs analysis              | Yes |    | No documentation at NPD                                   |
| Initial Project Description |     | No |                                                           |
| Pre-feasibility study       |     | No |                                                           |
| Alternative analysis        |     | No |                                                           |
| Feasibility                 | Yes |    | No documentation at NPD                                   |
| Detailed design             | Yes |    | China - Detailed design limited involvement by SLR        |
| Detailed estimation         | Yes |    | China - Detailed cost analysis for activity-based payment |

Source: Author

As the first step of the analysis, whether the project adhered to the steps of the project planning process was checked; Table 4.6 presented the findings (questionnaire used for data collection is in Appendix-VII). The Cabinet first approved the project; a detailed design and estimation followed. Documents on the project concept paper and feasibility study were not available with NPD.

#### *Suggested application:*

This railway track consists of tunnels, viaducts, and long bridges, and therefore no local data to benchmark the construction cost. The projected per kilometre cost of investment is benchmarked with comparable projects in Asian countries. Data collected from WB and ADB databases were used to estimate the investment cost of the railway track project. Both the WB and ADB select projects by following the pre-feasibility, feasibility and design stages [13], [207], [247], and they choose contractors

through competitive bidding [248]. In the analysis, Projects commenced and completed between 2007-2019 in Asia were selected for cost benchmarking (Appendix-VIII). Although track gauges and terrains vary across countries, these variations are considered negligible for calculation.

After analysing the collected data, the average cost of construction was computed. Figure 4.7 indicates railway track construction cost in USD million per kilometre. Price was standardised to local cost of labour [241], [249]; the material cost was retained on the assumption that material was imported from overseas (details of the analysis are attached in Appendix -VIII). All data points were inflated to the 2010 standard rate for comparison. Table 4.7 discusses the average cost of investment per railway track construction and the average cost of savings.

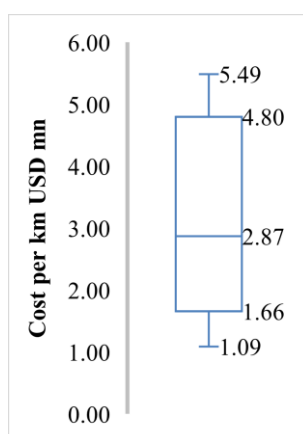


Figure 4.7: Box plot of railway track construction cost per kilometre in USD million

Source: Author

Table 4.7: Cost analysis based on the average cost of construction

| Description                  | Matara - Beliatta railway track (27 km) | The average cost of investment - Figure 4.7 | The average saving per km |
|------------------------------|-----------------------------------------|---------------------------------------------|---------------------------|
| Average cost (USD mn per km) | 10.31                                   | 2.87                                        | 7.44                      |

Source: Author

Figure 4.7 and Table 4.7 indicate that the average cost of investment per kilometre was USD 2.87 million at the 2010 standard rate. If the project invests at the rate of USD 2.87 per kilometre, the savings of the project:

$$\begin{aligned}
\text{Average savings per kilometre} &= \frac{\text{Actual cost per km} - \text{Average cost per km}}{\text{Actual cost per km}} \\
\text{(As a percentage of actual cost)} &= \frac{(10.31 - 2.87)}{10.31} \times 100 \\
&= 72.16\%
\end{aligned}$$

If the analysis is conducted on the average investment cost per kilometre, savings account for 72.16% of the investment. Therefore, it is necessary to include SOPs in the planning process to benchmark the investment cost with similar local and international projects. This SOP is introduced under the pre-feasibility stage, and the NPD is responsible for benchmarking the cost of investment.

#### 4.4.3 Case study 3 - Cost benchmarking of Matara - Beliatta new railway line signalling project

After completion of track construction, a signalling system is essential to start operations. The signalling solution for this track was provided by the subcontractor recommended by a contractor (China National Machinery Imports and Exports). The total cost of the signalling system was USD 16.81 million (2017 estimated value). There are five stations from Matara to Beliatta (including Matara station). Detailed investigation (Table 4.8) of the project planning process reveals that the Cabinet has approved the project without following the process.

Table 4.8: Project planning process main steps used for the case study 3

| Activity                    | Yes | No | Description |
|-----------------------------|-----|----|-------------|
| Need analysis               | Yes |    |             |
| Initial Project Description |     | No |             |
| Pre-feasibility study       |     | No |             |
| Alternative analysis        |     | No |             |
| Feasibility                 |     | No |             |
| Detailed design             | Yes |    | By China    |
| Detailed estimation         | Yes |    | By China    |

Source: Author

As indicated in Table 4.8, an alternative analysis, feasibility study and cost analysis were not conducted by the project management unit. The project management unit requested contractors to identify a subcontractor and develop the signalling system.

The subcontractor did the detailed design and estimation for the project, as indicated in Table 4.9.

#### Cost breakdown analysis

Table 4. 9: Detailed cost breakdown of the signalling installation

| Description                                 | Cost (USD million) | Percentage    |
|---------------------------------------------|--------------------|---------------|
| Central Traffic Control Centre connectivity | 0.67               | 4.13%         |
| Station yards (5 stations)                  | <b>9.99</b>        | <b>61.63%</b> |
| Level crossing (7 crossings)                | 1.37               | 8.45%         |
| Spare parts, technology transfer and other  | 1.12               | 6.91%         |
| Civil work                                  | 3.06               | 18.88%        |
| Total                                       | 16.21              | 100.00%       |

Source: Author

Accordingly, the project has spent USD 9.9 million for five (5) station yards. Thus, the average cost per station amounts to USD 1.98 million.

As explained by the SLR's sub-department of signalling and telecommunication, the current signalling system used in Matara - Beliatta railway station can be replaced with the signalling system introduced Narahenpita railway station. The new signalling system in Narahenpita was installed by the signalling and telecommunication sub-department of the SLR in 2017. The installation cost was USD 0.1 million (2017 standard price) per station [149]. This information was published in the Research for Transport and Logistics Industry conference proceedings in 2018.

Table 4.10 discusses the cost of installing the signalling system at station yards from Matara- Beliatta and their cost disparities.

Table 4.10: Matara-Beliatta Station yard signalling cost analysis

| Project                             | Matara - Beliatta signalling Station Yard (Table 4.9) | Narahenpita station signalling system | The average cost saving from actual investment |
|-------------------------------------|-------------------------------------------------------|---------------------------------------|------------------------------------------------|
| Cost per station yard (USD million) | 1.98                                                  | 0.1                                   | 1.88                                           |

Source: Author

As Table 4.10 indicates, if the Narahenpita signalling systems were adopted, then the cost-saving would have been USD 1.88 million (2017 standard price) per station:

$$\begin{aligned}
 \text{Savings} &= \frac{\text{Actual cost} - \text{Narahenpita station yard signalling}}{\text{Actual cost}} \\
 \text{(As a percentage of actual cost)} &= \frac{(1.98 - 0.1)}{1.98} \times 100 \\
 &= 94.94\%
 \end{aligned}$$

The cost saving from the actual cost of investment is 94.94%.

SLR's signalling and telecommunication sub-department submitted a Cabinet paper to seek approval for setting up the signalling system. However, this was not accepted, and the project was handed over to the Chinese contractor. This indicates that the project selection decision was biased. Although the signalling and telecommunication department could have developed the project, it was awarded to outsiders for the construction at a higher cost.

#### 4.4.4 Case study 4 - Railway track reconstruction Northern line project

At the end of the civil war, reconstruction of the Northern railway track was carried out. SLR did the railway track reconstruction from Vavuniya to Omanthai (13km). The rest of the 261km railway track reconstruction was conducted by IRCON International Limited India (IRCON) and funded by the Indian government. Table 4.11 discusses the main steps in the project planning process followed to reconstruct the Northern railway line for 261 km.

Table 4.11: Main steps of project planning process used for the case study 4

| Activity                    | Yes | No | Description                      |
|-----------------------------|-----|----|----------------------------------|
| Need analysis               | Yes |    |                                  |
| Initial Project Description | Yes |    |                                  |
| Pre-feasibility study       |     | No |                                  |
| Alternative analysis        |     | No |                                  |
| Feasibility                 | Yes |    | 2009 from University of Moratuwa |
| Detailed design             | Yes |    | India (IRCON)                    |
| Detailed estimation         | Yes |    | India (IRCON)                    |

Source: Author

The average cost incurred for the reconstruction from Vavuniya to Omanthai was USD 0.5 per km by SLR [171]. Table 4.12 shows the details of the average cost of railway track reconstruction by ICORN and the estimated average cost savings if the SLR constructed the track.

Table 4.12: Railway track rehabilitation cost of investments and estimated savings

| Railway track                                                               | Average Cost per km (USD mn) | Average cost constructed by the SLR (USD mn) | Estimated cost savings (USD mn) | Estimated Percentage of saving |
|-----------------------------------------------------------------------------|------------------------------|----------------------------------------------|---------------------------------|--------------------------------|
| Mannar rail track reconstruction (106 km) – Contractor IRCON                | 2.2                          | 0.5                                          | 1.7                             | 77.3%                          |
| Omanthai - Palali rail track reconstruction (99 km) - Contractor IRCON      | 1.9                          | 0.5                                          | 1.4                             | 73.68%                         |
| Palali - Kankasanthurai rail track reconstruction (56 km)- Contractor IRCON | 2.6                          | 0.5                                          | 2.1                             | 80.76%                         |

Source: Sri Lanka Economic Research Conference 2020

Table 4.12 calculation indicated that possible savings if the SLR constructed are greater than 73%. SLR did the railway track reconstruction (from Vavuniya to Omanthai) before it was awarded to IRCON. However, the project was directly awarded to IRCON; without a proper evaluation of the investment cost by comparing it with local and proposed international projects.

#### 4.4.5 Case study 5 - Railway signalling Northern line railway project

The IRCON carried out signal system installation for the Northern railway line. IRCON subcontracted the signalling installation to another Indian subcontractor [171]. Table 4.13 discusses the main steps of planning process followed in the project.

Table 4.13: Project planning process main steps used for case study 5

| Activity                    | Yes | No | Description   |
|-----------------------------|-----|----|---------------|
| Need analysis               | Yes |    |               |
| Initial Project Description |     | No |               |
| Pre-feasibility study       |     | No |               |
| Alternative analysis        |     | No |               |
| Feasibility                 |     | No |               |
| Detailed design             | Yes |    | India (IRCON) |
| Detailed estimation         | Yes |    | India (IRCON) |

Source: Author

As discussed in Table 4.13, the project has not followed the steps of the project planning process. Signal installation at the station yards in the Northern line was directly handed over to the IRCON. Contract cost was USD 3.0 million per station, and according to a Sri Lanka Economic Research Conference (2020), a subcontractor has installed signalling per station at USD 0.3 million [171].

$$\begin{aligned}
 \text{Average savings per station yard} &= \frac{\text{Actual cost} - \text{subcontractor cost}}{\text{Actual cost}} \\
 \text{from signalling} & \\
 \text{(As a percentage of actual cost)} & \\
 &= \frac{(3.0 - 0.3)}{3.0} \times 100 \\
 &= 90.0\%
 \end{aligned}$$

Based on this explanation, it appears that the cost of signal installation was overvalued. As a result, the IRCON International Limited India reaped all benefits.

#### 4.4.6 Case study 6 – Road construction

According to the analysis of road projects constructed from 2005 to 2012 in Sri Lanka by Gunaruwan (2016), the Journal of Economic Research indicated the local contractors were less capital intensive than foreign contractors [55]. This is further confirmed by the study presented by Gunaruwan and Jayasekara under the Sri Lanka Economic Research Conference (2020) [171]. According to the findings, the average cost of investment for foreign no bid for road construction (including technologies of DBST, SBST and Asphalt) was Rs. 12.76 mn per m-km. In contrast, the local average cost of construction was Rs. 3.3 mn per m-km. If a local contractor was selected, savings would have amounted to Rs. 9.46 mn per m-km.

Based on the above analysis, the average cost savings is calculated as follows:

$$\begin{aligned}
 \text{Average road construction cost saving per m-km} &= \frac{\text{Foreign no-bid cost} - \text{Local cost}}{\text{Foreign no bid cost}} \\
 \text{(As a percentage of actual cost)} & \\
 &= \frac{(12.76 - 3.3)}{12.76} \times 100 \\
 &= 74.14\%
 \end{aligned}$$

The summary of the above discussed projects is indicated in Table 4.14.

Table 4.14: Summary of percentage of savings

| <b>Project</b>                                                                  | <b>Savings</b> |
|---------------------------------------------------------------------------------|----------------|
| Extension of Southern Expressway – Beliatta to Wetiya                           | 65.06%         |
| Matara-Beliatta new railway track construction project                          | 72.16%         |
| Matara - Beliatta new railway line signalling project (station yard signalling) | 94.94%         |
| Railway reconstruction Northern line railway track project                      | Above 73%      |
| Railway signalling Northern line project                                        | 90%            |
| Average road construction from different surface technologies                   | 74.14%         |

Source: Author

Project cost analysis reveals the possibility of securing a significant saving on project investment cost if a well-established project planning process is followed. Assessment of projects at their planning stage and benchmarking with recently completed projects would lead to better determination and negotiation of project investment value. The projects discussed under Table 4.14 have not followed the main steps involved in the project planning process.

As per the above discussion, further evidence that PPs are not following the NPD transcribed SOPs for project planning. Some of the above selected projects are direct contract projects; PPs have taken the direct Cabinet approval by following the procurement guideline [250]. This depicts that the procedures provide room for projects to bypass the project planning process. Although PP ignores the NPD Project planning process, NPD cannot take any action against PP or halt the project to eliminate the unnecessary cost of investments. The above finding indicates a lack of authority within NPD to play a vigilant role of gatekeeper [60], [251] to select the most required projects for public investment. At the same time, political influence on project selection is evident, and NPD is unable to play the expected role due to the influence of politicians.

Table 4.15 summarises the causes influencing the project planning process from secondary data analysis (FR, OM, and selected case studies).

Table 4.15: Findings from secondary data on the project planning process

| Findings                                        | Description                                                                                                                                                                                                                                               |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Institutional arrangement for project screening | Lack of authority to operate as an independent organisation for project screening when compared with the selected countries                                                                                                                               |
| The guideline used for project planning         | <p>Gaps are indicated in the OM when compare with the SOPs. Summary of the gaps are as follow:</p> <ul style="list-style-type: none"> <li>• Alternative identification and assessment</li> <li>• Feasibility</li> <li>• Post-completion review</li> </ul> |
| The guideline used for project screening        | <p>Single point screening by the internal staff of NPD</p> <p>Direct Cabinet approval for direct contracting (unsolicited) projects</p> <p>Some projects have not followed the SOPs of the OM</p>                                                         |
| Cost of investment                              | <p>Cost of investment was higher for direct contracting projects</p> <p>Most of the projects have not followed the project planning process</p>                                                                                                           |

Source: Author

Causality analysis is conducted to identify root causes for the above issue:

## 4.5 Causality Analysis

Interviews were conducted with 20 industry experts involved in project planning to explore reasons for not following the current project planning process. This section discusses concerns raised during the interviews related to rail and road transport infrastructure projects and the current project planning process. Detailed findings are presented in Appendix- IX. Table 4.16 is produced based on the analysis of Appendix- IX, categorising interviewees' views into main causes.

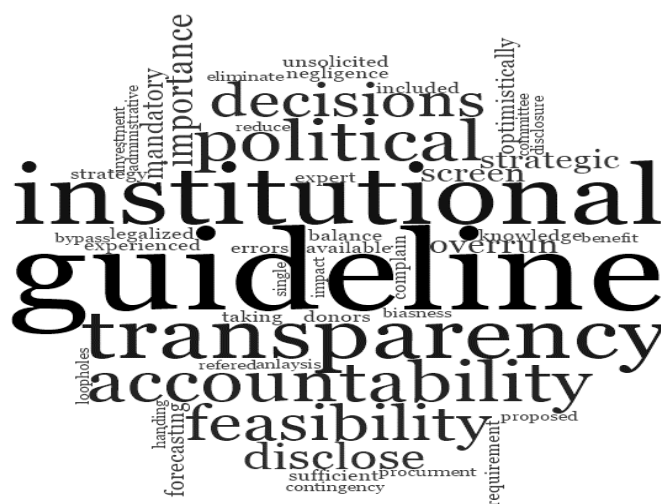


Figure 4.8: Main nodes identified from NVivo word cloud

Source: Author

Using the cloud feature of NVivo software, most frequently used words by professionals were identified to detect the main issues in the process. Based on the findings, the main nodes were developed for the analysis. Figure 4.8 showed the NVivo cloud is used to recognise the frequently used words by professionals.

After analysis of the NVivo cloud, issues in the project planning process were derived and grouped into seven (7) main nodes: unclear institutional role of NPD, loopholes in the guideline, lack of transparency of the process, political influence, poor screening of projects, change orders, planning fallacy. The main issues are discussed under each node, the number of reference points and the percentage of references are shown in Table 4.16 and Figure 4.9.

Table 4.16: Main nodes and child nodes from NVivo for interview data

| Main node<br>(Total percentage of reference)          | Child nodes                                         | References | Percentage of reference |
|-------------------------------------------------------|-----------------------------------------------------|------------|-------------------------|
| <b>Loopholes in the guideline<br/>(28.57%)</b>        | 1.1 Lack of direction to conduct feasibility study  | 13         | 9.29%                   |
|                                                       | 1.2 Direct Cabinet approval                         | 12         | 8.57%                   |
|                                                       | 1.3 First focus on funding source                   | 8          | 5.71%                   |
|                                                       | 1.4 Lack of post-completion review                  | 4          | 2.86%                   |
|                                                       | 1.5 One-point screening                             | 3          | 2.14%                   |
| <b>Unclear institutional role of NPD<br/>(22.14%)</b> | 2.1 No check and balances                           | 18         | 12.86%                  |
|                                                       | 2.2 Not accountable for the decisions made by staff | 13         | 9.29%                   |
| <b>Lack of transparency in process<br/>(17.14%)</b>   | 3.1 No system to inquire about projects             | 11         | 7.86%                   |
|                                                       | 3.2 No disclose on screening process of projects    | 7          | 5.00%                   |
|                                                       | 3.3 No disclose on link to development strategy     | 6          | 4.29%                   |
| <b>Political influence<br/>(14.29%)</b>               | 4.1 Influence on project evaluation                 | 12         | 8.57%                   |
|                                                       | 4.2 Corruption                                      | 8          | 5.71%                   |
| <b>Change orders<br/>(9.29%)</b>                      | 5.1 Scope changes after approval                    | 7          | 5.00%                   |
|                                                       | 5.2 Limited involvement of stakeholders             | 5          | 3.57%                   |
|                                                       | 5.3 Schedule changes                                | 1          | 0.71%                   |
| <b>Planning fallacy<br/>(5.17%)</b>                   | 6.1 Forecasting errors                              | 2          | 1.43%                   |
|                                                       | 6.2 Negligence of real requirement                  | 2          | 1.43%                   |
|                                                       | 6.3 Optimistic biases on design                     | 2          | 1.43%                   |
|                                                       | 6.4 Lack of contingency planning                    | 1          | 0.71%                   |
|                                                       | 6.5 Lack of knowledge on project                    | 1          | 0.71%                   |
| <b>Poor screening of projects<br/>(2.85%)</b>         | 7.1 Lack of expert committee to screen              | 3          | 2.14%                   |
|                                                       | 7.2 Lack of capacity of the staff                   | 1          | 0.71%                   |

Source: Author, based on NVivo output

NVivo analysis findings from Table 4.16 indicates that seven (7) main nodes are subdivided into twenty-two (22) child nodes. An in-depth review with the professional revealed the following:

1. Loopholes in the current guideline is the highest cause that influences the project planning process. Two main reasons for loopholes are lack of direction in the OM for project planning steps and the ability to get direct Cabinet approval for the direct contracting projects.
2. The second highest percentage of reference is for the unclear institutional role, NPD's current role is not established under a transparent system with checks and balances. Therefore, the employees of the NPD do not have the authority to make decisions at the stage of project screening.
3. Transparency of the decision making process is the third highest rank node. As indicated by the professional, the current system of the project screening process is not disclosed to the public.
4. Political influence, change orders, planning fallacy, and inadequate project screening are referred from the professionals consecutively as factors that impacted the decision making process.

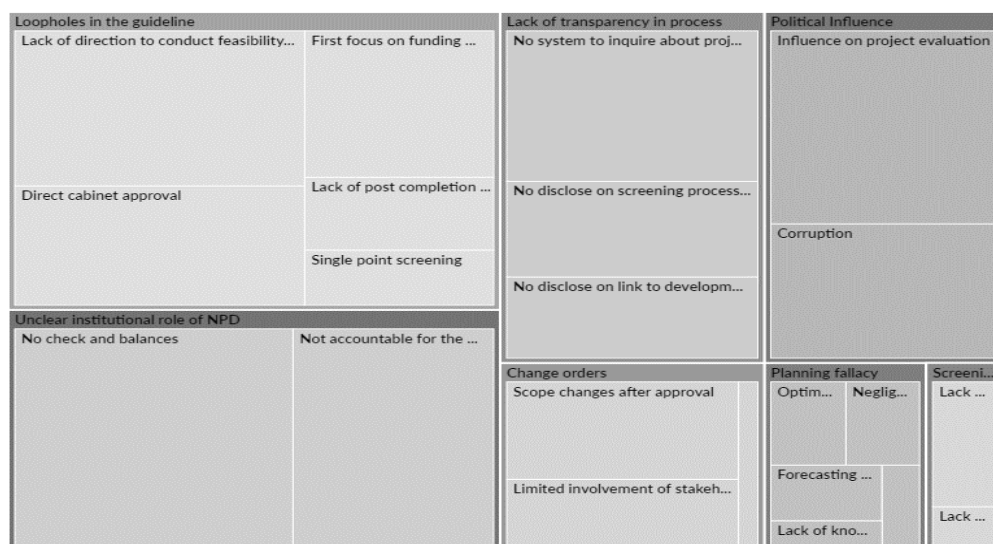


Figure 4.9: Level of responses to each factor affecting the project planning process.  
Source: Author, based on NVivo output

According to the secondary and primary data findings as summarised in Table 4.15, Table 4.16 and Figure 4.9 indicate that the current public sector capital investment project planning process has issues related to loopholes in the current process, unclear institutional role, lack of transparency of the process, and political influences. Figure 4.10 sums up the key findings from primary and secondary data and the leading causes that impacted the project planning process.

As discussed in Figure 4.10, the causes of the project planning process are mainly categorised into seven (7) causes.

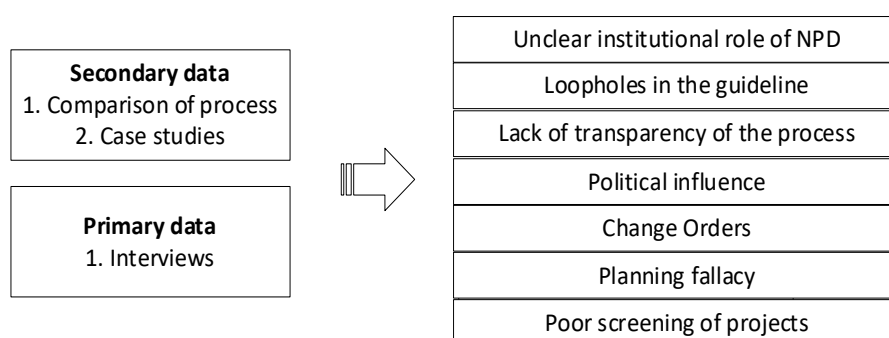


Figure 4.10: Main causes that bear impact on the project planning process

Source: Author

An in-depth analysis of the above causes was conducted from the why-why analysis to identify root causes.

#### 4.5.1 Root cause analysis on issues in public infrastructure investments

##### 4.5.1.1 The unclear institutional role of NPD

According to NVivo analysis, industry professionals have stated that 22.14% of references were related to the unclear institutional role performed by the NPD. The primary function of NPD is to screen the public sector capital investment project's feasibility and provide recommendations to the cabinet on approving the project. Nevertheless, in the current context, NPD cannot play an independent role during the process of project screening. In Sri Lanka, projects are not appropriately screened by NPD due to the unclear institutional role, and public servants are not accountable for

the decision at NPD. Due to this situation, resources are allocated to low priority or unaffordable projects in public investments.

There are no checks and balances in the current system, although there are guidelines and circulars to guide the decision-makers for project identification. These guidelines are not mandatory to follow, and no one can initiate legal action for not following the guidelines. Therefore, a better institutional arrangement is required to conduct an independent project planning and appraisal review. This is further explained from the following Figure 4.11:

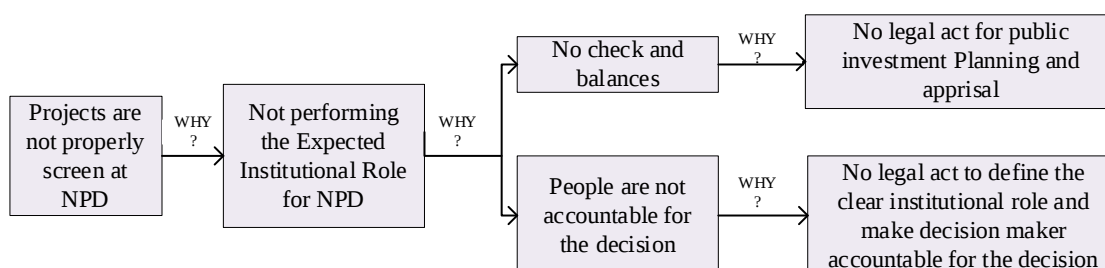


Figure 4. 11: Why-Why analysis of the projects are not appropriately screened

Source: Author

There is no “legislation” for NPD's public investment planning and appraisal to perform an independent role. For example, there is a National Environmental Protection and Management Act [252] for the environment, Protection and Sustainable Development Act [253] for the enforcement of policy and strategy for sustainable development. However, surprisingly there is no legislation for public investment management. Sri Lanka is following financial regulations (1992) for public finance management, OM (2019) and Circular No. MNPEA 02/2019 as the guideline for submitting development project proposals for public investments. All these guidelines do not provide enough authority to NPD to perform the expected role.

As discussed in Table 4.1, many countries are using separate independent institutions to evaluate public sector investment projects. Vietnam is a recent example. In 2014, they adopted a new law on public investment with the guidance of WB [187] to eliminate the issues in independent project evaluation and increase the accountability of the decision-makers. Similarly, India introduces a separate independent experts

committee [189] to evaluate large scale public investment projects. It is suggested to develop legislation to grant powers to a regulatory body to make better decision-making on capital investment projects conducted by the public sector in Sri Lanka. Introducing a regulatory body through an Act of Parliament creates a clearly defined institutional role and governance practices to reduce waste of resources and increase project screening success as this is a mandate by law [189], [254]. This creates accountability for decision making and may lead to independent project appraisal and selection, hence better selection of projects for the country [188], [239].

#### 4.5.1.2 Loopholes in guideline

NVivo Analysis results show that 28.57% of people referred to loopholes in the current guideline as an issue in the planning process. Experts mainly refer to the current OM as not providing enough direction to conduct a feasibility study. Figure 4.12 discussed further Why-Why analysis of the issue.

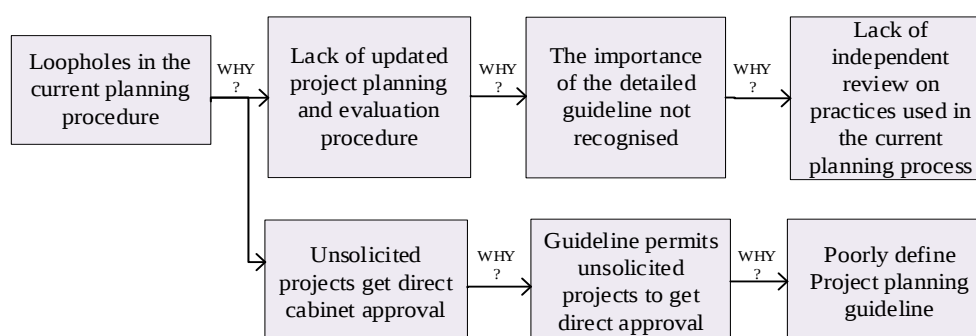


Figure 4.12: Why-Why analysis on loopholes in the current guideline

Source: Author

India did a review of the public sector project planning process during 2018-2019 with the National Institution for Transforming India Aayog [189]. They introduced several changes to the public capital investment procedure to improve efficiency and transparency. In 2013-2014 and 2017-2018, Vietnam reviewed the project planning and capital investment process with the help of WB [188]. It proposed a number of changes to the planning process to improve early analysis of the project concept and feasibility study. With time, a review of the project planning process is required to

update the guidelines with new practices. Sri Lanka also analysed the project planning process, and changes were introduced for the OM in 2019; with the comparison of SOPs and findings from the interviewees, there are loopholes in the OM, although it was introduced recently. Due to this, PPs do not get the required level of guidance for project planning. OM needs to be presented with a detailed step by step approach to project planning and appraisal.

Unsolicited projects are commonly used in many countries [117], [241], [255] for public sector capital investments, but accepting a project without proper planning and evaluation is the main loophole in the current project planning process used within Sri Lanka. Most of the projects deviate from the OM due to direct contracting. It is suggested to halt the evaluation of different financing options until the project gets approval for feasibility. In addition, the following practices are also recommended to be included in the project planning procedure: a cross-sectional analysis, identification of different alternatives, detailed risk analysis and post completion review on completed projects to bring forward the lessons learnt. As discussed above, most of the challenges can be overcome by introducing a well-guided, centralised, cohesive project planning system. Therefore, the project planning process needs to be developed with clearly defined steps to uphold project planning for accurate screening and selection.

#### 4.5.1.3 Lack of transparency of the process

17.14% Industry personnel said transparency in the current project planning process is low, as there is no system for the public to inquire about projects. Figure 4.13 illustrates the issue.

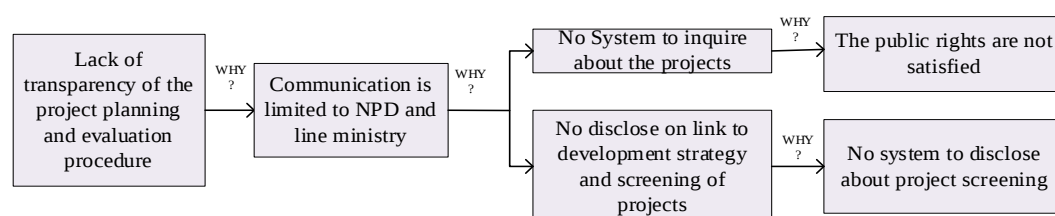


Figure 4.13: Why-Why analysis on lack of transparency of the process

Source: Author

In current context, most public sector capital investment projects are known to the public only at the implementation. All these projects are implemented with public money, and there should be a more transparent system for the public to inquire about the projects. According to the WB, transparency is essential to improve the productivity of project selection during the planning process [187]. In Hong Kong, public views are recorded at different stages of the project planning process to increase the transparency of the project and eliminate delays in the implementation stage [15]. It is the right of the public to find out how tax money is used to develop the country. Therefore, the introduction of a transparent system for the project planning process is essential. Meantime, enhancing the transparency of the procedure will improve the ability of decision-makers to arrive at a reasonably accurate decision [256].

#### **4.5.1.4 Political influence**

Public investments are vulnerable to political influence, primarily when public officials and politicians process information and make decisions for personal gains at the project planning stage [10]. Political influences on public capital investment projects are widely discussed in the literature, specifically for transport infrastructure investments [44], [93]. According to the NVivo analysis results, 14.29% of the person's references were given for political influence due to the corruption and influence on the planning process's decision-making.

As described by the NPD staff, the current project screening is influenced by the politicians. Due to this situation, NPD is unable to perform the role as an independent organisation. Politicians influence the government workers to approve the projects according to the politicians' favour. Direct contracting projects are highly impacted by corruption [55]. Since the funding organisations suggest direct contracting projects and the main motive is to make higher gains [241], the funding organisation tries to get approval for the projects by bribing politicians. Politicians influence the government servants to support projects by deviating from the OM process. Government servants do not have the authority to go against politicians [113], [257]. They perform the role according to political wishes as they are concerned about their survival, the analysis of ACCA (2018) stated that politicians influence 93% of times on making favourable

decisions [79]. Meantime in Sri Lanka, public sector capital investments allocate around 30% - 35% for the rail and road transport infrastructure (as discussed in figure 1.1), whereas the health (10% - 20%) and education sector (4% - 6%) get lesser benefits [24]–[26]. Countries with high corruption tend to invest less in education and health [16]. Therefore, a legally enforceable system is needed to improve the independence and professionalism of decision-makers, possibly enabling better screening and selection of the projects [257].

#### **4.5.1.5 Change orders**

According to the analysis, 9.29% of the professionals referred to change orders as an issue in the project planning process. Due to the limited involvement of the project's major stakeholders at the early stage of planning, many projects are suggested changes in the latter stages of construction. In many projects, limited stakeholders are involved during the early planning stage to reduce disputes in the planning. However, this made an additional cost of investment due to changes in the latter stages of construction [78]. Also, scope changes happen after approving the projects due to the influence of the different stakeholders (e.g.: political, villages), impact the cost of investment. Schedule changes also affect investment costs due to not investing in a project at the right time[258]. The proposed guideline involves stakeholders at an early stage of planning to reduce the issues during the latter part of the project. This may delay project implementation but reduce distractions during the implementation stage [187].

#### **4.5.1.6 Planning fallacy**

Based on NVivo analysis, professionals referred 5.71% issues are related to the planning fallacy. Forecasting errors of the projects are common in the current studies. Since planners make predictions from the wrong estimates. in the meantime, the planners' optimistic biases could also adversely impact over-estimations of benefits and under-estimation of costs of investments [259], [260]. Finally, the planners' actions lead to investing in projects that could be considered white elephants. According to Figure 2.1 in the literature review, planning fallacy has become the top-ranked cause of capital deployment inefficiencies. Post project reviews indicated the

planning fallacy as a cause of inefficiency. There can be several hidden other factors that influence the planning fallacy at the phase of planning.

Moreover, lack of contingency planning, negligence of situation and actual requirement also influence the planning errors of the projects. Lack of knowledge and capacity of internal staff also increase the planning errors in the current system. Therefore, NPD needs to thoroughly screen the projects and provide detailed guideline to reduce planning mistakes.

#### **4.5.1.7 Poor screening of projects**

Inadequate screening of projects has become another issue (2.85%) that impacted the project planning process of the country. The internal staff of NPD conducts current screening, and it is doubtful whether the team's capacity is sufficient. The professionals explain that NPD does not have enough internal resources to analyse road and rail transport infrastructure investment projects. Also, no expert panel participates in the screening of the project. As a result, the quality of recommendations given by the NPD is questionable. Therefore, NPD needs to look for external experts' support rather than focusing on internal staff. Meantime internal staff capacity needs to be developed. Until the development of internal teams' ability, it is suggested to appoint an external committee to screen and approve the projects [21], [188].

### **4.6 Summary**

Chapter 4 discussed implications identified in the public sector capital investment project planning process in Sri Lanka. Detailed investigation on OM, case studies and causes analysis from in-depth interviews were used to identify the implications in the current project planning process. Loopholes in the OM, high cost of investment for direct contracting projects, inability to perform the expected institutional role by NPD, lack of transparency in the project screening, and political influence are identified as the leading implications in the project planning process. Root cause analysis of implications indicates the importance of establishing an efficient and transparent project planning system to enhance the capital deployment efficiency of public sector capital investments.

## CHAPTER 5: SUGGESTIONS TO IMPROVE THE PROJECT PLANNING PROCESS FOR PUBLIC SECTOR CAPITAL INVESTMENTS IN SRI LANKA

### 5.1 Introduction

This chapter suggests an integrated approach to enhance the capital deployment efficacy of the project planning process for public infrastructure investments in Sri Lanka. Issues were discussed in chapter 4, and mitigation methods are discussed in detail under this chapter.

### 5.2 Suggestions to Improve the Project Planning Process

Figure 5.1 discusses the suggested approach for enhancing the project planning and appraisal process. These suggestions are discussed under three main sections: institutional arrangement, a comprehensive central guideline for the project planning process and transparency for the project planning process.

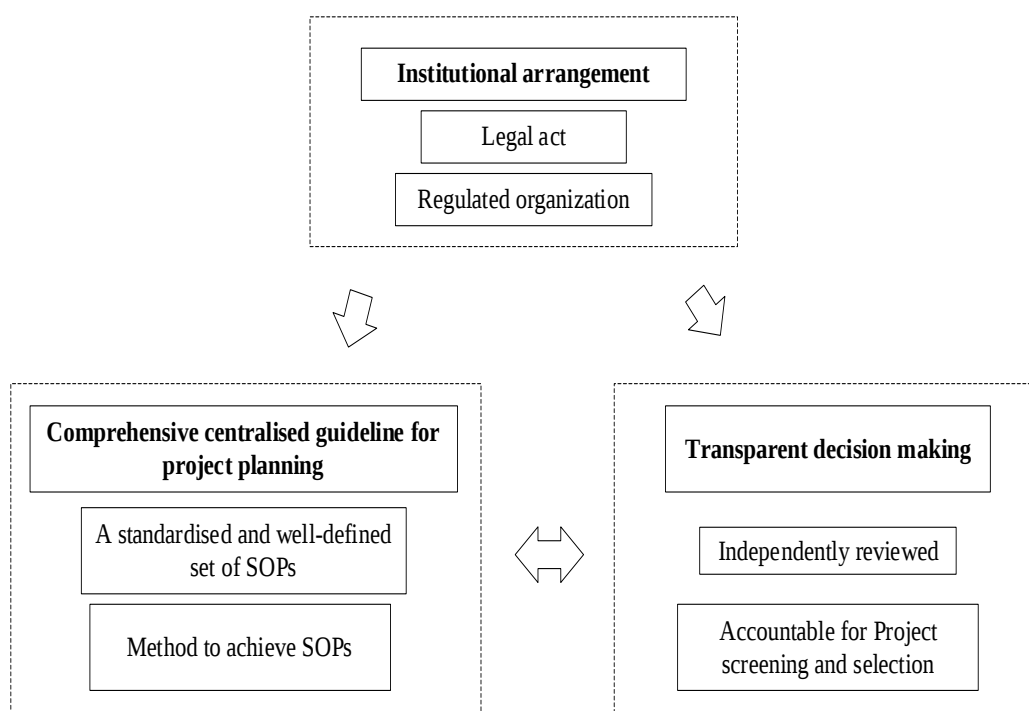


Figure 5.1: Integrated approach to improve the project planning process

Source: Author

The main steps of the proposed framework are as follows.

- **Institutional arrangement:** Propose to draft and enact an Act of Parliament to delegate the powers and responsibilities of the project planning process to an independent organisation. Moreover, this arrangement makes decision-makers accountable for their actions. As discussed in Chapter 4, the current institutional arrangement does not provide enough authority for NPD to play the expected role. The proposed arrangement provides authority to play an independent role.
- **Comprehensive centralised guideline for proposed planning process:** Issue a guideline to ensure that project planning follows a clear, consistent set of procedures and techniques. This process helps to reduce loopholes in the current guideline, plan fallacies, and reduce the number of change orders during the project implementation.
- **Transparent decision-making:** Establish a system to scrutinise and review the projects approval process. As discussed in Chapter 4, the screened projects and the project's importance are not disclosed to the public until the point of implementation. Therefore, the public is not in a position to inquire about the projects. The proposed system enables the public to inquire about the projects, which also implicitly reduces the political influence due to public vigilance.

### **5.2.1 Institutional arrangement**

A formal arrangement for public investment management is vital for the independence and transparency of capital intensive project evaluation [260], [261]. As discussed in Chapter 4, currently, NPD does not enjoy any operational freedom provided by law. It is suggested to establish NPD as an independent body by enhancing its professional freedom, transparency, and accountability. The recommended independent body should have decision making authority that should be prevented from political influences. More authority should be provided to the current organisation (NPD), converting it to, say, a “National Project Appraisal Authority (NPAA)”. It may be emphasised here that the term “Authority” should not signify the organisational

structure currently operating with that name tag in Sri Lanka but the “professional decision making authority” of the proposed organisation.

This independent institution will require a legislative enactment by passing an Act of Parliament on “Public Investment Projects Planning and Appraisal”. NPAA is to be a separate independent body, and its primary functions would be to:

- formulate fair and efficient policies, guidelines, and procedures for project planning and screening to ensure value for public investments
- facilitate the implementation of project planning and appraisal through standardisation, monitoring and capacity development
- ensure transparent project planning and screening for all large scale public sector capital investment projects
- ensure that violation of SOPs/practices or guidelines entail criminal offence that the general public can take legal action against all responsible parties, including public servants
- ensure that all projects follow the project planning and appraisal procedure before looking for sources of finance.
- ensure projects cannot get funds from the budget without following the project planning procedure
- ensure opportunities for meaningful public participation during the development and appraisal phases.

#### **5.2.2 Comprehensive centralised guideline for the project planning process**

The primary purpose of the OM is to give clear guidance about the project planning process to PP. The proposed project planning process guides the PP to follow a step by step planning approach. It is suggested to shift from one-step approval to a three-step process. Initiation, pre-feasibility, and FEDD & feasibility will be the three steps of the project planning process that is also used in the 3 stage model introduced in

1995 [204]. Figure 5.2 and Figure 5.3 show steps, and Table 5.1 explains SOPs with further details.

Stages and essential steps are discussed below:

#### *Stage 1: Initiation Stage*

This stage sets the foundation for decision-making in the latter stages of project planning [133]. The initiation stage focuses on defining the problem/need, setting objectives and scope with the involvement of major internal stakeholders (project proposing division and other directly related organisations). Initial Project Description (IPD) [21], [163] is developed based on the outcome of the analysis at this stage. IPD includes objectives of the project, impact assessment on quantitative measures and few qualitative measures based on the availability of information (economic, social, environmental), outcome, and output of the project [261]. It is suggested to submit IPD to NPAA to assess project scope, strategic importance, and contribution to the economy. Most countries evaluate the project at this stage to minimise the use of resources in the following stages of the planning process, which is not practising in the current project planning process in Sri Lanka. In the proposed process, NPAA will rank projects based on the strategic importance and prioritise at this stage [221].

It is suggested to conduct a clientele analysis (needs analysis of the project by comparing it with others) by NPAA to identify any duplication and overlaps between newly suggested projects or other ongoing projects. NPAA will have more information regarding ongoing and proposed projects. If required, PP can do a clientele analysis for micro and small scale projects after clearly defining the construction area since micro and small-scale projects may not be available within NPAA.

Based on the project evaluation, NPAA can accept or reject the project. If the project is accepted, NPAA will ask PP to conduct the pre-feasibility. Accepted projects can be published on the NPAA website and in newspapers to solicit public views. If there are any questions related to the project from the public, NPAA can forward them for PP's response. At an early stage, awareness about the project is a common practice

[93], [156] to mitigate project delays due to public influence after construction, which is not practised in Sri Lanka.

Meantime, NPAA appoints a Project Appraisal Committee (PAC) to evaluate the project at the pre-feasibility and feasibility stages to get an independent overview of the project. PAC consists of experts in project related fields. NPAA is responsible for maintaining a pool of experts from different fields and appoint them for the related project. NPAA can nominate a minimum of 3 and a maximum of 5 experts to the PAC. NPAA will be responsible for entering an agreement with appointed experts, stipulating that they cannot be involved in related project/s until the project feasibility is completed.

#### *Stage 2: Pre-feasibility Stage*

The second stage of the process is used to identify different options for addressing the need. Alternative identification is carried out for a wide range of possibilities under four topics: regulatory reform, governance reform, asset use reform, and capital investment [221]. However, the current OM direction is minimum to identify the vivid range of alternatives. Cost-benefit analysis, cost-effectiveness analysis and multi-criteria analysis could be used as techniques for evaluating different options.

Selected options will then be compared in terms of economic, social, and environmental advantages and disadvantages. The most preferred options will be further analysed with a preliminary design. Moreover, alternatives will be screened through risk assessment, availability of land, initial environmental impact, social impact assessment and economic assessment. Most suitable option will be reported to NPAA, including all rejected options, with reasons for rejection. NPAA will appraise the viability of the option and benchmark the estimated cost of investment with similar local and international project/s (international benchmarks). This comparison will enable NPAA to analyse the cost of investment of the project and get an overview of the reliability of estimates [119]. Meantime, NPAA may submit the pre-feasibility report to PAC and get the recommendations from the PAC experts. Based on these

PAC recommendations, NPAA approves PP to proceed with the public awareness programme.

As the last step, it is suggested to conduct a public awareness programme, get feedback on project implementation from the public and address their concerns. Finally, NPAA reviews the PAC recommendations and approves to move into the next stage after addressing the public issues.

### *Stage 3: FEDD and Feasibility Stage*

After establishing the project scope and approach in the above two stages, the PP's design team carries out FEDD after an in-depth analysis of the need. The PP's design team is responsible for segregating beneficial and non-beneficial functions in the project. Non-beneficial functions will be removed from the project design. Further, cost-optimised solutions are to be provided for the beneficial functions. Major stakeholders who are involved in this activity should discuss issues and suggest further improvements to the design. In the meantime, PP focuses on detailed economic, social, environmental assessment, sensitivity analysis and probabilistic risk assessment based on project cost and FEDD. It is suggested to use professional software (Acume risk, @RISK, etc.) to evaluate the risk of the project in more detail, which is not conducting in Sri Lanka for the public sector capital projects.

After completing detailed feasibility and FEDD, PP may submit the report to the NPAA for assessment and approval. First, the project is evaluated by PAC, which will provide recommendations to NPAA for final approval. In the current context, projects are only assessed by the internal staff of NPD, but the knowledge on the project appraisal is limited.

At the same time, NPAA will publish the project feasibility report on the website and open it to the general public for questioning the proposed project. PP is responsible for responding to public concerns and issues. Finally, NPAA assumes responsibility for the final project approval decision by analysing PAC recommendations and public concerns.

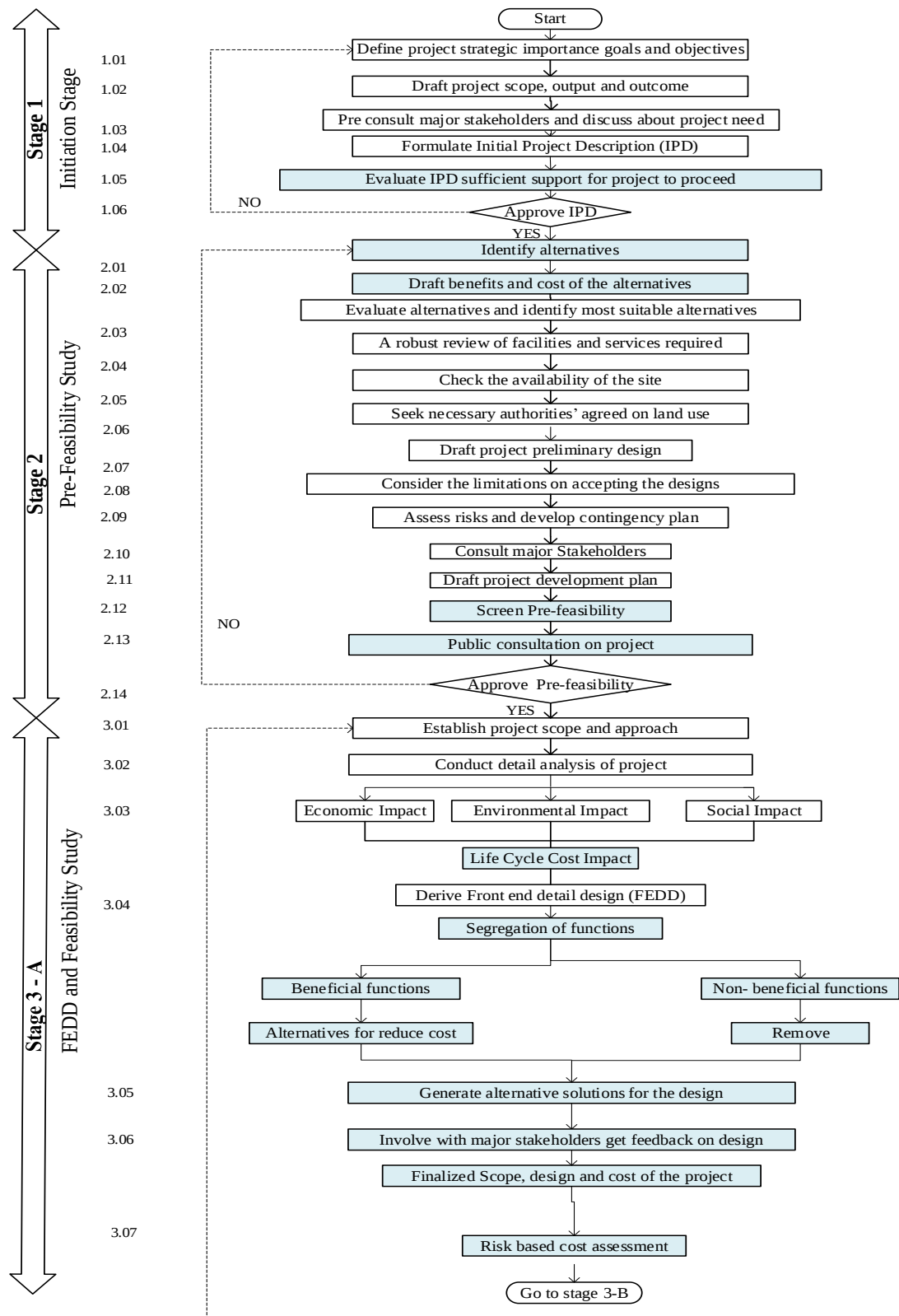


Figure 5. 2: Centralised guideline proposed for the planning process (Stage 1 to 3-A)

Source: Author

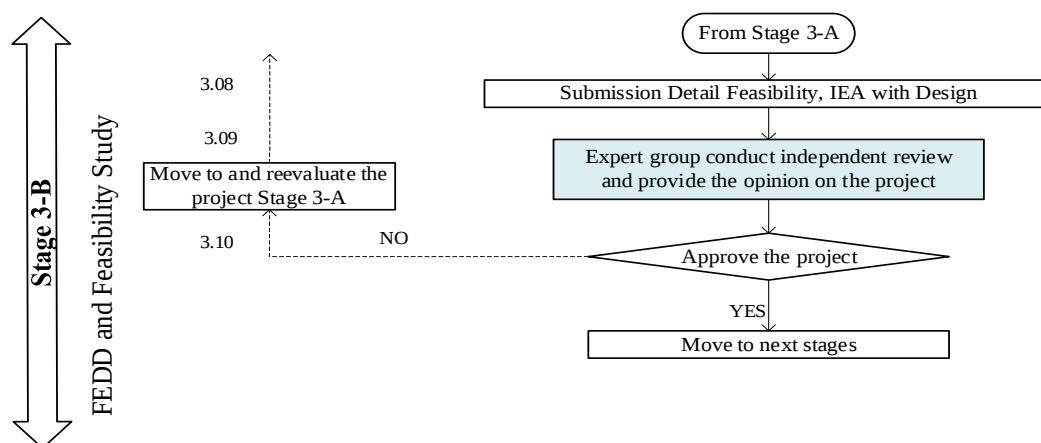


Figure 5. 3: Centralised guideline proposed for the planning process (Stage 3-B)

Source: Author

Table 5.1: SOPs of centralised guideline proposed for the project planning process

| Stage 1   | Initiation stage |                                                               |                                                                                                                                                                                                                                                                                                                    |            |
|-----------|------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Step      | Duty             | SOP                                                           | Method                                                                                                                                                                                                                                                                                                             | Time frame |
| Step 1.01 | PP               | Define project strategic importance, goals, and objectives    | Perform a needs analysis and evaluate contributions to the economic, social, and environmental development of the country/region                                                                                                                                                                                   | 1-2 months |
| Step 1.02 | PP               | Draft scope, output, and outcome of the projects              | Determine project's expected output and outcome and major and minor stakeholders involved in the project                                                                                                                                                                                                           | 1-2 months |
| Step 1.03 | PP               | Pre consult major stakeholders and refine steps 1.01 and 1.02 | Involve major stakeholders related to the project, discuss, and revise the discussion output from Step 1.01 and 1.02                                                                                                                                                                                               | 1-2 months |
| Step 1.04 | PP               | Formulate Initial Project Description (IPD)                   | Draw up a broad overview of the project scope, objectives, impact (economic, social, environment), outcome and output                                                                                                                                                                                              | 1-2 months |
| Step 1.05 | NPAA             | Evaluate IPD - sufficient support to proceed                  | Compare project scope, contribution to the sector and economy, cross-sectional analysis with other ongoing projects                                                                                                                                                                                                | 1-2 months |
| Step 1.06 | NPAA             | Approve IPD and appoint a Project Appraisal Committee (PAC)   | Suggest improvements and approve the PP to conduct a pre-feasibility study<br>If the project is recommended for pre-feasibility, publish the IDP on the NPAA website and newspapers to get the public view and provide an opportunity to question about the project.<br>Appoint a PAC and inform about the project | 1-2 months |

| Stage 2   | Pre-feasibility study |                                                                         |                                                                                                                                                                                                                                       |              |
|-----------|-----------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Step      | Duty                  | SOP                                                                     | Method                                                                                                                                                                                                                                | Time frame   |
| Step 2.01 | PP                    | Identify alternatives                                                   | Identify a wide range of options (regulatory reform, governance reform, assets use reform and capital investment) to address the need proposed in IPD                                                                                 | 1-2 months   |
| Step 2.02 | PP                    | Analyse cost and benefits of alternatives                               | Identify costs and benefits of each alternative<br>If required, obtain further information on economic impact, social impact assessment, environmental impact assessment                                                              | 1-2 months   |
| Step 2.03 | PP                    | Evaluate the alternatives                                               | Compare alternatives and find the most preferable option (based on economic, social, and environmental advantages and conduct sensitivity analysis for the most preferable option)                                                    | 1-2 months   |
| Step 2.04 | PP                    | A robust review of facilities and services required                     | Develop a plan on facilities and services required (land acquisition, etc) and check their availability                                                                                                                               | 2-3 months   |
| Step 2.05 | PP                    | Check the availability of the site                                      | Check if approval for land acquisition has been secured                                                                                                                                                                               | 1-2 months   |
| Step 2.06 | PP                    | Seek approval for land use from authorities                             | Ensure appropriate zoning has been done or statutory land-use regulations have been followed and check delegated authorities' approval is needed on the land use                                                                      | 1 - 2 months |
| Step 2.07 | PP                    | Draft project preliminary design                                        | Develop the preliminary design for the selected alternatives                                                                                                                                                                          | 1-2 months   |
| Step 2.08 | PP                    | Consider the limitations on accepting the design                        | Evaluate different designs and identify best alternative/s; check for conflicts with ongoing and proposed projects in the selected project area                                                                                       | 1-2 months   |
| Step 2.09 | PP                    | Assess risks and contingency planning                                   | Work on the risk matrix and develop a contingency plan including appropriate persons responsible for managing and mitigating various risk                                                                                             | 1-2 months   |
| Step 2.10 | PP                    | Consult major stakeholders                                              | Discuss project alternatives and selection. Pre-evaluate possible impacts and costs of the project changes based on the cost-benefit analysis and risk analysis; obtain support from related stakeholders to manage and mitigate risk | 2-3 months   |
| Step 2.11 | PP                    | Draft project pre-feasibility, including all actions in pre-feasibility | Based on the findings from the alternative analysis, design, and risk analysis, draft a report and submit it to the NPAA                                                                                                              | 1-2 months   |

| Stage 2   | Pre-feasibility study |                                    |                                                                                                                                                                                                                                                            |            |
|-----------|-----------------------|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Step      | Duty                  | SOP                                | Method                                                                                                                                                                                                                                                     | Time frame |
| Step 2.12 | NPAA & PAC            | Evaluate Pre-feasibility           | Recheck viability of selected option and benchmark cost (local, international, or suggested contractor's projects implemented in other countries), the strategic importance of the selected alternative, and the impact on economic and social development | 1-2 months |
| Step 2.13 | NPAA & PP             | Public consultation on the project | Develop a promotional campaign to demonstrate project benefits to the public and get public feedback. Come up with solutions for public issues within the specific area.                                                                                   | 2-3 months |
| Step 2.14 | NPAA                  | Approve pre-feasibility            | Provide feedback and suggest conducting a feasibility study to PP                                                                                                                                                                                          | 1-2 months |

| Stage 3-A and 3-B | FEDD and Feasibility study |                                                                        |                                                                                                                                                                                |            |
|-------------------|----------------------------|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Step              | Duty                       | SOP                                                                    | Method                                                                                                                                                                         | Time frame |
| Step 3.01         | PP                         | Establish project scope and approach                                   | Prepare scope and approach for the project based on outcomes of the above activities                                                                                           | 1 week     |
| Step 3.02         | PP                         | Conduct detail analysis                                                | Conduct detailed financial analysis, Environment Impact Assessment (EIA), Social Impact Assessment, Economic Impact Assessment, Technical Impact Assessment and LCC Assessment | 3-4 months |
| Step 3.03         | PP                         | Derive Front End Detail Design (FEDD) including all required functions | Conduct in-depth analysis of needs and develop the detailed design based on the project brief                                                                                  | 3-6 months |
| Step 3.04         | PP                         | Segregation of functions                                               | Segregate beneficial and non-beneficial functions and eliminate the latter.                                                                                                    | 2-4 months |
| Step 3.05         | PP                         | Generate alternative solutions for the design                          | Generate creative ideas to complete construction at a lower cost than estimated and identify possible areas to use sustainable resources.                                      | 2-3 months |
| Step 3.06         | PP                         | Involve with the major stakeholders and get feedback on the design     | Assess the facilities' practicability, viability, and justification; ensure compliance with the economic, social, and environmental impact assessment.                         | 2-3 months |
| Step 3.07         | PP                         | Risk-based cost assessment                                             | Detailed risk assessment of project cost and probabilistic risk-based cost estimates                                                                                           | 1-2 months |
| Step 3.08         | PP                         | Submission of detail feasibility                                       | Submit a detailed feasibility study and FEDD to NPAA for in-depth assessment.                                                                                                  | 1-2 months |

| Stage 3-A and 3-B | FEDD and Feasibility study |                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |
|-------------------|----------------------------|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Step              | Duty                       | SOP                                                            | Method                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Time frame |
| Step 3.09         | NPAA & PAC                 | Evaluate the project by NPAA and expert group appointed in PAC | Publish feasibility report in NPAA website and open for public comments<br>Perform a detailed review of project impact and suggest improvements if required: <ul style="list-style-type: none"> <li>○ Strategic importance and significance of the project</li> <li>○ Impact on the economic development</li> <li>○ Environmental protection issues</li> <li>○ The scale of land acquisition, clearance, compensation</li> </ul> Amount of investment and risk associated with the investment | 3-4 months |
| Step 3.10         | NPAA                       | Approve the project                                            | Based on the suggestions, review the project, and approve the project                                                                                                                                                                                                                                                                                                                                                                                                                         | 1-2 months |

Note: Steps coloured in blue are suggested to fill the gaps in the current project planning process

Source: Author

### *Post completion review*

Public capital investments take time to deliver the expected economic gains [221]; therefore, it is suggested to conduct a review in three to five years after completing the project, which is not happening in the current context.

As an independent body, it is suggested for NPAA to conduct the post-completion review. Three main aspects need to be evaluated: whether the project has achieved its intended strategic objective, economic gains from the project, and how efficiently it has delivered against the budgeted cost of investment [140], [220], [221]. Finally, NPAA must share lessons learned for the benefit of future projects. Table 5.2 discusses the steps of the post-completion review.

Table 5.2: Post completion review

| Post completion review |                                  |                                                                                                                                 |            |
|------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------------|
| Duty                   | SOP                              | Method                                                                                                                          | Time frame |
| NPAA                   | Conduct a post-completion review | Evaluate project performance three-five years after project completion (strategic fit, economic merit, and delivery efficiency) | 2-4 months |

Source: Author

The above proposed planning process was refined through consultation with industry experts. The primary purpose of these consultations was to receive industry experts' feedback on content, methods, time frame, and structure of the process to check the practical applicability of the proposed project planning process within Sri Lanka.

A questionnaire survey was distributed among eight (8) planning experts representing NPD, RDA, SLR and CECB to validate the proposed process and the survey was conducted twice. After getting the feedback from experts in the first round, re-developed the procedure and sent it for the second assessment. The questionnaire survey results are shown in Table 5.3; the mean and standard deviations (SD) of the three segments (action, methods, and time frame) were analysed in different stages. Significant improvements in the mean and SDs were recorded in the second round for all steps.

Table 5.3: Results of the process action, method, and time frame analysis survey

| Stage                                       | Mean<br>SD | Action                   |                          | Method                   |                          | Timeframe                |                          |
|---------------------------------------------|------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                                             |            | 1 <sup>st</sup><br>round | 2 <sup>nd</sup><br>round | 1 <sup>st</sup><br>round | 2 <sup>nd</sup><br>round | 1 <sup>st</sup><br>round | 2 <sup>nd</sup><br>round |
| Stage 1: Initiation                         | Mean       | 4.31                     | 4.45                     | 3.78                     | 4.01                     | 3.68                     | 3.91                     |
|                                             | SD         | 0.74                     | 0.66                     | 0.58                     | 0.62                     | 0.85                     | 0.71                     |
| Stage 2: Pre-feasibility study              | Mean       | 4.20                     | 4.50                     | 3.71                     | 3.95                     | 3.79                     | 4.00                     |
|                                             | SD         | 0.85                     | 0.79                     | 0.85                     | 0.65                     | 0.92                     | 0.69                     |
| Stage 3: Feasibility                        | Mean       | 4.04                     |                          | 3.28                     |                          | 3.36                     |                          |
|                                             | SD         | 0.92                     |                          | 0.82                     |                          | 1.06                     |                          |
| Stage 4: FEDD                               | Mean       | 4.18                     |                          | 4.04                     |                          | 3.81                     |                          |
|                                             | SD         | 0.77                     |                          | 0.65                     |                          | 0.92                     |                          |
| Stage 3-A & 3-B: FEDD and feasibility study | Mean       |                          | 4.00                     |                          | 3.89                     |                          | 3.93                     |
|                                             | SD         |                          | 0.77                     |                          | 0.62                     |                          | 0.59                     |
| Post completion review                      | Mean       | 3.79                     | 4.27                     | 3.79                     | 4.14                     | 4.00                     | 4.36                     |
|                                             | SD         | 1.07                     | 0.63                     | 1.07                     | 0.56                     | 1.07                     | 0.66                     |

Note: Stage 3A&B is suggested instead of Stage 3 and Stage 4 as proposed by the experts; the mean scores for the first-round survey are not available.

Source: Author

Based on experts' views in the first round, the following adjustments were carried out in the process:

1. Involving major stakeholders (PP internal stakeholders and affected stakeholders related to other ministries) at the feasibility and FEDD stages for risk assessment.

2. Granting final approval for the project after assessing feasibility and FEDD. Until this approval is completed, PP cannot proceed to find financing sources.
3. Combining feasibility study and FEDD, as the design is mandatory for the analysis of the project cost.

Undertake public consultation for specific areas on the project as the last step of the pre-feasibility stage. According to experts, this is more practical in the local context than doing consultations at the beginning (as in other countries).

### **5.2.3 Transparent decision making process**

#### **5.2.3.1 Interactive e-system**

It is suggested to develop an e-system to improve the efficacy, transparency and accuracy of screening and selection for national projects. Such an interactive system is not utilised in the current project planning process. The following steps are proposed to be followed thereafter:

1. Publish project in the e-system,
2. Open a platform to question about the projects for the public,
3. Publish final decisions of projects with recommendations for the public view, thus increasing the transparency of the decision.

### **5.3 Summary**

One critical success factor of capital deployment efficacy is that it follows a stepwise process to evaluate public investments [150], [194]. As discussed, the current process in Sri Lanka and other countries has significant differences in institutional arrangements, the process, and the execution method. Hence, there has been a noticeable impact on the project planning, as evidenced in Chapter 4. This chapter supports building a new approach for project planning procedures. Essential elements discussed in the chapter is depicted in Table 5.4. Once this procedure is implemented, it is expected to improve public sector investment projects capital efficiency.

Table 5.4: Summary of suggested initiatives with cross-references

| Initiatives                                                                                                                                                                            | Suggestions                                                                                                                                                                                                                                                            | Cross-reference                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Institutional Reforms:<br>To ensure greater autonomy and authority to Project planning and appraisal procedure to guarantee the professional decision making on public investments. | (a) An autonomous and independent "National Project Appraisal Authority",<br>(b) A new Act of Parliament empowers the new authority and the appraisal/decision-making process and urges the citizens to seek judicial intervention whenever the procedure is violated. | <ul style="list-style-type: none"> <li>• Australia, Germany, Hong Kong, Canada, and Vietnam have separate independent bodies, developed under an Act to screen the projects, discussed in Table 4.1.</li> <li>• Importance of the segregation of duty of project appraisal is discussed in Sri Lankan context [212]</li> <li>• Financial Regulations [28] is the main document presently used for capital allocation decisions, but this is not a process guided and empowered by an Act of Parliament.</li> </ul>                                                                                                                                                                                                                                                                                                         |
| 2. Transparent procedure enables public scrutiny of development projects, their structure, costs, financing mechanisms, and intended benefits.                                         | Enabling the public to scrutinise project development, appraisal and decision making processes and empowering them to seek judicial intervention if any irregularity or violation of procedure is observed.                                                            | <ul style="list-style-type: none"> <li>• In Canada, people can go to court for violating the procedure. Further, if the public has any issue related to the project which is unable to resolve at the initial stage public can go to court. Until the court decision, PP cannot start the project [243].</li> <li>• In Hong Kong, the public can inquire about the projects, and the project screening process is transparent to the public. Therefore, the public involvement at the planning stage is high [115], [162].</li> <li>• In Sri Lanka, only the Environmental Assessment procedure [252] is subject to public scrutiny (under National Environmental Act, No. 47 of 1980). This does not cover other aspects associated with planning, appraisal, and decision-making regarding public investment.</li> </ul> |
| 3. The centralised new guideline, including SOPs three-staged procedure                                                                                                                | A new Three-Stage Project Development and Appraisal Procedure was introduced to be overseen by the NPAA, guided by the newly proposed Act.                                                                                                                             | <ul style="list-style-type: none"> <li>• This is suggested under the 3 stage model introduced by Gunaruwan [204]. Canada, Australia, Hong Kong, and Germany are also following the three-stage process for project screening.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Stage 1: Initiation stage                                                                                                                                                              | (a) PP and line Ministry conceive and develop projects, and NPAA preliminarily screens projects                                                                                                                                                                        | <ul style="list-style-type: none"> <li>• Canada, Germany, Hong Kong, and Australia screen the project's strategic importance at the initiation stage before moving to the project in-depth analysis by following pre-feasibility and feasibility stages [11], [240].</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                                                                                                                        | (b) Clientele analysis by NPAA                                                                                                                                                                                                                                         | <ul style="list-style-type: none"> <li>• Analyse project need with the suggested and ongoing projects to reduce conflicts during implementation and waste of resources. OM [206] guides to conduct clientele analysis by the PP. The new guideline suggests to conduct clientele analysis by NPAA as they have information on all ongoing and suggested projects, which PP may not be aware of. This is practiced in Australia, Canada, Vietnam [221].</li> </ul>                                                                                                                                                                                                                                                                                                                                                          |

| Initiatives                                | Suggestions                                                                                                                                                                                          | Cross-reference                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Stage 2: Pre-feasibility stage</i>      | (a)PP and line Ministry conceive and develop projects and NPAA screens projects at the pre-feasibility stage                                                                                         | <ul style="list-style-type: none"> <li>• Canada, Germany, Hong Kong, Australia, India and Vietnam screen the strategic importance and alternatives of the project before the feasibility study of the project [11], [240].</li> </ul>                                                                                                                                                                                                                                                                    |
|                                            | (b)PP to identify a wider range of alternatives and perceive their relevant costs and benefit                                                                                                        | <ul style="list-style-type: none"> <li>• Australia, India, Vietnam introduced different options to identify cost and non-cost based alternatives [221].</li> </ul>                                                                                                                                                                                                                                                                                                                                       |
|                                            | (c)PP, Line Ministry and the NPAA to benchmark project cost estimates using comparative local and international norms/standards                                                                      | <ul style="list-style-type: none"> <li>• Suggested to benchmark cost with local and international projects when screening at NPAA. This is applied in Vietnam to eliminate projects with over or under valuation (Vietnam News Agency 2001).</li> <li>• Gunaruwan (1995) suggested that no project should be allowed to be included in the "Project Pipeline" unless the NPD has granted Stage-II clearance.</li> </ul>                                                                                  |
| <i>Stage 3: FEDD and Feasibility stage</i> | (a)PP and line Ministry conceive and develop projects, and NPAA screens projects at the FEDD and feasibility stage                                                                                   | <ul style="list-style-type: none"> <li>• This stage is suggested by OM, but direct contracting projects can take direct cabinet approval [244] without following any of the above steps.</li> <li>• Gunaruwan (1995) suggested financing through consolidated Fund at least until the completion of the pre-feasibility stage [204]. The new Act proposed as a result of this study is intended to compel searching for financing options after completing the project approval at Stage III.</li> </ul> |
|                                            |                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>• Also insisted that projects should not be included in the "Public Investment Programme" (PIP), and budgets should not be voted unless and until NPD finally approves the project after State-III appraisal [204].</li> </ul>                                                                                                                                                                                                                                    |
|                                            | (b)Detail analysis of probabilistic based risk and segregation of beneficial and non-beneficial functions of the design                                                                              | <ul style="list-style-type: none"> <li>• Australia, Hong Kong suggested conducting a detailed analysis of the risk of the project using software and applying value engineering concepts to reduce the cost of investment from the analysis of project design [161], [201], [239].</li> </ul>                                                                                                                                                                                                            |
|                                            | (c)Involve a group of external experts to screen the projects at pre-feasibility and feasibility stages, and NPAA to make the final decision based on the experts' recommendations and public views. | <ul style="list-style-type: none"> <li>• A similar type of suggestion is included in the FR but currently not followed by the NPD [28].</li> <li>• India used a separate expertise group to screen projects [238].</li> </ul>                                                                                                                                                                                                                                                                            |
| <i>Post Completion review</i>              | Proposed to conduct Post-completion review by NPAA                                                                                                                                                   | <ul style="list-style-type: none"> <li>• Post completion review is suggested under [204] three-stage model. But currently not in practice.</li> </ul>                                                                                                                                                                                                                                                                                                                                                    |

Source: Author

## **CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS**

Chapters 4 and 5 discussed the findings of this research on the gaps and issues in the current project planning process in Sri Lanka and made suggestions for improvements. This chapter concludes this study by underscoring its contribution to existing literature and providing recommendations based on its analysis of the current project planning process.

### **6.1 Summary and Conclusion**

As specified in the scope and objectives, this research suggested improvements to the current project planning process with the expectation of minimising gaps and issues.

Several actions were undertaken to answer the research questions:

Chapter 4: The primary research objectives were identifying SOPs and the gaps and issues in the project planning process. As the first step, the capital efficiency in selected countries (Australia, Canada, Germany, Hong Kong, India, Vietnam, and Sri Lanka) was measured based on ICOR. ICOR values of Germany, Canada, Australia, Hong Kong, India, Vietnam indicated better performance than Sri Lanka's. Policies and project planning processes adopted in these countries were identified through the literature review. Analysis of the legislation and policies revealed that almost all selected countries except India and Sri Lanka were using legislation for their public investment management process.

SOPs used for the project planning process were identified from the literature review. Then, the SOPs and project planning processes in selected countries (Australia, Canada, Germany, Hong Kong, India, Vietnam, and Sri Lanka) were compared. The comparison revealed that Australia, Canada, Germany, and Hong Kong follow all identified SOPs. India and Vietnam were rated lower than the other four countries due to a lack of screening projects at the point of needs analysis. Sri Lanka's average rating was lower than that of all other countries.

Furthermore, analysis was conducted to identify Sri Lanka's OM and actual process practices (need identification, pre-feasibility, and feasibility). Sri Lanka's OM and real

context were evaluated against the SOPs identified from selected countries.

Findings from the comparison revealed that Sri Lanka was not conducting project screening for need identification and pre-feasibility. PP develops the project without due assessment until the feasibility study is submitted to NPD for screening. Further comparison with SOPs in other countries revealed that alternative analysis, probabilistic risk analysis, design evaluation and post-completion review were also not conducted in Sri Lanka.

Findings from case analyses and interviews revealed other issues pertaining to the current planning process. Most projects had not gone through the steps of the project planning process in Sri Lanka. Direct contracting projects got direct approval from the Cabinet, bypassing the direction of the NPD.

Further analysis was conducted by calculating the cost of investment on road and rail projects by estimating the average percentage of savings of the selected projects. This was calculated by comparing selected projects against others that duly followed the current project planning process. Findings indicated that if the planning process was followed, the cost incurred would have been lower. This confirmed that the projects implemented without proper planning consumed increased capital investment.

Analysis of causes specific to the planning phase was conducted based on interviews with key planning personnel. NVivo software was used to analyse interviews. Results obtained from the interviews were analysed by categorising them into seven main causes. Finally, all identified gaps and issues were further discussed through a why-why analysis. Remedial actions were suggested to improve the authority of institutions, increase the transparency of decision-making, and reduce loopholes in guidelines.

Chapter 5: The last research question was to suggest improvements to the planning process to minimise issues and gaps.

Improvements for a better institutional arrangement was proposed by an Act of Parliament to institutionalise the procedure and establish an independent body.

Further, to increase the transparency of decision making within the institution, it was suggested to introduce an e-system for the public to inquire about projects.

Centralised guideline was proposed including SOPs for evaluating projects. This has three stages: project appraisal: initiation, pre-feasibility, and FEDD and feasibility.

The suggested stages of the project planning process were:

- Stage 1 - Initiation: Assessment of initial project description and clientele analysis followed by approval to move into the pre-feasibility stage.
- Stage 2 - Pre-feasibility: Suggest a range of alternatives rather than selecting them ad-hoc; evaluate the suggested alternatives and verify the cost estimation accuracy by comparing with local and international projects and survey public issues related to the project.
- Stage 3 - FEDD and Feasibility: Probabilistic risk-based analysis, LCC, design analysis by segregating essential and non-essential functions.

After implementation, a post-completion review is to be conducted to evaluate the extent to which project objectives have been achieved. It is suggested to conduct this review three to five years after project completion. NPAA must examine whether the project has achieved the expected objectives and carry forward the lessons learned for future projects.

Finally, industry experts validated the above project planning process, and checked its applicability in the local context. This was conducted in two rounds. In the first round, suggestions were captured. In the second round, suggestions were included in the process and referred to experts for their views.

The suggested steps/process may be "adjusted and adapted" as appropriate to each country, considering their conjunctural, contextual and socio-political realities. At the same time, the validity of the essential "directions for improvement" remains intact and unchanged regardless of the country and region.

## 6.2 Originality and Contribution

This study contributed to the existing body of knowledge by analysing gaps and issues in the current project planning process and suggesting actions to minimise identified issues.

***Implications for the current project planning procedure in Sri Lanka:*** Comparison with international SOPs, case studies and causality analysis revealed issues in the project planning process. Three main issues were that (i) projects were not adequately screened at NPD and did not strictly follow planning guidelines due to political influence, lack of accountability among decision-makers and absence of checks and balances in the system, (ii) the current project planning process lacked transparency since project approval was communicated only between the NPD and line ministry, (iii) the guidelines had loopholes in when compared with SOPs used in other countries. These are the critical root causes that adversely affect the current project planning process in Sri Lanka.

***Presenting an integrated approach to reduce gaps and issues in the public sector capital investment project planning process:*** The proposed integrated approach for the project planning process was presented to reduce these weaknesses of public investments. This approach suggests improving institutional authority, transparency of decisions, and clarity of guidelines for project planning. Applying this newly developed approach would lead to better planning and screening of projects in their early stages.

## 6.3 Limitations of the Research

There were several limitations to this study. Reasonable efforts were made to reduce their impact and to generalise the results of this study.

***Data limitation:*** Information related to SOPs are selected from six countries. Therefore, SOPs that enhance the capital deployment efficiency of a project in other countries have been omitted.

***Focus was only on rail and road transport infrastructure investments:*** Data collection and analysis on issues pertaining to the project planning process were specific to the rail and road transport infrastructure investment projects in Sri Lanka.

There was no previous local data related to track laying for comparison of the railway track construction cost. So, data were collected from the WB and ADB databases. These projects are differed in features (gauge, terrain, rolling stock, etc.), but these differences were considered insignificant for comparison purposes. Cost conversion was based on research conducted in Europe, where labour cost allocated was 20%, and the material cost stood at 80%. Since labour cost is high in European countries, these calculations may have over-valued labour cost in Sri Lanka.

***Evolution of project planning process:*** The evolution of the project planning process was studied from 1995 onwards due to the unavailability of past data.

***Proposed project planning process applicable to Sri Lanka:*** The proposed planning process was amended to suit the local context. Therefore, the suggested flow may not necessarily be applicable to other countries.

#### **6.4 Future Research**

Research in the following areas could be recommended to be conducted in the future:

1. The proposed planning process is based on a theoretical analysis of the literature. It is suggested to apply this process to an actual project and evaluate the project's capital efficiency.
2. Public involvement in decision making is an encouraging feature to improve transparency. It is proposed to develop a model to increase public participation in the decision-making process.
3. Extend the procedure to other project management stages such as funding, detailed cost estimation and BoQ preparation, call for bids, and construction and suggest improvements.

4. Examine KPIs to measure the actual impact on capital efficacy and suggest a model including tangible and intangible factors that would calculate a project's capital efficacy.
5. Analysis of other sectors receiving public investment checks the similarities and differences of implications in other sectors such as health and education.
6. Further adaptations that may be necessary to be introduced to the proposed mechanism, taking different socio-political, economic and conjunctural realities of Sri Lanka into consideration, could be recommended for future studies.

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## APPENDICES

Appendix I - Figure1.1: Budgeted investment on Rail and Road Infrastructure

|                                 | 2011           | 2012           | 2013           | 2014           | 2015           | 2016           | 2017            | 2018           | 2019           |
|---------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|----------------|----------------|
|                                 | Rs.<br>Million | Rs.<br>Million | Rs.<br>Million | Rs.<br>Million | Rs.<br>Million | Rs.<br>Million | Rs.<br>Million  | Rs.<br>Million | Rs.<br>Million |
| <b>Investments<br/>in Total</b> | <b>149102</b>  | <b>147407</b>  | <b>356469</b>  | <b>151821</b>  | <b>201098</b>  | <b>136415</b>  | <b>230748.8</b> | <b>230627</b>  | <b>209694</b>  |
| <b>Domestic</b>                 | <b>50221</b>   | <b>49389</b>   | <b>57427</b>   | <b>24962</b>   | <b>42085</b>   | <b>44372</b>   | <b>100230.8</b> | <b>111790</b>  | <b>99308</b>   |
| rail                            | 24995          | 26769          | 27917          | 11593          | 11939          | 22115          | 30740           | 31963          | 18455.2        |
| road                            | 25226          | 22620          | 29510          | 13369          | 30146          | 22257          | 69490.8         | 79827          | 80852.8        |
| <b>Foreign</b>                  | <b>98881</b>   | <b>98018</b>   | <b>299042</b>  | <b>126859</b>  | <b>159013</b>  | <b>92043</b>   | <b>130518</b>   | <b>118837</b>  | <b>110386</b>  |
| rail                            | 23028          | 25464          | 16800          | 39751          | 42315          | 22694          | 8190            | 11405          | 15029.2        |
| road                            | 75853          | 72554          | 282242         | 87108          | 116698         | 69349          | 122328          | 107432         | 95356.8        |

Source: [26], [27]

Appendix II - Figure 2.1: Pareto chart causes impacted on capital inefficacies

| Causes for inefficiencies | Number |
|---------------------------|--------|
| Planning fallacy          | 86     |
| Increase cost of inputs   | 75     |
| Procurement system issues | 59     |
| Scope and design changes  | 46     |
| Technical knowhow         | 41     |
| Political influence       | 33     |
| Land acquisition          | 20     |
| Weather shocks            | 11     |
| Capacity of contractor    | 5      |
| Macroeconomic conditions  | 3      |

Source : [75], [76]

## Questionnaire

Project Planning Process framework for major road and rail infrastructure projects evaluation and implementation

### Guidance on completion of the questionnaire

Thank you for participating in this research survey by making the best use of your expertise in providing a valuable opinion on formulating a comprehensive framework to guide the project's inception, feasibility, and post review of a project planning framework.

Please use the following steps to fill the questionnaire:

Step 1: Please go through the questionnaire to be filled – Page 1

Step 2: Study Appendix A -Draft steps of the Planning framework – Page 2 and 3

Step 3: Study the Appendix B – Planning framework steps in detail on the procedure, method, and timeframe – Page 4 to 6

Step 4: Please fill the questionnaire based on your findings given in step 2 and 3

Referring to the proposed framework, please give a score according to a 5-point Likert scale on the appropriateness of procedures and expected outcomes, evaluation methods, and the time frame in each stage of project development. You are encouraged to insert additional comments to enhance the framework.

| Please relate your answers to the 5-point scale, with 1 being “very inappropriate” and 5 being “very appropriate.”                                                                                                |                                                                                                                                    |                                                                                                                                    |                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <i>Project stage and key elements of capital efficiency enhancement framework</i>                                                                                                                                 | <i>Procedure</i>                                                                                                                   | <i>Method</i>                                                                                                                      | <i>Timeframe</i>                                                                                                                   |
| Stage 1: Inception<br>○ Evaluate IPD – Cross-sectional analysis<br>○ Public consultation on the project                                                                                                           | 5 4 3 2 1<br><input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/><br>Comments: | 5 4 3 2 1<br><input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/><br>Comments: | 5 4 3 2 1<br><input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/><br>Comments: |
| Stage 2: Pre-feasibility<br>○ Identify alternatives in a wide range<br>○ Evaluate alternatives                                                                                                                    | 5 4 3 2 1<br><input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/><br>Comments: | 5 4 3 2 1<br><input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/><br>Comments: | 5 4 3 2 1<br><input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/><br>Comments: |
| Stage 3: FEDD and Feasibility<br>○ Risk-based cost assessment<br>○ Determine different financing options<br>○ Evaluate the sensitivity of the project<br>○ Analysis of design functions and generate alternatives | 5 4 3 2 1<br><input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/><br>Comments: | 5 4 3 2 1<br><input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/><br>Comments: | 5 4 3 2 1<br><input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/><br>Comments: |
| Stage 8: Post completion review<br>○ Conduct post-completion review                                                                                                                                               | 5 4 3 2 1<br><input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/><br>Comments: | 5 4 3 2 1<br><input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/><br>Comments: | 5 4 3 2 1<br><input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/><br>Comments: |
|                                                                                                                                                                                                                   |                                                                                                                                    |                                                                                                                                    |                                                                                                                                    |

Appendix IVV - Figur4.1: Incremental Capital Output Ratio

| <b>Country</b> | <b>ICOR</b> |
|----------------|-------------|
| Germany        | 1.9         |
| Canada         | 2.89        |
| Hong Kong      | 3.21        |
| Australia      | 3.6         |
| India          | 3.9         |
| Vietnam        | 6.0         |
| Sri Lanka      | 6.2         |

Source : [60], [61], [180]

Appendix V - Cross country analysis

| Stage               | Step                                                                                                      | SOP                                                                                                                                                                           | Australia | Canada | Germany | Hong Kong | India | Sri Lanka | real context |
|---------------------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--------|---------|-----------|-------|-----------|--------------|
| Need identification | <b>Input</b><br>1.Preliminary recognition of the problem from:                                            | 1.1. Forecasting                                                                                                                                                              | 5         | 5      | 5       | 5         | 2.5   | 2.5       | 0            |
|                     |                                                                                                           | 1.2. Root cause analysis                                                                                                                                                      | 5         | 5      | 5       | 5         | 5     | 2.5       | 0            |
|                     | <b>Process</b><br>1. Analysis of the problem/need and identifying the real requirement:                   | 1.1 Analysis of strategic importance                                                                                                                                          | 5         | 5      | 5       | 5         | 5     | 2.5       | 2.5          |
|                     |                                                                                                           | 1.2 Quantify the cost of impact over the time by not addressing problem/need                                                                                                  | 5         | 5      | 5       | 5         | 5     | 2.5       | 0            |
|                     |                                                                                                           | 1.3 Identification of all stakeholders affected by problem/need                                                                                                               | 5         | 5      | 5       | 5         | 5     | 2.5       | 0            |
|                     |                                                                                                           | 1.4 Identify goals and objectives                                                                                                                                             | 5         | 5      | 5       | 5         | 5     | 5         | 2.5          |
|                     |                                                                                                           | 1.5 Identify output, outcome                                                                                                                                                  | 5         | 5      | 5       | 5         | 5     | 5         | 0            |
|                     | <b>Deliverables</b><br>1. Develop the Initial Project Description (IPD) of the project and rank the need: | 1.1 Evaluate whether project need is consistent with the strategic importance, goals and objectives of the sector and country strategy and rank the importance of the project | 5         | 5      | 5       | 5         | 5     | 2.5       | 0            |
|                     |                                                                                                           | 1.2 Cross-sectional analysis to identify conflicting issues with other projects                                                                                               | 5         | 5      | 5       | 5         | 5     | 2.5       | 0            |
|                     |                                                                                                           | 1.3 Public consultation on the project by publishing the project need                                                                                                         | 2.5       | 5      | 5       | 5         | 2.5   | 0         | 0            |

|                        |                                                                                       |                                                                             |                  |               |                |                  |              |                  |                     |
|------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------|---------------|----------------|------------------|--------------|------------------|---------------------|
|                        |                                                                                       | Approve the project to move into the next stage                             | 5                | 5             | 5              | 5                | 0            | 0                | 0                   |
|                        |                                                                                       |                                                                             | 4.7727273        | 5             | 5              | 5                | 4.0909091    | 2.5              | 0.45454545          |
|                        |                                                                                       |                                                                             | <b>Australia</b> | <b>Canada</b> | <b>Germany</b> | <b>Hong Kong</b> | <b>India</b> | <b>Sri Lanka</b> | <b>real context</b> |
| <b>Pre-feasibility</b> | <b>Input</b><br>1.Different alternative identification                                | Identify capital and non-capital alternatives from demand and supply side   | 5                | 5             | 5              | 5                | 5            | 2.5              | 0                   |
|                        |                                                                                       | Identify long term, medium-term and short-term planning to achieve the need | 5                | 2.5           | 2.5            | 2.5              | 2.5          | 0                | 0                   |
|                        | <b>Process</b><br>1.Evaluate the alternatives and identify the most preferable option | Cost-benefit analysis                                                       | 5                | 5             | 5              | 5                | 5            | 5                | 2.5                 |
|                        |                                                                                       | Cost-effective analysis                                                     | 5                | 5             | 5              | 5                | 5            | 5                | 0                   |
|                        |                                                                                       | Multi-criteria analysis                                                     | 5                | 5             | 5              | 5                | 5            | 2.5              | 0                   |
|                        |                                                                                       |                                                                             |                  |               |                |                  |              |                  |                     |
|                        | 2.Further analysis of shortlisted options                                             | Economic, social, and environmental feasibility on the selected options     | 5                | 5             | 5              | 5                | 5            | 5                | 2.5                 |
|                        |                                                                                       | Analysis of land availability                                               | 5                | 5             | 5              | 5                | 5            | 5                | 2.5                 |
|                        |                                                                                       | Analysis of primary design for selected alternatives                        | 5                | 5             | 5              | 5                | 5            | 5                | 2.5                 |
|                        |                                                                                       | Analysis of project risk                                                    | 5                | 5             | 5              | 5                | 5            | 0                | 0                   |
|                        | <b>Deliverables</b>                                                                   | Choose the highest net benefit option/s.                                    | 5                | 5             | 5              | 5                | 5            | 5                | 2.5                 |

|                    |                                                                                                             |                                                                                                                                                                            |                  |               |                |                  |              |                  |                     |
|--------------------|-------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|---------------|----------------|------------------|--------------|------------------|---------------------|
|                    | 1.Select the best alternative/s                                                                             | Ensure that the options are not removed due to personal preferences, perceived political difficulties or in any way that prevents genuine consideration of certain options | 5                | 5             | 5              | 5                | 5            | 0                | 0                   |
|                    |                                                                                                             | Independent appraisal of alternatives that are identified to satisfy the need to evaluate the strategic importance of the selected option                                  | 5                | 5             | 5              | 5                | 5            | 0                | 0                   |
|                    |                                                                                                             |                                                                                                                                                                            | 5                | 4.7916667     | 4.7916667      | 4.7916667        | 4.7916667    | 2.91666667       | 1.04166667          |
|                    |                                                                                                             |                                                                                                                                                                            | <b>Australia</b> | <b>Canada</b> | <b>Germany</b> | <b>Hong Kong</b> | <b>India</b> | <b>Sri Lanka</b> | <b>real context</b> |
| <b>Feasibility</b> | <b>Input</b><br>1.Further analysis of selected option                                                       | Develop a base case related to the pre-feasibility selected option                                                                                                         | 5                | 2.5           | 2.5            | 2.5              | 2.5          | 2.5              | 2.5                 |
|                    | <b>Process</b><br>1. Evaluate detailed economic, environmental, and social feasibility of selected option/s | Evaluate detailed economic, environmental, and social feasibility of selected option/s                                                                                     | 5                | 5             | 5              | 5                | 5            | 5                | 2.5                 |
|                    |                                                                                                             | Sensitivity analysis                                                                                                                                                       | 5                | 5             | 5              | 5                | 5            | 5                | 2.5                 |
|                    | 2. Risk assessment and action plan to manage and mitigate risk (stage                                       | Identify the major risk of the project involving the stakeholders                                                                                                          | 5                | 5             | 5              | 5                | 5            | 2.5              | 0                   |
|                    |                                                                                                             | Identify the risk involved with the general public                                                                                                                         | 5                | 5             | 5              | 5                | 5            | 0                | 0                   |

|  |                                                                       |                                                                                |          |          |          |          |          |           |           |
|--|-----------------------------------------------------------------------|--------------------------------------------------------------------------------|----------|----------|----------|----------|----------|-----------|-----------|
|  | may differ from country to country)                                   | Analysis of risk due to climate changes and disasters (earth slip, flood etc.) | 5        | 5        | 5        | 5        | 5        | 2.5       | 0         |
|  |                                                                       | Calculate probabilistic based risk on project cost                             | 5        | 5        | 5        | 5        | 0        | 0         | 0         |
|  | 3. Evaluate the risk of different financing options (value for money) | Evaluate the risk of different financing options (value for money)             | 5        | 5        | 5        | 5        | 5        | 2.5       | 0         |
|  |                                                                       | Preference to the local investors                                              | 2.5      | 2.5      | 2.5      | 2.5      | 5        | 0         | 0         |
|  | 4. Evaluate project design and operation plan                         | Technical evaluation committee for detailed investigation on design and cost   | 5        | 5        | 5        | 5        | 5        | 5         | 2.5       |
|  |                                                                       | Evaluate governance structure and operation plan after implementation          | 5        | 5        | 5        | 5        | 5        | 4         | 0         |
|  | <b>Deliverables</b>                                                   | In-house experts evaluate and approve                                          | 5        | 5        | 5        | 5        | 5        | 5         | 2.5       |
|  | Approval to develop the detailed design                               | Analyse and approve the project by a committee of experts                      | 5        | 5        | 5        | 5        | 5        | 0         | 0         |
|  |                                                                       |                                                                                | 4.807692 | 4.615385 | 4.615385 | 4.615385 | 4.423077 | 2.6153846 | 0.9615385 |

Appendix VI - Case studies analysis

| Stage               | Step                                                                                                      | SOP                                                                                                                                                                           | Southern Expressway | Extension of Southern Expressway | Port access elevated highway | Matara-Beliatta railway track construction | Matara-Beliatta railway track signalling | Reconstruction of Northern railway track | Northern railway track signalling |
|---------------------|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------------------|------------------------------|--------------------------------------------|------------------------------------------|------------------------------------------|-----------------------------------|
| Need identification | <b>Input</b><br>1.Preliminary recognition of the problem from:                                            | 1.1. Forecasting                                                                                                                                                              | yes                 | Yes – accuracy is questioned     | Yes                          | Yes – accuracy questioned                  | yes                                      | yes                                      | yes                               |
|                     |                                                                                                           | 1.2. Root cause analysis                                                                                                                                                      | yes                 | no                               | Yes                          | no                                         | no                                       | yes                                      | no                                |
|                     | <b>Process</b><br>1. Analysis of the problem/need and identifying the real requirement:                   | 1.1 Analysis of strategic importance                                                                                                                                          | yes                 | no                               | No                           | no                                         | no                                       | no                                       | no                                |
|                     |                                                                                                           | 1.2 Quantify the cost of impact over the time by not addressing problem/need                                                                                                  | Yes                 | no                               | Yes                          | no                                         | no                                       | no                                       | no                                |
|                     |                                                                                                           | 1.3 Identification of all stakeholders affected by problem/need                                                                                                               | no                  | no                               | No                           | no                                         | non                                      | no                                       | no                                |
|                     |                                                                                                           | 1.4 Identify goals and objectives                                                                                                                                             | yes                 | yes                              | Yes                          | yes                                        | yes                                      | yes                                      | yes                               |
|                     |                                                                                                           | 1.5 Identify output, outcome                                                                                                                                                  | yes                 | no                               | Yes                          | non                                        | no                                       | no                                       | no                                |
|                     | <b>Deliverables</b><br>1. Develop the Initial Project Description (IPD) of the project and rank the need: | 1.1 Evaluate whether project need is consistent with the strategic importance, goals and objectives of the sector and country strategy and rank the importance of the project | Yes                 | no                               | Yes                          | no                                         | no                                       | no                                       | no                                |
|                     |                                                                                                           | 1.2 Cross-sectional analysis to identify conflicting issues                                                                                                                   | no                  | no                               | Yes – by RDA                 | no                                         | no                                       | no                                       | no                                |

| Stage           | Step                                                                           | SOP                                                                             | Southern Expressway | Extension of Southern Expressway | Port access elevated highway | Matara-Beliatta railway track construction | Matara-Beliatta railway track signalling | Reconstruction of Northern railway track | Northern railway track signalling |
|-----------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------|---------------------|----------------------------------|------------------------------|--------------------------------------------|------------------------------------------|------------------------------------------|-----------------------------------|
|                 |                                                                                | with other projects                                                             |                     |                                  |                              |                                            |                                          |                                          |                                   |
|                 |                                                                                | 1.3 Public consultation on the project by publishing the project need           | Yes                 | no                               | Yes                          | no                                         | no                                       | no                                       | no                                |
|                 |                                                                                | 1.4 Approve the project to move into the next stage                             | yes                 | no                               | Yes                          | no                                         | no                                       | no                                       | no                                |
| Pre-feasibility | Input<br>1.Different alternative identification                                | 1.1 Identify capital and non-capital alternatives from demand and supply side   | no                  | no                               | No                           | no                                         | no                                       | no                                       | no                                |
|                 |                                                                                | 1.2 Identify long term, medium-term and short-term planning to achieve the need | no                  | no                               | No                           | no                                         | no                                       | no                                       | no                                |
|                 | Process<br>1.Evaluate the alternatives and identify the most preferable option | 1.1 Cost-benefit analysis                                                       | yes                 | Yes – Not available within NPD   | Yes                          | Yes - Not available within NPD             | Yes - Not available within NPD           | Yes - Not available within NPD           | Yes - Not available within NPD    |
|                 |                                                                                | 1.2 Cost-effective analysis                                                     | No                  | No                               | No                           | No                                         | No                                       | No                                       | No                                |
|                 |                                                                                | 1.3 Multi-criteria analysis                                                     | No                  | No                               | No                           | No                                         | No                                       | No                                       | No                                |
|                 | 2.Further analysis of shortlisted options                                      | 2.1 Economic, social, and environmental feasibility on the selected options     | Yes                 | No                               | Yes                          | no                                         | no                                       | no                                       | no                                |
|                 |                                                                                | 2.2 Analysis of land availability                                               | yes                 | no                               | Yes                          | yes                                        | yes                                      | yes                                      | yes                               |
|                 |                                                                                |                                                                                 |                     |                                  |                              |                                            |                                          |                                          |                                   |

| Stage              | Step                                                   | SOP                                                                                                                                                                             | Southern Expressway | Extension of Southern Expressway | Port access elevated highway | Matara-Beliatta railway track construction | Matara-Beliatta railway track signalling | Reconstruction of Northern railway track | Northern railway track signalling |
|--------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------------------|------------------------------|--------------------------------------------|------------------------------------------|------------------------------------------|-----------------------------------|
|                    |                                                        | 2.3 Analysis of primary design for selected alternatives                                                                                                                        | no                  | No                               | No                           | no                                         | no                                       | no                                       | no                                |
|                    |                                                        | 2.4 Analysis of project risk                                                                                                                                                    | yes                 | No                               | Yes                          | No                                         | no                                       | no                                       | no                                |
|                    | <b>Deliverables</b><br>1.Select the best alternative/s | 1.1 Choose the highest net benefit option/s.                                                                                                                                    | yes                 | No                               | Yes                          | no                                         | no                                       | no                                       | No                                |
|                    |                                                        | 1.2 Ensure that the options are not removed due to personal preferences, perceived political difficulties or in any way that prevents genuine consideration of specific options | yes                 | no                               | Yes                          | no                                         | no                                       | no                                       | no                                |
|                    |                                                        | 1.3 Independent appraisal of alternatives that are identified to satisfy the need to evaluate the strategic importance of the selected option                                   | yes                 | no                               | Yes                          | no                                         | no                                       | no                                       | no                                |
| <b>Feasibility</b> | <b>Input</b><br>1.Further analysis of selected option  | 1.1 Develop a base case related to the pre-feasibility selected option                                                                                                          | yes                 | no                               | Yes                          | no                                         | no                                       | no                                       | no                                |
|                    | <b>Process</b><br>1. Evaluate detailed economic,       | 1.1 Evaluate detailed economic, environmental, and social feasibility of selected option/s                                                                                      | Yes                 | No                               | Yes                          | No                                         | No                                       | No                                       | No                                |

| Stage | Step                                                                                                      | SOP                                                                                | Southern Expressway | Extension of Southern Expressway | Port access elevated highway | Matara-Beliatta railway track construction | Matara-Beliatta railway track signalling | Reconstruction of Northern railway track | Northern railway track signalling |
|-------|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------|----------------------------------|------------------------------|--------------------------------------------|------------------------------------------|------------------------------------------|-----------------------------------|
|       | environmental, and social feasibility of selected option/s                                                | 1.2 Sensitivity analysis                                                           | yes                 | no                               | Yes                          | no                                         | no                                       | no                                       | no                                |
|       | 2. Risk assessment and action plan to manage and mitigate risk (stage may differ from country to country) | 2.1 Identify the major risk of the project involving the stakeholders              | yes                 | no                               | Yes                          | no                                         | no                                       | no                                       | no                                |
|       |                                                                                                           | 2.2 Identify the risk involved with the general public                             | yes                 | no                               | yes                          | no                                         | no                                       | no                                       | no                                |
|       |                                                                                                           | 2.3 Analysis of risk due to climate changes and disasters (earth slip, flood etc.) | no                  | no                               | no                           | no                                         | no                                       | no                                       | no                                |
|       |                                                                                                           | 2.4 Calculate probabilistic based risk on project cost                             | no                  | no                               | no                           | no                                         | no                                       | no                                       | no                                |
|       | 3. Evaluate the risk of different financing options (value for money)                                     | 1.1 Evaluate the risk of different financing options (value for money)             | no                  | no                               | no                           | no                                         | no                                       | no                                       | no                                |
|       |                                                                                                           | 1.2 Preference to the local investors                                              | no                  | no                               | no                           | no                                         | no                                       | no                                       | no                                |
|       | 4. Evaluate project design and operation plan                                                             | 6.1 Technical evaluation committee for detailed investigation on design and cost   | yes                 | yes                              | yes                          | yes                                        | yes                                      | yes                                      | yes                               |
|       |                                                                                                           | 6.2 Evaluate governance structure and operation plan                               | yes                 | yes                              | yes                          | yes                                        | yes                                      | yes                                      | yes                               |

| Stage | Step                                       | SOP                                                           | Southern Expressway | Extension of Southern Expressway | Port access elevated highway | Matara-Beliatta railway track construction | Matara-Beliatta railway track signalling | Reconstruction of Northern railway track | Northern railway track signalling |
|-------|--------------------------------------------|---------------------------------------------------------------|---------------------|----------------------------------|------------------------------|--------------------------------------------|------------------------------------------|------------------------------------------|-----------------------------------|
|       |                                            | after implementation                                          |                     |                                  |                              |                                            |                                          |                                          |                                   |
|       | <b>Deliverables</b>                        | 1.1 In-house experts evaluate and approve                     | Yes                 | Yes- Cabinet direct approval     | yes                          | Yes- Cabinet direct approval               | Yes- Cabinet direct approval             | Yes- Cabinet direct approval             | Yes- Cabinet direct approval      |
|       | 1. Approval to develop the detailed design | 1.2 Analyse and approve the project by a committee of experts | no                  | no                               | no                           | no                                         | no                                       | no                                       | no                                |

## Appendix VII – Questionnaire on project planning framework steps

This questionnaire is used to evaluate the project planning framework applied in Sri Lanka for the investment of land (Road and Rail) transport infrastructure.

There are 3 main steps in the questionnaire. Following steps provide you with basic information on how to fill the questionnaire.

Step 01: Basic information about your self

Step 02: Basic information about the project

Step 03: Evaluate steps taken at each stage of the project planning framework

| Step 01: Basic Information                                                                                                                                                                                                                                                                                                                                                                                       |                   |                                                |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------------------------------------|--------|
| 1. Organisation and Department: <i>Ministry of Transport Management</i>                                                                                                                                                                                                                                                                                                                                          |                   |                                                |        |
| 2. Job Designation: <i>Project Director</i>                                                                                                                                                                                                                                                                                                                                                                      |                   |                                                |        |
| 3. Area of Expertise: <i>Civil Engineering</i>                                                                                                                                                                                                                                                                                                                                                                   |                   | 4. Years of experiences: <i>30 years</i>       |        |
| 5. Contact number: <i>0715320357</i>                                                                                                                                                                                                                                                                                                                                                                             |                   | 6. Email address: <i>amaratungav@yahoo.com</i> |        |
| Step 02: Project Details                                                                                                                                                                                                                                                                                                                                                                                         |                   |                                                |        |
| Project Type: Land Transport Infrastructure (Rail <i>Railway</i> / Road _____)                                                                                                                                                                                                                                                                                                                                   |                   |                                                |        |
| Project name: <i>Matara - Beliatta Railway track construction and signalling</i>                                                                                                                                                                                                                                                                                                                                 |                   |                                                |        |
| Brief Project description (Client, consultant, area of construction, distance, no. of bridges and special features, etc)                                                                                                                                                                                                                                                                                         |                   |                                                |        |
| <i>Client : Ministry of Transport Management</i><br><i>Consultant :- Central Engineering Consultancy Bureau (CECB)</i><br><i>Contractor :- China Machinery Import &amp; Export Corporation (CMC)</i><br><i>Area - Matara - Beliatta</i><br><i>Main station - Kekandura, Babaranda, Veurukannoli, Beliatta</i><br><i>Sub station :- Pitaduma, Weherahena</i><br><i>Tunnels - 02 nos</i><br><i>Bridge - 1.2 km</i> |                   |                                                |        |
| Your role in the project                                                                                                                                                                                                                                                                                                                                                                                         |                   | <i>Project Director 2012-2014</i>              |        |
| Investment value (LKR/USD) of the project                                                                                                                                                                                                                                                                                                                                                                        |                   | Budgeted                                       | Actual |
|                                                                                                                                                                                                                                                                                                                                                                                                                  |                   | <i>278.2<sup>USD</sup></i>                     |        |
| Project period                                                                                                                                                                                                                                                                                                                                                                                                   | Month/Year        |                                                |        |
| Project approval for concept paper from authorities                                                                                                                                                                                                                                                                                                                                                              | <i>Not known.</i> |                                                |        |
| Project approval for the feasibility study                                                                                                                                                                                                                                                                                                                                                                       | <i>May 1991</i>   |                                                |        |
| Approval for the project from the cabinet                                                                                                                                                                                                                                                                                                                                                                        | <i>2009.11.05</i> |                                                |        |
| Project commencement                                                                                                                                                                                                                                                                                                                                                                                             | <i>2013.08.01</i> |                                                |        |
| Project completion                                                                                                                                                                                                                                                                                                                                                                                               | <i>2020.05.26</i> |                                                |        |

The above project has followed the steps of the project planning process:

### 1. Need analysis

- a. The requirement of the project was identified from a need analysis (conducted by project proponent planning department): **Yes/No**

- i. If Yes, what is the basis for the project selection:

National requirement/ ~~Economic benefits~~/ Social benefits/ other (please specify)

- ii. If No, what is the basis for the project selection:

Suggested by the higher-order authorities/ Examples from other countries/ other (please specify) .....

### 2. Initial project description (Concept paper)

Initial project description (IPD) is used as a document to analyse the requirement of the project at the stage of need analysis/project inception. This document (IPD) consists of the goals, objectives, requirements and key parameters (economic, social and environmental) of the project. IPD assess the merits and suitability of the project.

- a. Have you carried out the following actions when developing the IPD/concept paper:

|   | Action                                          | Yes | No |
|---|-------------------------------------------------|-----|----|
| 1 | Scope, goal and objectives of the project       |     |    |
| 2 | Input, output and outcome of the project        |     |    |
| 3 | Rough benchmarked/estimated cost of the project | ✓   |    |
| 4 | Initial environmental assessment                | ✓   |    |
| 5 | Initial social assessment                       |     |    |

### 3. Pre – Feasibility Study and feasibility

- a. Have you conducted the pre-feasibility study, get approval then moved to the feasibility study or pre-feasibility and feasibility was taken at the same point or other (please specify)

..... *Feasibility & Economic Feasibility* .....

#### 4. Feasibility study

a. Who has conducted the feasibility study:

Foreign consultant/ Local consultant/ other (please specify) ..... *Foreign Consultant* .....

b. What is the funding source for the feasibility study?

..... *Donation* .....

c. Have you carried out the following activities at the stage of feasibility study:

|   | Action                                                                     | Yes | No |
|---|----------------------------------------------------------------------------|-----|----|
| 1 | Economic Feasibility                                                       | ✓   |    |
| 2 | Social and legal Feasibility                                               | ✓   |    |
| 3 | Financial feasibility                                                      | ✗   | ✓  |
| 4 | Technical feasibility                                                      | ✓   |    |
| 5 | Environmental Feasibility                                                  | ✓   |    |
| 6 | Identify constraints of project implementation                             | ✓   |    |
| 5 | Appraisal of different option to achieve objectives (Alternative analysis) | ✓   |    |
| 6 | Approval for land acquisition                                              |     | ✗  |

d. In financial feasibility, have you carried out the following actions:

|   | Action                                                                                | Yes | No |
|---|---------------------------------------------------------------------------------------|-----|----|
| 1 | Life Cycle Cost (LCC) assessment for different alternatives                           |     |    |
| 2 | Evaluate the operation and maintains cost                                             |     |    |
| 3 | Evaluate the source of funding                                                        |     |    |
| 4 | Compare Bill of Quantity (BoQ) prices with international commodity prices for imports |     |    |

#### 4. Approval

a. Final approval for the project was given based on FR 135 (A committee of secretaries should evaluate the final project given the approval for allocation of money from budget):

Yes/~~No~~

b. Who has given the final approval for the project proceeded with construction?

Cabinet/Department of National Planning/ other (please specify) ..... *Cabinet* .....

c. NPD or ERD has carried out a cross-sectional analysis of the approved projects with the new suggested project ? Yes/No *Not known*

## 5. Project Financing

e. What is the method of funding for the project:

|     | Funding source          | Investment amount in USD | Investor |
|-----|-------------------------|--------------------------|----------|
| 1   | Government of Sri Lanka |                          |          |
| 2   | Grant                   |                          |          |
| 3   | Loan                    | 247 USD                  |          |
| 3.1 | Local bank              |                          |          |
| 3.2 | Foreign Bank            |                          |          |

f. Have you conducted the bidding process for the selection of contractor/s? Yes/~~No~~

If Yes, please tick (✓) the method of contractor selection?

1. Financier's the choice /Unsolicited proposal
2. Limited Open bidding with national preference
3. bidding in the donor's country
4. Open bidding
5. Open bidding with national preference

*Unsolicited*

If No, please specify the method of contractor selection:

.....

g. Have you evaluate the cost of construction for different alternatives of the project:

Yes/~~No~~

h. As per your evaluation, please indicate the cost per unit (km) of construction.

| Alternatives                           | Cost per unit construction |
|----------------------------------------|----------------------------|
| Locally construction cost              | <i>not know</i>            |
| International benchmark cost           | <i>60 USD/km</i>           |
| International competitive bidding cost | <i>not know</i>            |
| Other (Please specify)                 |                            |

i. Were there any drawbacks in the construction of the project locally? Yes/~~No~~

If Yes, please specify the drawbacks? (financial, technical, etc.)

- |         |         |
|---------|---------|
| 1 ..... | 4 ..... |
| 2 ..... | 5 ..... |
| 3 ..... |         |

# Appendix VIII - Cost of railway track construction cost

| Country     | New Track - Flat Terrain           | Gauge          | Track  | Funding Source | Contractor selection                          | Type of contractor | Year | Length | Cost per km in USD million - flat terrain | Labour (Cost per km*20% ) | Labour rate (LKA standard ) | Inflation (2010 standard ) | Labour 2010 | Material (Cost per km*80% ) | Material 2010 | 2010 cost per km in USD mn |
|-------------|------------------------------------|----------------|--------|----------------|-----------------------------------------------|--------------------|------|--------|-------------------------------------------|---------------------------|-----------------------------|----------------------------|-------------|-----------------------------|---------------|----------------------------|
| Cambodia    | Bat Doeng-Kratie 258km             | Meter Gauge    | single | ADB            | Open bidding                                  | Foreign            | 2011 | 258    | 2.66                                      | 0.53                      | 1.80                        | 1.50                       | 1.44        | 2.13                        | 3.20          | 4.64                       |
| Cambodia    | Poipet-Sisophon 48km               | Meter Gauge    | single | ADB            | Open bidding                                  | Foreign            | 2010 | 48     | 1.67                                      | 0.33                      | 1.92                        | 1.00                       | 0.64        | 1.34                        | 1.34          | 1.98                       |
| Lao PDR     | Vientiane-Thanaleng 9km            | Meter Gauge    | single | AFD            | Limited Open bidding with national preference | Foreign            | 2017 | 9      | 5.56                                      | 1.11                      | 3.11                        | 0.14                       | 0.48        | 4.45                        | 0.61          | 1.09                       |
| Vietnam     | Ho Chi Minh City-LocNinh 129km     | Meter Gauge    | single | ADB            | Open bidding                                  | Foreign            | 2016 | 129    | 7.00                                      | 1.40                      | 1.40                        | 0.29                       | 0.44        | 5.60                        | 1.62          | 2.07                       |
| Afghanistan | Hairatan to Mazar-i-Sharif railway | Standard Gauge | Single | ADB            | Open bidding                                  | Foreign            | 2010 | 73.47  | 2.31                                      | 0.46                      | 4.74                        | 1.00                       | 2.19        | 1.85                        | 1.85          | 4.05                       |
| Kazakhstan  | Zhetysay-Korgas railway            | Standard Gauge | Double | government     |                                               | local              | 2012 | 298    | 2.49                                      | 0.50                      | 0.82                        | 0.70                       | 0.29        | 1.99                        | 1.39          | 1.67                       |
| India       | Nadikudi-Srikalahasti section      | board gauge    | Double | government     | Open bidding with national preference         | local              | 2010 | 308    | 1.10                                      | 0.22                      | 3.33                        | 1.00                       | 0.74        | 0.88                        | 0.88          | 1.62                       |
| India       | Dharam-Qazigund-Baramulla - ICORN  | Board gauge    | Single | ICORN          | Open bidding with national preference         | Local              | 2008 | 120    | 3.54                                      | 0.71                      | 3.45                        | 0.70                       | 1.70        | 2.83                        | 1.97          | 3.68                       |
| China       | China Nanning – Guangzhou          | Standard Gauge | Double | WB             | Open bidding                                  | local              | 2014 | 463    | 8.50                                      | 1.70                      | 1.14                        | 0.61                       | 1.17        | 6.80                        | 4.12          | 5.28                       |
| China       | China Harbin – Jiamusi             | Standard Gauge | Double | WB             | Open bidding                                  | local              | 2016 | 343    | 8.50                                      | 1.70                      | 1.13                        | 0.63                       | 1.21        | 6.80                        | 4.28          | 5.49                       |

As railway track construction cost data are not available in the local context, worldwide information was collected and standardised for comparison [55], [57], [246]. Cost of investment was observed varying with labour cost and inflation. Total construction cost per kilometre was divided mainly into 20% labour and 80% material cost. Equation 1 depicts railway track construction cost; PricewaterhouseCoopers applied an equation within European Union to calculate the cost of investment at a standard price [246].

Total cost of railway track construction (per kilometre) = Labour cost + Material cost ----- Equation 1

$$20\% + 80\%$$

Labour costs vary from country to country. These were therefore converted to Sri Lankan standards using information from the International Labour Organisation (ILO). Inflation data are extracted from the World Bank Purchasing Power Parity (PPP) index. The following formula was used to calculate the cost of the standard labour rate of Sri Lanka in the base year of 2010:

Labour cost = Per km cost\*20%\* labour wage rate (Sri Lanka standard wage rate) \*Inflation (2010 base year)

Material suppliers are international, and there is no material price difference by country. As a result, the material cost of investment was calculated for the base year 2017.

Material cost = Per km cost\*80%\*Inflation (2010 base year)

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| <ul style="list-style-type: none"> <li>• Due to the lack of local funding to invest in infrastructure projects, the funding organisation suggested the related ministries choose projects. Moreover, most of these projects are direct contracting, and adhering to the funding organisation's rules is a must. According to the procurement guideline, these types of projects get direct approval from the Cabinet and send to NPD for approval. Direct contracting is allowed in the current guideline. Planners bypass a proper project screening at NPD. This is mainly due to the gaps in the current guideline suggested following for the planners. The NPD developed this. NPD does not have the authority to reject a Cabinet's project as the Cabinet gives the final decision.</li> <li>• Poor guideline directions in the operation manual and planners are not following the guideline. Loopholes are easy to show the path to bypass the manual.</li> <li>• Direct Cabinet approval without a feasibility study is standard for direct contracting projects. When feasibility reports send to NPD, some projects are not screening properly due to corruption.</li> <li>• Currently, projects are evaluated by the internal staff of the NPD and recommendations for approval are given to the Cabinet. NPD does not have the ultimate authority to approve the projects for implementation.</li> <li>• Lack of transparency in decisions due to no disclose to development strategy and screening process. And no system to inquire about projects from public</li> <li>• Most of the projects are coming to the NPD with the funding availability and Cabinet approval. So, these projects need NPD recommendations to proceed. Due to this situation and political influence, NPD approved projects, although these projects did not need to be implemented immediately.</li> </ul> | <p>NPD</p> |
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| <ul style="list-style-type: none"> <li>• Not mandatory to follow the operation manual. NPD does not have the legal power to stop projects that NPD does not screen before Cabinet approval. It is not a must to follow the Guideline (OM) proposed by NPD. So, the process of approval of the project changed from project to project. Some projects get Cabinet approval at the begging and send the concept paper and feasibility study document. For the sake of auditing purposes. But this will not provide the purpose of selecting the most required projects for the country.</li> <li>• Bypassing the guideline (OM) by taking the direct Cabinet approval is allowed in the current process. It is allowed to get direct Cabinet approval for direct contracting projects. Most of the projects find funding sources before the analysis of need as the planning process is not a legal process, not a must to follow.</li> </ul> | <p>NPD</p> |
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| <ul style="list-style-type: none"> <li>• Screen the project at only a single point. The accuracy of the screening and political influence on project selection is high. The Cabinet directly approves many scope changes after approving the project. Due to the lack of reservations for the contingencies during the planning stage, scope changes suggest the latter stages, which incur huge cost.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                       |
| <ul style="list-style-type: none"> <li>• Due to the lack of funding to invest in infrastructure projects from the local money funding organisation suggested the related ministries choose projects. Furthermore, most of these projects are direct contracting, and adhering to the funding organisation's rules is necessary. According to the procurement guideline, these types of projects get direct approval from the Cabinet and send to NPD for approval. NPD does not have the authority to reject a Cabinet's project as the Cabinet gives the final decision. Bypass the process of project screening.</li> <li>• Currently, projects are evaluated by the internal staff of the NPD and recommendations for approval are given to the Cabinet. NPD does not have the ultimate authority to approve the projects for implementation. Lack of transparency in the current process, as all the decisions are communicated to NPD, line ministry and Cabinet. No disclosure to project screening and importance to the general public.</li> <li>• Most of the projects are coming to the NPD with the funding availability and Cabinet approval. So, these projects need NPD recommendations to proceed. Due to this situation and political influence, NPD approves projects, although these projects did not need to implement immediately.</li> </ul> | NPD                   |
| <ul style="list-style-type: none"> <li>• Funding organisation agencies suggested projects with a perspective to increase the profit of the funding organisation. And the use of the equipment that is already brought to the country for past infrastructure investment purposes. Strong political influence on the selection of funding organisation suggested projects due to the availability of funds and financial gains.</li> <li>• Due to the gaps in the guideline, government planning agencies focus on the funding source at first and develop a direct contract with the funding organisation.</li> <li>• The operation manual indicates that it is not mandatory to follow and involve the major stakeholders of the projects at the begging stages. Due to this situation, some scope changes are requested at the end of the project phases, which incur a considerable cost to conduct changes.</li> <li>• NPD is not performing the expected institutional role due to the lack of authority to play the role. The current process politically impacts and NPD unable to perform the role.</li> </ul>                                                                                                                                                                                                                                            | Ministry of transport |

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| <ul style="list-style-type: none"> <li>• The Cabinet gives the final decision of the project selection and approval. Final approval and selection of the projects are with the responsibility of the line ministry minister. So, the influence of the project selection and approval is solely by the minister. That direct to high decision-making power, which can be misused. Since final approval for the selected projects within the ministry is given to ministers, all these politicians impact the institutional roles of ministries and NPD. So, corruption within the NPD and line ministries are experienced by the employees.</li> <li>• Public involvement of the projects is limited. Process of project approval is limited to related line ministry, NPD, and Cabinet. Public involvement and surveying of the project need, and issues are not happening for most of the projects—transparency of the investment unable to inquire by the public.</li> </ul> | RDA |
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| <ul style="list-style-type: none"> <li>• Scope changes due to the political influence were impacted in the projects in the recent past. Because some projects requested to change the design locations, the addition of new construction facilities increases the infrastructure's capacity to influence the project cost. But NPD was influenced to approve these types of projects due to the influence from the politicians, and NPD does not have the ultimate authority to reject the changes.</li> <li>• Choose of projects are depended on the political view and funding availability, less focus on the economic development and NPD cannot reject these projects due to the political influence. Due to the weak institutional role, people are not accountable for the decisions made within NPD.</li> <li>• Current guidelines are not supported to conduct a post-completion review, and no lessons are taken from previous projects. However, RDA was eye-witnessed on negative impacts on direct contracting projects.</li> <li>• Politicians interest in direct contracting projects are high due to the political influence on the decisions. NPD cannot do an independent review on the projects due to the lack of clear institutional role and lack of check and balances in the system.</li> </ul> | RDA |
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| <ul style="list-style-type: none"> <li>• The procedure suggested in circular number MNPEA 20/2019 is an administrative process, which, with any failure to follow, may result in the person in omission being held not legally liable for such failure. This instance is attributable to the fact that most stakeholders tend not to follow the process and try to take shortcuts for the convenience of approval. No check and balances in the system and not a legalized process perform the institution. The decision is biased due to political influence: the internal staff screens projects and the lack of internal staff to review the projects. Meantime, the review of projects is highly influenced due to corruption.</li> <li>• The operation manual has some issues related to the project appraisal, the project is screen one time at NPD, but earlier, this was done as two steps of initial screening and final screening. At the initial screening project concept evaluates and approve for the feasibility study. However, in the current context, projects are getting to the NPD after the feasibility study, which incurs a considerable cost. Gaps in the guideline distract an independent evaluation on feasibility and post-completion review.</li> </ul> | Finance Ministry |
| <ul style="list-style-type: none"> <li>• Circulars that notify of the Cabinet approval for some projects indicate exceptional circumstances that may have led to a departure from the standard procedure. These indicate that exceptions are made in the Cabinet approval stage. Therefore, the project proponent attempts to follow similar measures to bypass the standard process involving NPD.</li> <li>• Lack of accuracy of the project feasibility due to the gaps in the guideline. Most of the projects are experience optimism biases, forecasting errors in the feasibility studies.</li> <li>• According to the financial regulations, NPD projects are evaluated by the committee of secretaries. The internal staff of the NPD does this in the current context. The Director-General of NPD gives the final decision of the project approval for Cabinet. Due to this situation, political influence on decision making is high on final approval as this is the sole decision.</li> </ul>                                                                                                                                                                                                                                                                             | SLR              |

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| <ul style="list-style-type: none"> <li>• NPD does not follow a standard method in prioritizing projects: All projects related to significant developments must follow procedures written by NPD, and they are submitted to NPD before implementation. NPD evaluates the need for the project and any overlap with other projects that are being planned for implementation in the same area. As indicated, many gaps are shown in the current guideline.</li> <li>• NPD internal staff is lack accountability for decisions made inside the NPD as the current system NPD role is not clear. Project selection and screening are influenced within NPD because NPD's institutional role is not clear.</li> <li>• No expert committee to evaluate the projects. Transparency of the decisions made by NPD is low. Bypass operation manual and no disclose on the project selection process and strategic importance.</li> <li>• Schedule changes of the projects are also highly impacting the cost of investment. Delay the projects impact cost of investment.</li> <li>• For example, suppose RDA is planning a new road and the Department of Railway has also suggested a railway track through the tract of land in an area where there is no demand for both rail and road. In that case, NPD will perform a cross-sectional analysis of the available projects and approve a more suitable project. As RDA and the Department of Railway are two separate organisations, they will not be aware of the project overlaps.</li> </ul> | SLR |
| <ul style="list-style-type: none"> <li>• Independent review of the feasibility of the projects NPD:</li> <li>• As per the FR135, before the funding approval, NPD must submit a report to the committee of secretaries appointed by the Parliament. NPD develops this report based on information provided by the project proponent. Based on the report, the committee evaluates the project and approves the allocation of funds. Nevertheless, this practice is not followed in the present; approval by the NPD is followed by funding allocated by the Treasury and External Resources Department.</li> <li>• These processes are not legal. Anybody can violate the regulations. No one is accountable for the decision of the project approval. Due to this situation, political influence and corruption are highly experienced in the current project planning process. Lack of accountability of the NPD and NPD is not performing a clear independent role during project screening.</li> <li>• Unable to raise against the project approval and major stakeholders are not involved in the initial planning stages. Major change orders happened at the end of the process.</li> </ul>                                                                                                                                                                                                                                                                                                                                         | SLR |
| <ul style="list-style-type: none"> <li>• Unsolicited proposals: Currently, in Sri Lanka, some projects lack funding. Therefore, governments try to fund the projects through external sources.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ADB |

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| <p>Sometimes, these external sources secure funds on loan from other countries. Once the loan is given, there are terms on contractor selection, raw material purchase, labour involvement, etc., which the project proponent must follow. Most of these terms of an agreement are favourable to the funding source.</p> <ul style="list-style-type: none"> <li>• The main issue on the direct contracting projects is agreed upon between two parties without adequately evaluating the need. Even the feasibility study is conducted after agreeing on the project. So, the accuracy of the feasibility study is less, but NPD cannot reject the project due to political influence. And Cabinet approval for the project has already taken.</li> <li>• As the role of NPD staff to provide recommendations for the project approval, however, due to corruption, decision-makers are not performing the expected role. NPD screens at one point as a guideline suggested for the project evaluation.</li> <li>• The decision makes inside the NPD are communicated only to the Cabinet and related line ministry. The current system is not transparent.</li> </ul> |  |
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| <ul style="list-style-type: none"> <li>• Scope changes after approval: Changes in scope are often requested after the project approval and while construction is underway: this is due to protests from the villagers, requests of politicians, and unexpected geographical conditions (rock beads, marshlands etc.). These types of scope changes make a direct impact on capital investment fluctuations. Moreover, due to the lack of involvement of major stakeholders' transparency, the decisions are minimal. Due to this situation, project changes suggested stakeholders at the latter part of the project, which incurred a huge investment cost.</li> <li>• The current guideline has some gaps in project alternative analysis, as all needs are not considered. Lack of involvement of major stakeholders and lack of transparency of the decisions due projects are not disclosed to the public and not able to inquire about those.</li> <li>• Transparency of decision-making is low due to the scope change and cost overrun incurred at the implementation. The public reason for project selection does not know projects, and feasibility reports are not disclosed.</li> <li>• Political influence on the projects and bypass the process.</li> <li>• Scope changes of the projects at the point of handing over the projects</li> </ul> | JICA |
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| <ul style="list-style-type: none"> <li>• Lack of independent review on the project by NPD due to the influence from the politicians and loopholes in the current procedure to bypass the operation manual. Cabinet gives decision for the project approval given by the NPD, final decision of approval.</li> </ul> | Academic |
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| <ul style="list-style-type: none"> <li>• The accuracy of the feasibility studies is low. However, NPD does not have the internal capacity to evaluate the accuracy of the project. NPD make recommendations for approval as an institution and do not have the authority to approve projects.</li> <li>• The current operation manual does not provide the required guideline for the project evaluation. Moreover, it is an administrative process no one legally binds for not following the operation manual.</li> <li>• Guideline proposed to take Direct Cabinet approval are taken for unsolicited projects as procurement guideline. People are not accountable for the decisions made at NPD.</li> </ul> |  |
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| <p>The current operation manual has some loopholes, which was unable to evaluate the projects by NPD. A detailed step by step process is not included in the operation manual to follow the users and not required to follow for each project. Especially, direct unsolicited projects can get direct approval from the Cabinet.</p> <p>Political influence project selection and approval. By-pass the process.</p> <p>Planning issues related to the negligence of the fundamental requirement in the guideline to conduct the feasibility study.</p> <p>Lack of transparency in the current process of planning no system to inquire about projects from the public.</p> <p>Lack of knowledge of the internal staff on the project screening with the NPD makes reporting for recommendations.</p> | Academic |
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| <p>Funding organisation agencies suggest the projects: Certain projects are suggested by funding agencies in line with those they have implemented in other countries. Often, these are implemented without an evaluation of Sri Lanka actual need. Support from the politicians' projects suggested by the funding organisations is getting direct approval from the Cabinet by following the procurement guideline. NPD does not get an opportunity to evaluate projects properly, and NPD does not have the ultimate authority to reject unacceptable projects. Political power and authority are higher than the NPD authority.</p> | Finance ministry |
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| <p>No system to review and directly inquire on planned and approved projects from NPD by the public. Transparency of the current system is low, and accountability of the decision-makers are also low due to</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                         |
| <p>Investments in construction are based on equipment and vehicles in the possession and political influence. Once an organisation has invested in certain types of equipment, it attempts to engage equipment in as many projects as possible. Funding agencies and line ministries suggest projects with funds to maintain and sustain within the country.</p> <p>Although the new operation manual suggests analysing the project's feasibility to reduce delays in project review, this increases the risk of selecting unnecessary projects due to the improper evaluation of need, alternatives, etc. NPD does not have the internal capacity to review the feasibility reports. Lack of institutional role due to lack of check and balances in the current system. Lack of legal author to perform independently.</p> <p>Lack of institutional role due to lack of check and balances in the current system. Lack of legal author to perform independently. Lack of authority within the staff to reject unnecessary projects. The Cabinet gives final approval.</p> | <p>Finance ministry</p> |
| <p>Involve with unsolicited projects – direct contracting with the funding organisation. Not to evaluate the project due to prior approval from the Cabinet by adhering to procurement guideline. Even the auditor general department cannot inquire on reasons for not following the project planning process since projects are taken direct Cabinet approval.</p> <p>NPD does not have the authority to select the most required projects. NPD can only provide recommendations for the project approval. The current process is an administrative and high political influence on the decisions of the NPD. The ability to select unnecessary investments are high—no system for the check and balances.</p>                                                                                                                                                                                                                                                                                                                                                             | <p>RDA</p>              |

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| <p>Operation manual guideline is not up to the standard, and there are several issues, such as gaps in the guideline given for the project appraisal process.</p> <p>They are prioritizing projects based on the availability of funds. Some projects were rejected at screening due to the unavailability of local funds and constructed by investing at a higher cost from a foreign loan (obtained at the commercial rate of interest). All these investments are made from public investments. Transparency of decision making low due to lack of involvement of disclose of the strategic importance.</p> <p>Institutional roles perform due to check and balances. The Cabinet approves direct contracting projects without an evaluation of the feasibility. But investment gains are not seen in most the recent invested projects.</p> | <p>Finance ministry</p> |
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