EXECUTIVE SUMMARY

FEASIBILITY STUDY and PROJECT PRIORITIZATION of TRANSPORT INVESTMENT to CONNECT with STRATEGIC TARGET

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EXECUTIVE SUMMARY:

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1. Introduction and statement of the problem

Public sector administration has developed budget allocation system by effectively analyzing of investment associated with several levels of strategy which are national, area, functional and organizational. The objective of strategic budget allocation is to prioritize the projects. Well prioritized budgeting is a good start of implementing strategic plan into action. In general, budget setting should be carried out based on production and predicted outcomes of the project, the better performance relates to more budget allocating.

Office of Transport and Traffic Policy and Planning (OTP) takes major part in establishing strategic plan for transport, monitoring the progress of the plans and giving advices to Ministry of Transport to allocate the budget for plans or projects. Consequently, OTP is considered a very important organization that plays major role in maximizing benefit of resources usage with regards to appropriate budgeting in transport.

However, there were some difficulties in budget allocating that the goal or expected outcome cannot be achieved. Major reasons are listed as follows;

- There was no clear direction of investment and comprehensive planning of connecting strategy among organizations in transport planning. Thus, this could cause improper direction of investment and pose risks to non-conforming resource usage with key issues.
- Although strategic budget planning has been established, most organizations never practically distribute the strategy into action for plans or projects. On the other hand, existing budgeting concepts of each organization were often applied and connection between master strategic plans was also neglected. Consequently, resources allocation was often not conform to goal of development when strategy-based budgeting was not applied.

- Lack of monitoring and evaluation of plans and projects after budget has been distributed and after project finish is one of significant problem. As a result, budget requesting for future project was not realistically carried out, mostly over estimation in order to get higher chance of budget allocation in the organization were made instead. When lack of concentration in project management and risk management is encountered, many projects, although represented acceptable productivity, did not show good performance on achieved outcome and revealed lower efficiency than expectation as budget requesting process. This implied inadequate accountability of involved organizations.
- Lack of comprehensive integration among strategic planning, budget allocation, and project monitoring and evaluation.

Several problems, above-mentioned, in transport in past decades and limited resources of public sector brought about the need of development of analysis tools for prioritization of investment in transport projects. The tools must also be able to analyze the impact of investment of plans or projects to country's macroeconomics. This study presents development of tools and approaches for prioritization investment in country's traffic and transport.

2. Objectives of the project

The solution to mentioned problems is to set up the project's framework. It consists of reviewing previous strategic plan and analyzing the conformity of strategic plan and budget allocation with National Economic and Social Development plan or government's policy of traffic and transport strategy. The analysis should extend to investigate the conformity of strategic plan among organizations in ministry, department and division level as well. Evaluation of level of project achievement is also presented. The objectives of the study are listed as follows;

1) The study carries out probability analysis and investment prioritization of public organizations and state enterprise in Ministry of Transport which related to development of traffic and transport's infrastructures of road, rail, water and air transport. The assessment shall be made based on priority of project to macroeconomics by formulating economic model to evaluate the effect of investment on macroeconomics. In addition, study also includes probability analysis of project achievement with regards to expenditure in national strategic budget controlling plan. Strategy

plotting, budget involvement, financial management and Performance Assessment Rating Tool (PART) are used as budget allocation concept. Mechanism of efficient and effective management in budgeting is also applied.

2) The study develops the system and prepares manuals for probability analysis and prioritization of investment in each mode of transport. The policy and standard plan shall be proposed for organizations under Ministry of Transport and Office of Transport and Traffic Policy and Planning. The system shall be strengthened in order to connect personnel strategic plan of infrastructure and service developing in transport to support appropriate macroeconomics. Present conditions and strategy of future foundation development of the country is also taken into consideration.

3) The budget allocating system is established for annual fiscal expenditure based on function and area. Criteria of allocation depend on capability of analysis, project planning, and investment decision making of organizations in Ministry of Transport. Indicators for project monitoring and assessment are created to control the development clearly, conformingly and comprehensively with Government strategic plan and 10^{th} national economic and social development plan (2007-2011).

3. Overview of budget management system on transport investment

3.1 Background

Transport sector is the foundation of country development and can generate direct and indirect consequences to economic and social development. Thus, investment in transport sector is always supported with budget continuously. During past decade, strategy setting of transport sector has been emphasized because of several issues as follows.

- As an investment in infrastructure of transport continued, better flow of traffic and development of transport can be achieved. However, safety problems and requirement of maintenance was also persistently increased.
- Inefficiently energy saving in transport sector caused lack of achievement in transport sector overview in terms of stimulating economic and social development.
- Over-investment in infrastructure of air transport led to low asset utilization.
- In the past, there was no clear direction of development in water transport and lack of integrated planning of among involved organizations.
- There was lack of investment in management which led to problems and limitations of development in each mode of transport and inter-modal transports.
- Although strategic budget planning has been established, most organizations never practically implemented the strategy for plans / projects.
- Lack of monitoring and evaluation of projects after budget has been distributed and after project finished revealed inadequate accountability of projects carried out by involved organizations

Several mentioned issues in transport during past decades and limited resources of public sector brought about the need of development of prioritization of investment in transport sector. This section presents detail of prioritization in transport investment as describe in following sections.

3.2 Objective of investment prioritization system

Concept and system of investment prioritization consists of following objectives.

(1) To develop system and tool in investment prioritization which emphasize prioritization based on multi-dimensional criteria

(2) To establish procedures for organization to propose appropriate and accountable budget allocation request

(3) To establish procedures of project evaluation after budget is received and after project is completed to assure effective budget utilization.

(4) To create connection among strategy setting, goal setting, indicators setting, evaluation process and budget allocation process which leads to integrated process development.

3.3 Design concept and limitation

3.3.1 Basic concept

The development of design concept of system and tool for transport investment prioritization concentrates on solution for major transport sector's issues. In addition, several factors which are encourage desired behaviors in project/program design, budget allocation request and budget utilization with accountability to project's target.

Furthermore, the design concept of system and tool also create motivation in integrated planning among organizations in Ministry of transport. As a result, the budget shall be efficiently utilized and cooperation planning for the same target among organization shall occur. Thus, the development shall take effect in transport mode level rather than focus on planning of individual project that only resulted in each organization.

3.3.2 Limitation of systems and tools at the initial stage of operation

Owing to the fact that it is the first time to initiate development of system and tool to prioritization of transport investment, there are still some problems and limitations of the development as follows.

1) **Insufficient database to create the objective indicator and to control each strategy** This limitation causes the difficulty of linking the project/project target to the strategic goal of each strategy in Ministry of Transport. Furthermore, there is limitation of indicators development in project outcome and impact which should be the indicators in mode of transport level. Therefore, at the initial stage Proxy KPI is still required as substitute indicator.
2) **Analysis of national transport model is still in progress of developing** At the initial stage, comparative analysis of plan/project can be executed in the same mode of transport only and there is still limitation in quantitative analysis of project.
3) **Evaluation of project during the operation and success level of project is not systematically standardized and not covered to many organizations** The evaluation in the initial stage with

designed tools and system cannot be applied for these projects. In other words, at the initial stage, the evaluation of project credibility cannot be carried out.

3.3.3 Summary of concept of project prioritization system design

Refers to mentioned concept, the design concept can be summarized as follows.

(1) Compare projects within the same transport mode and compare projects within the same strategy. Thus, the organization shall identify the type of operation strategy to be applied for the budget allocation request.

(2) Compare projects within the same project characteristic. Thus, the organization shall identify the characteristic of the project for the budget allocation request.

(3) Compare projects within the same mode of transport, strategy, characteristic and output / outcome. This type of comparison shall represent efficiency of resource utilization.

(4) Criteria for project evaluation consist of 4 main groups as follows

a. Criteria to reveal outcome of Financial and Economic Returns of Project
b. Criteria to reveal project alignment with strategic objectives of Ministry of transport
c. Criteria to evaluate resource efficiency compared with output, outcome and impact of the project
d. Ability of project management or creditability of organization in terms of resource, present capability and historical records of performance

(5) Operation result of project, plan and each mode of transport are main factors to allocate the budget to each transport mode in next fiscal year. Additionally, overview budget allocation to each transport mode shall determine condition of key issues of each mode concurrently. When each mode of transport is allocated, budget allocation in each strategy shall be carried out with the same logic.

The overview of transport system and evaluation criteria detail of each group is presented in Section 3.5 and 3.6, respectively.

3.4 Previous study of investment prioritization system from abroad

The purpose of this topic is to present case study from aboard that developed the prioritization system of budget allocation for organization in transport sector. The analyzed organizations by the Advisor consist of Department for Transport (DfT) in the United Kingdom and Department of Transport (DOT) in the United States of America.

3.4.1 Case study of Department for Transport (DfT), The United Kingdom

This report summarizes the analysis of Department for Transport's (DfT) operation. The operation scope and decision-making authority of this organization is similar to Ministry of transport and the authority in decision-making of DfT is more than that of OTP.

The objectives of this report is to reveal 1) Importance of analysis tool development for investment and budget allocation requesting for organization to issue country's transport policies, 2) Tools, procedures and processes for project analysis and 3) Operation context of DfT and organizations in transport sector in the UK that related to project analysis. Major issue to be considered is continuous development of tools. Importance of DfT development is also emphasized in order to maintain organization status to be responsible for budget allocation for organization in transport sector and local authorities.

(1) Guidelines and major procedures of DfT to determine budget allocating request

- The procedures of assigning direction, policies and action plans of transport sector in the UK are executed by DfT by using tools and following components.
    - National Transport Model (NTM): It is the integrated model of transport system in country's level. It is composed of sub-models and database of several modules with relationship derived by economics equation from research and development of DfT. NTM is applied to issue policies and assign action plans for overview transport sector in the UK to establish 10-year plan. Furthermore, it is used to formulate transport policies in transport mode's level, regional's level or local transport's level. The issued policies and action plans shall be transformed into public service agreement (PSA) which consists of indicators and objectives that is consistent with the 10-year plan.
    - Policies received from independent regulator.
    - Policies received from Government which consists of importance in action plan and implementation less than policies received from independent regulator.
    - Evaluation result of Office of the auditor general in terms of value of budget utilization.
    - Evaluation result of internal audit of government organizations and private organizations that provide transport service.

- Policies from the summit between DfT and transport organization in air transport and water transport including transport safety and environment board as well.

- Direction, policies and action plan of transport sector shall be reviewed every fiscal year to evaluate value of operation and check the consistency of outcome with public service agreement (PSA) as well as to examine the necessity of project scheme adjustment.
- DfT has developed Guideline for local authorities seeking government funding for major transport scheme[1] by creating procedures, forms and required list of data that organization need to submit to DfT. Moreover standing advisory committee for trunk road assessment (SACTRA) was appointed as trunk road may contribute economic and social advantages to many communities.
- Major procedures of project determination consist of 3 procedures which are (1) Program entry, (2) Conditional approval and (3) Full approval.
- When the information from the organization that is prepared in major scheme business case (MSBC) is received, DfT staff will analyze the project. Then the project detail shall be prepared to propose to the Minister who is responsible for DfT with following project analysis details.
    - Strategic consistency analysis is carried out by investigating whether the project's target is consistence with objectives or targets in local, regional and country's level.
    - Evaluation of value for money
    - Capability of project management to evaluate the creditability of project operator whether it is conformed to the proposed business case. The determination of organization's creditability and past performance records shall include mechanism of stakeholder's participation and risk management plan.

[1] Guideline for Local Authorities Seeking Government Funding for Major Transport Scheme: It can be noticed that DfT generally supports big transport projects and required high investment budget. The self-financing projects shall be operated by local authorities and transport service providers.

- Thoroughness, accuracy and creditability in project's financial cost estimation and financial capability of local authorities (in case of co-funding between central authorities and local authorities.
- Feasibility and effectiveness in project operator selection.

- The analysis of value for money[2] (VfM) of the project consists of following details.
  - Analysis of Benefit Cost Ratio (BCR) is composed of following criteria.
    - The project with BCR less than 1.0 is considered not economical or no VfM project. Thus, DfT shall not support this group.
    - Project with BCR between 1.0-1.5 is considered low VfM project. The support from DfT to this group shall be minimal. Additional consideration for immeasurable impact to local area or communities may be taken into.
    - The project with BCR between 1.5-2.0 is considered medium VfM project. Most projects of this group shall be supported by DfT. The chances of unequal support distribution and market distortion shall be considered as well.
    - The project with BCR more than 2.0 is considered high VfM project. Almost every project of this group shall be support by DfT.
  - The definition of BCR used in the UK is the net benefits-cost to customers, business sector and private service providers divided by the project budget.
  - Criteria to consider BCR consist of measurable parameters that can be transformed into monetized impacts as follows.
    - Time saving
    - Safety
    - Overcrowding for railway transport
    - Construction-financing costs
    - User charges/ticket revenues
    - Disruption during construction

[2] Analysis based on guidance of Value for Money

- BCR shall benefit to DfT only as indication, but other project related factors that cannot be transformed into monetized impacts shall also be taken into account.
- DfT shall focus on evaluation and review of post-implementation project's benefit. The budget of this review shall also be recommended by DfT to involved organization to prepare.
- There are several details that DfT also emphasizes as well as development of appropriate budget allocating assessment tool and evaluation of value for money. Firstly, the mentioned details are setting of system for budget requesting, creating suitable behaviour in the organization that request the budget, changing of behaviour in budget requesting and responsible budget utilization. Additionally, initiation to create required database and strengthen of organization's project management are also considered. Moreover, the support to audit the operation at the initial stage, implementation stage and post-implementation stage is also significant.

(2) **Key Takeaways from DfT case study**

After analyzing the guidelines of budget requesting of DfT, it is found that the major concepts to be applied to guideline of capability increase of OTP's budget request determination are listed as follows.

- The decision-making of budget request determination of organizations shall be carried out in terms of both quantitative and qualitative analysis. In addition, logical consideration shall be included especially when the required database is still in progress of developing.
- The development of database is still needed to be carried out continuously. The direction of database development should be in the way that support the project determination and be able to increase the capacity of quantitative analysis. However, as the development in transport sector trigger the direct and indirect impacts in terms of economic, social and environment, qualitative factors are still necessary for project determination.
- Other important factors of decision-making tool development are creation of system and processes to encourage accountable and creditable budget requesting system of organization. In addition, there should be development of information list and determination criteria that are agreed by involved

organizations for the purpose of systematical and directional database development.

- Since OTP does not have the authority to make a clear decision due to organization's rules, creditability of OTP shall be established instead. The setting of organization's status as concept providing leader in transport sector is required. As a result, OTP will have the capability to implement the budget allocating determination system with the approval from involved organizations.

3.4.2 Case study of Department for Transport (DfT): Procedures and development of project determination system

This part of report is the additional part to the case study of Department for Transport (DfT). The main purpose is to present the concept of development of analysis tool and investment prioritization of organization that is responsible for issuing policies, plotting strategy and filtering budget allocation in transport sector. The content is derived from organization analysis summary of similar characteristic organizations in many countries such as the UK, USA, Germany, France and countries in the EU that assigned free-flow of Goods directives

Presented concepts in following tables summarize the analysis of similar guidelines of organization in mentioned countries. Consequently, OTP can use this as a guideline to develop analysis and investment prioritization tool as shown in following details.

Table 3.4-1: Guideline of analysis tools development and investment prioritization.

Guidelines	Initial Phase (3-5 Years)	Intermediate Phase (3-5 Years)	Future Phase
Assignment of the Policies, Objectives and Strategies	Development of Modal-based Model[3] for transport mode. Each model consists of at lease 2 sub-modules which are Demand Model and Capacity and Cost Model. Developments of these models are the foundation of objective assignment to develop transport sector and strategy setting of each phase[4]. The model shall be continuously developed due to the strategy of each phase. Suggestions from the independent regulator (transport organizations and other organizations such as independent regulator, environment organizations), report from internal audit in transport sector as well as the change of technology and the structure of transport industry are also included		
Tools, mechanism and system for project analysis and budget allocation	● In initial phase, project analysis and budget allocation must be operated under terms and conditions of data and limitation of detail and accuracy of model to evaluate compensation and impact. For that reason, evaluation of feasibility and project prioritization shall be the combination of between quantitative evaluation such as Benefit-Cost Ratio and qualitative evaluation, especially consistency analysis of strategic indicator or the assigned objectives.	● Gateway criteria or criteria of whether "pass/not pass" for is introduced to select the project before the project prioritization is applied ● Gateway criteria consist of Cost-Benefit Ratio and/or social and environment impact criteria from the project operation (however, in Thailand, application of Cost-Benefit Ratio in Gateway criteria is likely to be suitable with state enterprises).	● When the Model is increased in resolution, it will be able to efficiently use Gateway criteria. The countries that have developed to this point will use Benefit-Cost ratio with gateway condition to analyze social, environment and public impacts. ● Provided with development in project financing options.

[3] For example, National Transport Model (NTM) of Department for Transport

[4] Time frame is different between 4, 5 and 10 years, depends on condition of consideration in each countries, such as the change of the Government strategy or life cycle of investment in transport sector.

Table 3.4-1: Guideline of analysis tools development and investment prioritization.

Guidelines	Initial Phase (3-5 Years)	Intermediate Phase (3-5 Years)	Future Phase
	• Due to the limitation of data for evaluation and indicator preparation for each level, assignment Gateway criteria or criteria for project priority selection is unable to be implemented because of the possible conflict among organizations. • The characteristic of consideration in project investment feasibility and project prioritization are combined with many criteria includes, o Benefit-Cost Ratio o Consistency with Strategy objective in each level. o History of project management and project operation in the past. • The weight of criteria in each section depends on following conditions. o Ability in evaluation of model's benefit-cost ratio.	• Scoring sheet is introduced to organizations in many countries then workshops were arranged for cooperation in creating scoring sheet. • Assignment procedures in consideration of project budget allocation is introduced with following procedures o Preliminary Screen – is operation analysis of data completeness in each project, for the project with incomplete data (as specified format) shall return the data in the specific time. o Conditional Approval - is the project assessment of scoring sheet with Gateway criteria. In this procedures, the organizations shall be	

Table 3.4-1: Guideline of analysis tools development and investment prioritization.

Guidelines	Initial Phase (3-5 Years)	Intermediate Phase (3-5 Years)	Future Phase
	○ Database which support indicator and evaluation. • In case of database is sufficient and evaluation of model is accepted, the weight to the consideration of criteria can be increased quantitatively. • In the initial phase, model and database are not completely ready. Thus, the important mechanism of organization that is responsible for budget consideration is to prepare "Required data list" to obtain important data as specified in the criteria. • Strategic concept for management alteration, firstly, is to encourage organization to create guideline, culture of accountability. Thus, in the initial phase, the guideline will follow 'Trust and Reciprocity' concept. As a result, in the initial phase, organizations that request the budget shall propose commitment for	acknowledged whether their status meet the requirement of Gateway criteria. In addition, score level of the project is presented (in order that, organization is able to self-asses the score). ○ Final Approval – is a project prioritization based on score ranking from scoring sheet incorporated with the Credit Rating Score of organization. • Encouragement of seriously Post-project evaluation to be assembled in credit assessment from organizations that request the budget.	

Table 3.4-1: Guideline of analysis tools development and investment prioritization.

Guidelines	Initial Phase (3-5 Years)	Intermediate Phase (3-5 Years)	Future Phase
	the project to be allocated with the budget. If the organizations are unable to perform according to their self commitment, the proposed project in the next fiscal year will have low creditability. Consequently, organizations that consider the budget shall prepare a progress report form for organizations. Above mentioned guidelines will be able drive accountability behaviour in operation and budget request of organizations.		
Operation in related activities.	● Development of analysis model of Benefit-cost ratio is mainly based on evaluation concept of FIRR (Financial Internal Rate of Return) and EIRR (Economic Internal Rate of Return). ● Upgrade the ability of internal audit function for organization in transport sector to technically audit during	● Upgrade analysis model of Benefit-cost ratio to evaluate benefit to stakeholders which are users, business sector and service providing sector then compare with operational cost. ● Apply assessment of ability in organization's operation substantially.	● Upgrade analysis model of Benefit-cost ratio by including more details to present influence of project result to transport sector, such as o Time Saving o Safety o Modal Shift o Technology Effectiveness

Table 3.4-1: Guideline of analysis tools development and investment prioritization.

Guidelines	Initial Phase (3-5 Years)	Intermediate Phase (3-5 Years)	Future Phase
	implementation and post-implementation period. ● Start to operate assessment of Post Project Evaluation. ● Assign scope of assessment in operation ability for organization (Credit rating). ● Start to coordinate data and mechanism in consideration with related organization, especially in environment organizations and local authorities. ● Create database or reports of operation progress for each project and organization.	● Incorporate the criteria from related organization especially from regulator and evaluator based on the issued policy, and Policy–Regulatory impact assessment. ● Support and develop the capability of transport organization in strategic planning and budget allocation appropriately.	● Adjust criteria of budget requesting to be consistent with assigned regulation.
Self-development of organization that is responsible for project consideration.	● Personnel development in competency of project analysis based on Benefit-cost model. ● Personnel development in preparing National Transport Model. ● Personnel development in understanding and competency in public finance.	● Continue personnel development in Benefit-cost model and National Transport Model. ● Personnel development of related organizations especially environment organization and local authorities to able to assess the impact to society	● Continue personnel development in Benefit-cost model and National Transport Model.

Table 3.4-1: Guideline of analysis tools development and investment prioritization.

Guidelines	Initial Phase (3-5 Years)	Intermediate Phase (3-5 Years)	Future Phase
	• Personnel development in understanding and competency in project assessment and organization assessment.	and environment from projects in transport sector. • Personnel development in internal audit function of transport organization to able to audit, project assessment during implementation and post-implementation period.	

3.4.3 Case study of Department of Transport (DOT), The United States of America

Department of Transport is US government sector has been using PART (Performance Appraisal Rating Tools) for project planning, budget management and Performance Improvement Initiatives (PII). It is considered main objective of government business management in United State of America.

PART is a system that Office of Management of Budget (OMB) which has the same mission as Bureau of the Budget of Thai government. It consists of major characteristics in these followings.

- PART is a tool to analyze effectiveness of the project which is budget-supported and aim for operation improvement. In other words, it is considered a guideline of development assessment. However, **the result of assessment is implied in decision-making of budget allocation**.
- Analysis scope of PART covers the process of Program purpose and design, planning, management-implementing and project results.
- After assessment in scope of PART, **each project shall be executed Effectiveness Rating and classified in listed level.**
    - Effective, or project with a good effectiveness result
    - Moderately Effective, or project with a moderately effectiveness result
    - Adequate, or project with an adequate effectiveness result
    - Result not demonstrated, or project without effective result
- After each project has been assessed and effectiveness rated, project owner shall create Performance Improvement Initiative (PII) to upgrade effectiveness of project. For this reason, PII is important plan for commitment to improve the effectiveness of the project.
- PART was designed in the concept of “user friendly” and “controlled logic”. As a result, **the organization must present the Citations of Evidence to support the decision in answering each question**.
- PART is a web-based system with an exact operation calendar in each process. Furthermore, PART is a system that is supported by the laws therefore it has status of Enforced Tool organization shall comply. Consequently, OMB organizes the training every year which includes refresher training for experienced PART user or introductory training for new user.

- When start using PART system, organization shall specify basic unit of analysis which can be a plan, a project or set of plans or set of projects with the same objective. – **It is clear that PART is the system that focuses on integration of plan or project with the same objective to benefit in efficiently resources utilization.**
- OMB classifies many types of project by characteristic of project, budget source, objective of project and type of asset.
- PART consists of specific question for each project type **which reflects the concept of comparison between the same type of project.** Moreover, PART understands that each type of project has differences in objective, planning, management stakeholders and characteristic of result which is unable to be compared with different types of project.
- PART emphasizes in giving advice for organization in performance measurement by mainly using outcome indicator. Because outcome indicator shall reflect the organization's performance most clearly.
- In addition, PART emphasize in building motivation for organization to develop efficiency. It can be operated in two alternatives. Firstly, generate more outcome than the specified value within the budget provided. Secondly, generate outcome as specified with less budget or resources utilized. The suggested PART's indicator to reflect organization's efficiency is Outcome Efficiency Indicator.

From the case study of Department of Transports (DOT) summarized above, major issues are listed as follows.

(1) The major concept of OMB and DOT is not focus on presentation of project attractiveness or preferred investment choice. Alternatively, organization shall focus on accountability in entire project operation which are project design / assign objective, planning, project management and accountability of work.

(2) Project assessment by PART encourages organization to perceive the importance of creating Performance Improvement Initiative (PII) and operation that follows PII. However, if organization is unable to develop and comply with PII, the budget is likely to be suspended, delayed or canceled especially, if the project duration is longer than 1 fiscal year.

(3) The summary concept of PART by OMB is to give an opportunity to organization to present the project in Self-propose within specified framework concept and assess

the achievement level of project by PART's concept. Consequently, operation can be improved, capability assessment and subsequent creditability of organization assessment. The consideration shall be made based on projects of organization and achievement level of project that operated according to PII.

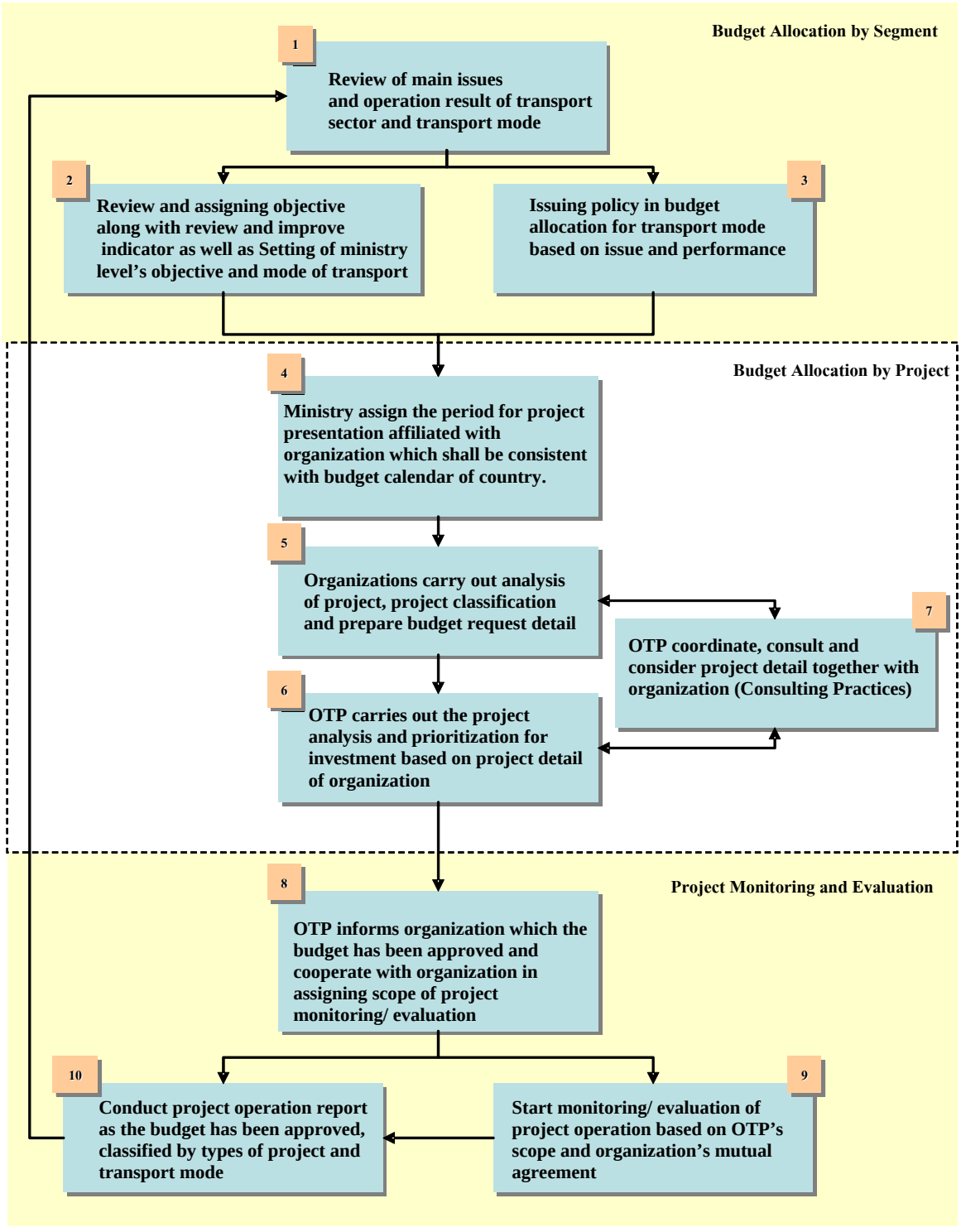
(4) The concept in topic (3) is difference from the case study of DfT, which focus mainly on project prioritization in basis of Value for Money (VfM). However, processes of DOT could be suitable for initial phase operation in Thailand. Then, after the database system, capability of indicator development in outcome level and impact, including model of transport system in country has been developed, the concept of DfT is applicable in Thailand to take project prioritization into account by using more quantitative techniques.

The case study of DfT and DOT reveal the concept of emphasizing on efficiently budget utilization. The major aspects including concept, tools and implementation from two of cases study shall be applied as foundation to develop analysis concept and investment prioritization in Ministry of transport as presented in the next section.

3.5 Overview of budget management system in transport investment.

In order to reflect the concept of the system with the mentioned limitation in topic 3.3, overview of budget management system in transport investment under Ministry of transport is presented in the below figure.

Figure 3.5-1: Overview of budget management system in transport investment



From above diagram, it can be seen that system overview consists of 3 parts and 10 subsequent steps. It is designed to be consistent with government strategic plan, frame work and budget allocating guideline as follows.

(1) **Part 1 Budget allocation for each mode of transport and project, consists of 3 major steps.** In this part, the main purpose is to review the key issues of the transport sector and transport in each mode. Problems in each mode and sector shall be defined and investigated (such as, safety, ability in competition and the service of transport system) and achievement report from project operation in each of fiscal year. The major outcome from this operation is the policy of assigning objective for Ministry of Transport (or transport sector) which probably covers the assigning objective, indicator and strategy. Furthermore, another important outcome is the policy of budget allocation for each transport mode and types of project. The budget allocation depends on agendas to address key issues and achievement in each of type of project, as well as efficiency and effectiveness in budget utilization for each type of project in each mode of transport. Main 3 steps of this part are listed below.

Step 1: Review the key issues and results of operations and transport sector in each mode.

Step 2: Review and set the objective as well as improve the indicators and goals in ministry and mode of transport level.

Step 3: Issue the policy in budget allocation for each transport mode, specified by problems and overall outcome of operation.

(2) **Part 2 Budget allocation for projects, comprises 4 major steps.** Focus of this part shall be on proposed project analysis by organization in Ministry of Transport. Requested budget shall be examined as well. The fundamental concepts of this process comprise 1) operation duration should be consistent with the budget calendar 2) project details proposal should be systematically for operation and complied with the Bureau of the Budget conventional form (PART). Moreover, official a form created by OTP should also be assigned to organization to provide more details (such as form B which was presented in this study). After that it shall be combined with citations of evidences to support objective assigning and assessment of project achievement. Major 4 steps are listed as follow.

Step 4: Ministry of Transport assign the calendar of the project period proposed by organizations. National budget calendar shall be considered accordingly.

Step 5: The organizations conduct a project analysis, specify the type of project and prepare sufficient details for budget requesting.

Step 6: Office of Transport and Traffic Policy and Planning conduct a project analysis and prioritize according to project detail proposed by the organizations.

Step 7: Office of Transport and Traffic Policy and Planning carry out cooperation, conferences and clarification in the project details among organization with consulting practices.

(3) **Part 3 Monitoring and evaluation project, consists of 3 major steps.** The objective of this part is to encourage behavior of accountability for budget utilization and guarantee of success of the project. Three major steps are shown by these following.

Step 8: Office of Transport and Traffic Policy and Planning notifies the organization with the approved budget and cooperate with the organization to assign project framework for monitoring and evaluation.

Step 9: Monitoring and evaluation of projects under the framework are carried out as cooperated between Office of Transport and Traffic Policy and Planning and the organization.

Step 10: Prepare a report of project operation as the budget approved, categorized into type projects and transport mode.

The process of annual budget document preparation by PART, initiated by Bureau of the budget, shall be directly related and connected to system overview in step 4, 5 and 9.

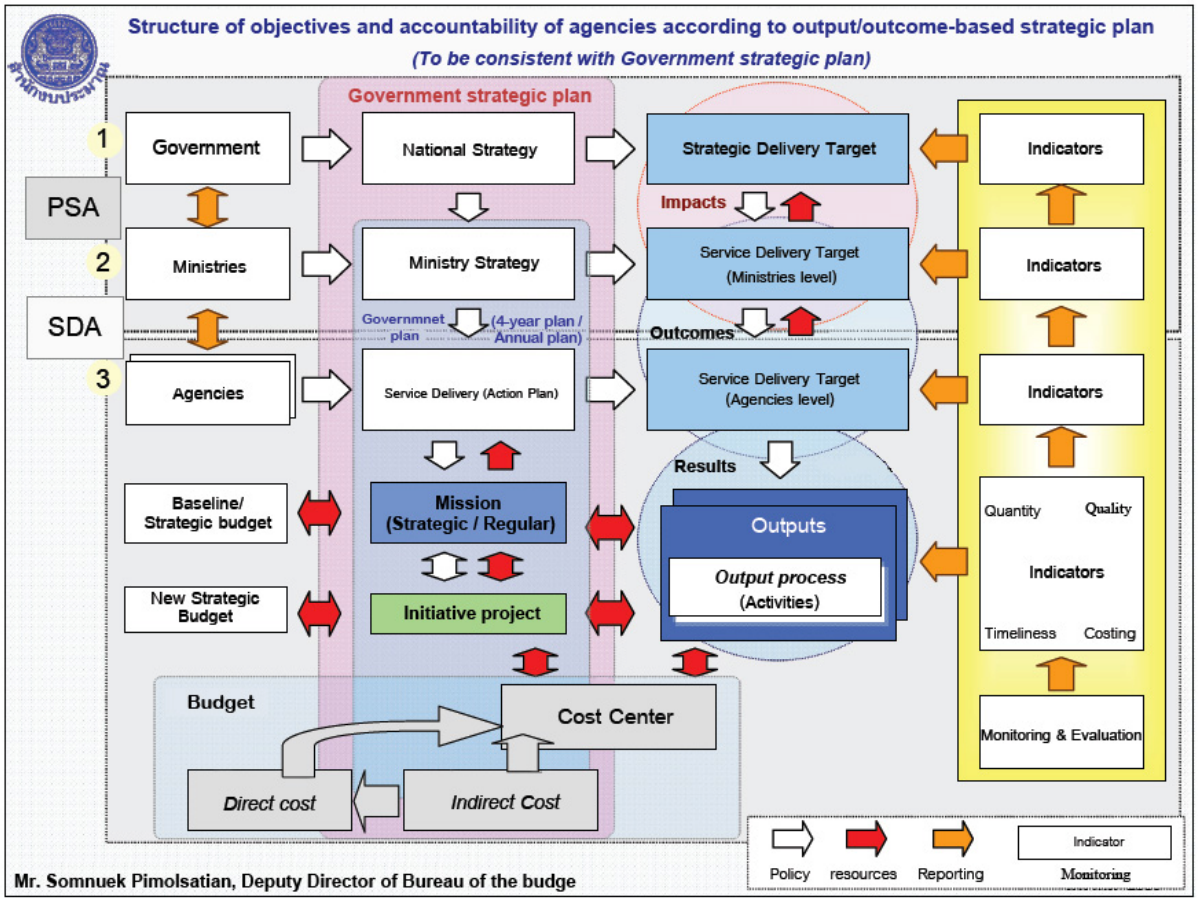
All presented above is the comprehensively conceptual idea of the designed system for analyzing the feasibility and prioritization of project. The next three sections provide a comprehensive overview of the three main components of the system which are (1) proposal of Ministry of Transport's Indicators, (2) tool of project prioritization and SAM, and (3) PART, accordingly.

4. Proposal of Ministry of Transport's Indicators

4.1 Introduction

According to planning framework and project management (source: Bureau of the budget, 2007), action plan determination is a signification factor to performance-based strategy management of Ministry of transport. It also can be used as concept of suitability determination of plan/project with regards to strategy, target or goal of Ministry and shall be applied in planning and budget allocating for next fiscal year. Major method in determination of plan/project with regards to strategy is to set the project output in accordance with service delivery target of organization, ministry and country respectively. This method can be derived from accurately strategic planning and output/outcome target setting and planning that reflects strategic requirement. In addition, strategy in each level (ministry strategy, organization and plan/project) shall be consistency with public service delivery target, organizational service delivery target and plan/project output as shown in figure 4.1-1.

Figure 4.1-1 Planning framework and project management



The setting of service delivery target in each level can be carried out by setting explainable success level of each indicator. Moreover, indicators can be grouped into many types which are input, process, output, outcome and impact. Each indicator shall represent operation result in term of quantity, quality, time and cost.

4.2 Ministry level indicator development framework

It is clear that strategic management and performance-based budget allocation focus on strategy of operational achievement system. Indicators shall be selected to set substantial service delivery target and action plan shall consist of indicators with clearly defined output and outcome for purpose of measurement and evaluation of operation result. Selected indicators used as success setting of output level and outcome level shall be connected with organizational indicator level as well. Ministry of transport, that responsible for government sector transport, generally focuses on impact of transport outcomes to people (different target group can be categorized into type of transport system utilization). Furthermore, impacts to people or to other sectors of society shall be presented by Ministry of transport as well. Operations executed by Ministry of transport are usually trigger impacts to economy, politics, society and environment. Generally impact to economy shall be main interest of the ministry. The impacts may also take security, social welfare (e.g. safety in transport) and environment into consideration.

Development in department or organization level is mainly concern with output indicator because it can represent object or service operational result. Type of service is dependent on role and type of organization mission as the operational result can be substantial or acknowledgeable such as consultant activity. The final stage of operation process in division or assigned activity is organization out to people. In other word the output shall be benefit to target group outside organization rather than target group inside the organization. Indicators in output level shall reflect the operation of the organization that need to control service delivery success and clearly define the measurement method. Consequently, the controlled factors consist of quantity, quality, cost and time. Moreover measurement method must be assigned to control cost or expense relating to output process. Differentiation between outcome and output is the key factor to develop efficiency measure of project operation. Operation efficiency measurement in ministry level is highly related to outcome indicator which is the final goal that ministry needs to obtain and it also provides advantages to customer as

well. Alternatively, output only represents number of products delivered, number of services provided or number of customers served by organization.

If Ministry of transport applies efficiency measurement of operation monitoring and impact prediction from investment or project operation correctly and consistent with vision, mission and action plan of ministry, following advantages are expected to be achieved.

- Result and operation efficiency can be explained to policy planner, customers and other involved parties.
- Correct and up-to-date information on transport system shall be provided and can be applied to explain and describe to customer, organization executives, general public and other involved parties.
- Organization efficiency can be increase when focusing on significant investment by incorporating the information into project prioritization.
- Objective achievement can be acquired effectively by using the information for long-term planning and transport sector's policies setting.
- Impact of each project operation alternative can be acknowledged and understood. Moreover, the result can be used to develop the operation process.

4.3 Recommendation and ministry level indicator detail

Indicators are considered important factors for plan/project determination, budget allocation, operation result measurement and service delivery target. As a result, related issues and aspects must be extensively and thoroughly analysis based on objectives and level of indicator in order to identify status of operation with reference to service delivery target of the project. The development of indicators required appropriate indicators selection by applying major criteria of indicator development of Ministry of transport. The properties of the required indicators are:

1) Categorized as outcome level indicator
2) Represent status/operational result of transport
3) Can be practically obtained the information. In this study, the Advisor assigned the project scope by considering basic type of transport. The investments are divided by transport modes which are road transport, railway transport, water transport and air transport. Moreover, the Advisor also considers scope of transport service providing area in each type which is city transport, intercity transport and international transport.

The classification of project by above criteria can be useful for project information collection in groups and project operation result within scope of service can be examined thus context of service can be assessed. In addition, project classification by considering scope of service shall reveal roles of investment in transport development within scope of service. Another advantage of project classification is involving organization of transport development can be identified.

The study of suitable indicators for Ministry of transport should consider 3 major strategies. In general, the target of main investment of Ministry of transport is consistent with above mentioned strategies which are.

- Strategy 1: Development and potential enhancement of transport to strengthen economy, commercial and services.
- Strategy 2: Development of safety in transport and reinforce national security
- Strategy 3: Traffic flow condition and access to transport infrastructure

Service delivery target in Ministry of transport level consists of 4 targets as follows.

Target 1: People can access to convenient and fast transport system, 2 indicators in this target are listed as follows.

- Infrastructure of transport is developed to increase passenger capacity not less than……passenger/year.
- Proportion of transport infrastructure that receives maintenance in relation with distance or operation plan assigned in each fiscal year not less than……..percent.

Target 2: Logistic system operates with appropriate cost and high competitiveness which consists of 3 indicators as follows.

- Transport infrastructure is developed to increase domestic freight capacity not less than…… per year.
- Freight on railway transport and water transport system increases not less than…..
- Logistic cost compared with gross domestic product (GDP) not more than……percent

Target 3: People can use safety transport system, in this target 1 indicator is listed below.

- Percentage of decrease in casualty per distance of highway travel

Target 4: Logistic system is managed efficiently, in this target 1 indicator is listed below.

- Percentage of customer satisfaction of transport system towards policies, management, projects and necessary measures not less than……

Detail with target value and responsible organization are shown in table 1 and 2 respectively.

Table 4.3-1: Summary of service delivery overview and indicators of Ministry of transport

Service delivery target provided by Ministry of transport in fiscal year 2010					
Service delivery target	Indicator's target				
Indicator	Unit	2009	2010	2011	2012
1. People can access to convenient and fast transport system					
Indicator: Infrastructure of transport is developed to increase passenger capacity not less than……passenger/year	Million people-trip	750	750	750	750
Indicator: Proportion of transport infrastructure that receives maintenance in relation with distance or operation plan assigned in each fiscal year not less than……..percent	Percent	70	75	80	85
2. Logistic system operates with appropriate cost and high competitiveness					
Indicator: Transport infrastructure is developed to increase domestic freight capacity not less than…… per year	Million Ton	500	500	500	500
Indicator: Freight on railway transport and water transport system increases not less than…..	Percent	2.5	3	3.5	4
Logistic cost compared with gross domestic product (GDP) not more than……percent	Percent	10	10	10	10
3. People can use safety transport system					
Indicator: Percentage of decrease in casualty per distance of highway travel	Percent	4	3	2.5	2
4. Logistic system is managed efficiently					
Indicator: Percentage of customer satisfaction of transport system towards policies, management, projects and necessary measures not less than……	Percent	80	80	80	80

Detail of operation guideline and responsible organization in each service delivery target is shown in table 2.

Table 4.3-2: Operation guideline and responsible organization in each service delivery target

Target	Indicator	Operation guideline	Responsible organization
1. People can access to convenient and fast transport system	Infrastructure of transport is developed to increase passenger capacity not less than……passenger/year	Improve quantity, quality and service of public transport to be connected and accessible	BMTA,TS,MRT, SRT,MD,DCA, AOT,THA
	Proportion of transport infrastructure that receives maintenance in relation with distance or operation plan assigned in each fiscal year not less than……..percent	Maintenance infrastructure to meet standard condition in both quantity and quality of service level	DOH, OR,EXAT, SRT,MRT,MD, PAT, TMN, CA, AOT,AEROTHAI, CATC
2. Logistic system operates with appropriate cost and high competitiveness	Transport infrastructure is developed to increase domestic freight capacity not less than…… per year	Improve and develop transport infrastructure to support freight capacity	DT, OTP, SRT, MRT, MD, PAT, DCA, AOT
	Freight on railway transport and water transport system increases not less than…..	Develop, encourage and improve logistic system to increase railway freight and water freight	PAT,SRT,MD
	Logistic cost compared with gross domestic product (GDP) not more than……percent	Develop supervising system to enhance transport infrastructure suitable for logistic	DOH, DOR EXAT, DLT, OTP,MD, PAT, SRT,AOT, THA, MD
3. People can use safety transport system	Percentage of decrease in casualty per distance of highway travel	Improve highway network to increase road safety	DOH, DOR, PAT
4. Logistic system is managed efficiently	Percentage of customer satisfaction of transport system towards policies, management, projects and necessary measures not less than……	Improve service delivery efficiency and comprehensive development travel network for customer	OTP, MOT

Indicators listed in table 4.3-1 and 4.3-2 have been developed from available information which contains several indicators that describe aspects of measurement. However, limitation of this indicators development is numbers of required information were not collected or data could not be verified for accuracy and reliability. As a result, many ideal indicators cannot be applied to set service delivery target as an example that there is no data that reveals the result and impact of the operation of convenient and fast target (indicator: speed of travel and time loss during travel), thus this important indicator cannot be practically applied. A solution to this is to assign indicator to identify capacity of infrastructure instead (capacity indicator) and assign infrastructure maintenance result as

an indicator to monitor infrastructure service providing. Nevertheless, according to the Advisor's proposal on budget planning (including project prioritization) with respect to mission of the ministry and transport mode, indicator and target setting shall be carried out in transport mode's level. This level of indicator is mode specific indicator, can be assigned with suitable indicators, contains adequate information to develop the indicator and can be designated with clear responsible organization. Indicators in each mode of transport are listed in table 4.3-3 to 6.

Table 4.3-3: Proposal of road transport level indicator

Target	Transport mode level indicator	Unit	Responsible organization	Ministry level indicator
1. People can access to convenient and fast transport system	Number of customer using public transport	Million people-trip	BMTA/TS	✓
	Percentage of completed distance or operation of road transport compare with planned distance or operation assigned in each fiscal year	Percent	DOH/DOR/EXAT	✓
	Percentage of main road in city with proportion of traffic per road capacity (V/C) more than….in peak hour	Percent	DOH/DOR/EXAT	✗
2. Logistic system operates with appropriate cost and high competitiveness	Volume of freight on domestic highway network	Million Ton-KM	DLT/ OTP	✓
	Logistic cost of road transport compared with gross domestic product (GDP)	Percent per GDP	DOH/ DOR/ EXAT/ DLT/ OTP	✓
3. People can use safety transport system	Reduction of casualty per volume of highway travel compare to pervious year	Percent	DOH/ DOR/ EXAT	✓

Remark: Mark ✓ shows that the indicator is the ministry level indicator and ✗ shows that the indicator is not the ministry level but it is necessary in mode of transport level indicator

Table 4.3-4: Proposal of railway transport level indicator

Target	Transport mode level indicator	Unit	Responsible organization	Ministry level indicator
1. People can access to convenient and fast transport system	Number of passenger using train and subway	Million people-trip	MRT/ SRT	✓
	Percentage of completed distance or operation of railway transport compare with planned distance or operation assigned in each fiscal year	Percent	MRT/ SRT	✓
2. Logistic system operates with appropriate cost and high competitiveness	Volume of freight on railway network	Million Ton-KM	SRT	✓
	Increase of freight on railway transport compared to previous year	Percent	SRT	✓
	Logistic cost of railway transport compared with gross domestic product (GDP)	Percent per GDP	SRT/ OTP	✓
3. People can use safety transport system	Casualty per volume of railway travel	People per 1 million railway passenger	MRT/ SRT	✘

Remark: Mark ✓ shows that the indicator is the ministry level indicator and ✘ shows that the indicator is not the ministry level but it is necessary in mode of transport level indicator

Table 4.3-5: Proposal of water transport level indicator

Target	Transport mode level indicator	Unit	Responsible organization	Ministry level indicator
1. People can access to convenient and fast transport system	Number of passenger using water transport	People-trip	MD	✓
	Percentage of completed maintenance operation of water transport compare with operation assigned in each fiscal year	Percent	MD/ PAT/ TMN	✓
2. Logistic system operates with appropriate cost and high competitiveness	Volume of freight by water transport both domestic and sea coast	Million Ton-KM	MD/ PAT	✓
	Increase of freight on water transport compared to previous year	Percent	MD/ PAT	✓
	Logistic cost of water transport (ocean/ sea coast and domestic) compared with gross domestic product (GDP)	Percent per GDP	MD/ OTP	✓
3. People can use safety transport system	Casualty in water transport (domestic and sea coast)	People	MD	✗

Remark: Mark ✓ shows that the indicator is the ministry level indicator and ✗ shows that the indicator is not the ministry level but it is necessary in mode of transport level indicator

Table 4.3-6: Proposal of air transport level indicator

Target	Transport mode level indicator	Unit	Responsible organization	Ministry level indicator
1. People can access to convenient and fast transport system	Number of passenger using air transport	Million people-trip	DCA/ AOT/ THA	✓
	Percentage of completed maintenance operation of air transport compare with operation assigned in each fiscal year	Percent	DCA/ AOT/ AEROTHAI/ CATC	✓
2. Logistic system operates with appropriate cost and high competitiveness	Volume of freight by air transport	Million Ton-KM	DCA/ AOT	✓
	Increase of freight on air transport compared to previous year	Percent	DCA/ AOT	✗
	Logistic cost of air transport compared with gross domestic product (GDP)	Percent per GDP	DCA/ AOT/ THA/ OTP	✓
3. People can use safety transport system	Casualty in air transport per 100 million air transport passenger	People per 100 million air transport passenger	DCA/ AEROTHAI	✗

Remark: Mark ✓ shows that the indicator is the ministry level indicator and ✗ shows that the indicator is not the ministry level but it is necessary in mode of transport level indicator

The recommendations from the Advisor are listed as follows.

- Strategic level or transport sector indicators should represent impact from strategic operation in ministry level as well as organization's operation in department level or equivalent. Generally, transport sector level indicator's characteristic is composite index.
- Ministry level indicators may consist of impact or outcome indicators because the operations are not carried out by itself. The main duty of the Ministry is to set the guideline and manage

the operation of department or equivalent level organizations with regards to assigned strategy. As a result, Ministry of transport is responsible for indicators that represent operations from each transport mode.

- Department level indicators may contain outcome and output indicators depend on project operation process and project life cycle. For example if the project duration is longer than one fiscal year, output measurement can be done in one fiscal year period before project is finished then after the project is finished, operation outcome can be measured. In some cases, when a project is partially finished and partly open for service (for example expressway that some finished sections are opened), outcome of project can also be measured.

OTP should establish guidelines to clearly assign indicator in each level and considered as project planning concept as well as budget requesting process. Main issues to be concern are listed as follows.

- In the initial stage, the support database of strategy level indicators, transport mode level indicators and ministry level indicators is generally not completed. Thus, low level indicator can be upgraded instead for example some department level indicators may be applicable to ministry level indicators.
- Above mentioned practices have been applied to present, however it does not support good operational development. The cases that OTP allow organization in ministry level and department level or equivalent apply lower level indicator to request the budget or measure strategic result is popularly used by many organizations. In other words, indicator of output level is presented instead. OTP should assign those organizations to evaluate operation result after the project is finished and apply indicators that reveal operation outcome by KPI monitoring or use indicators that monitor the operation instead of evaluate the result.

Procedures to connect indicators in each strategy consist of following steps.

(1) Assign strategy level indicators and overview transport sector. Indicator in this level shall be applied to set the development direction and used as guideline to assign scope of plan/project in each level.

(2) Assign transport mode level indicators. It can be derived from defining success factors that support the achievement of target of strategy level or key success factors or define key issues in order to achieve target with strategy level indicator. The scope of Transport mode

level indicator may be partially assigned by determination of investment relationship such as traffic flow in toll way, time controlling of freight train in doubled track railway, average waiting time for landing on international airport.

(3) Assign organization level indicators. These indicators are resulted from transport mode level indicators both in agencies and state enterprises.

(4) Assign share KPI. In some key issues or success factors, operations are usually involved and controlled by more than one organization. In this case, shared KPI is generally applicable for example indicator that represents decrease of accident at the intersection of highway so that both organization Department of highway and Department of rural road are responsible for this indicator. Furthermore, in case of indicator that reveal transport modal shift, share KPI is responsible by not less than 2 organizations. However, share KPI designate among organization shall have clear definition and meaning of indicator among responsible organization.

5. Assessment and Prioritization of Transport Investment Project

Apart from developing sets of key performance indicators to ensure that strategic delivery targets in various levels are logically aligned and that projects can be evaluated quantitatively, project prioritization is also vital in budgetary process. Its importance is echoed by the fact that budgetary resources are limited and as a result they must be effectively utilized. In addition, the use of project prioritization also makes budget allocation process towards more scientific manner and more use of objectivity. This section therefore develops criteria and tools in assessing and prioritizing transport investment projects

5.1 Concept of investment prioritization

The assessment of benefit and impact of transport in transport projects is far more difficult and complicated than other types of project. This is because each transport project is usually linked with development in economic, social and other transport network. Additionally, it is involved with other surrounding factors to evaluate benefit and impact of transport project. However, there is no single criterion to clearly evaluate the project in terms of quantitative measurement. Thus, there are several options of operation guideline to assess the project's significant and to rank the alternatives.

This study develops criteria for project assessment and project prioritization. As a result, Ministry of transport can apply assessment tool and project prioritization to analyze benefit, impact and economic boosting measure efficiently. After that, Ministry of transport is able to plan, assess and prioritize the investment with regards to ministry's strategy. In addition, it shall be accurately and appropriately consistent with National economic and social development plan and Government's policy.

5.2 Criteria, method and guideline of project prioritization

The criteria used in assessment and prioritization of investment consist of 6 components as follows.

1. Financial Internal Rate of Return (FIRR)
2. Economic Internal Rate of Return (EIRR)
3. Social Accounting Matrix (SAM)
4. Impact to overall transport system
5. Conformity of strategic plan
6. Outcome efficiency

The guidelines and methods of project prioritization are listed in following sequences.

1. Organization propose the project by prepare information detail and carry out self-assessment. The information shall be recorded in project determination's questionnaire (Form A)
2. Central organization (Office of Transport and Traffic Policy and Planning (OTP)) check the project's significant and rate the project based on investment prioritization criteria (Form B). The maximum score of each project is 100 points
3. The score weight or importance of each criterion shall be varied by types of transport. The assigned weight in each criterion is derived from data and concept of the focus group. Then, transport investment shall be divided into 4 modes which are railway transport, water transport, road transport and air transport. Types of transport investment are varied in objectives and basis of project analysis as a result composition of criterion weights in each transport mode is differed by this feature. In addition, assessment and project prioritization in each mode of transport shall be executed separately. The comparison of assessment between different transport modes shall not occur.
4. The purpose of budget management in transport investment is to encourage organization in Ministry of transport effectively utilize resources. The performance of organization shall represent level of reliability or creditability towards the organization. After the prioritization system has been used for some period, credit rating, which ranged from 0-1, shall be used as a coefficient to the assessment result to obtain risk adjusted score. Besides, organization that proposed the project reserve to right to review the score rating by challenging with additional information within the specified period for the purpose of determination process's transparency.

5.3 Macroeconomic Impact

Macroeconomic impact of investment shall be analyzed by social accounting matrix which has been developed to assess impact to macroeconomic in 3 components as follows.

- Growth of Gross Domestic Product (GDP)
- Growth of household income
- Growth of income in labor sector

5.3.1 Concept of Social Accounting Matrix Model (SAM)

The basic concept of social accounting matrix is a double-entry system that presents overview of relationship and economic activities of country in accounting system format. Social accounting matrix is composed of Gross National Income and input-output factors then it is tabulated to show circulation of output, income and expense of overall economic activity unit. The mentioned circulation information created by social accounting matrix provides more complete information than that of both from Gross National Income entry and table of input-output factors. For the reason that social accounting matrix can reveal connectivity in economic system which covers to source of income, expense, production, income distribution, money saving, investment and foreign sector rather completely in every aspect.

The impact analysis is conducted based on concept of Pyatt and Round (1979), so called fixed price multiplier, with the assumption that price of every item in economic system is constant. When external parameters are changed such as increase of investment in government sector, social accounting matrix can be used to analyze impact from investment to overall economic system. In this study, economic of Thailand is divided into 5 sectors which are household, business sector, government sector, financial sector and foreign sector. The connectivity of all 5 sectors can reveal the circulation of income, expense and added value of productive factor in economic system.

Therefore, social accounting matrix is entry format that show the relationship of income and expense from economic activities in each economic sector. Since the table size of social accounting matrix is considerable large, the social accounting matrix is simplified to symbol of connectivity of economic unit as shown in Table 5.3-1.

The development concept of social accounting matrix is the same as input-output factor model development, in other word the relationships of parameters are arranged in equation. Input-output factor model is derived from arranging relationship of information from mentioned input-output factor table.

General feature of social accounting matrix is square matrix whereas total income of each economic sector must be equal to the expense of the same sector (from the table 1, R1=C1, R2=C2, R3=C3, R4=C4). As mentioned, the limitation of resources is also taken into account.

Table 5.3-1: Example of Social Accounting Matrix

Item	Production sector	Household	Government sector	Foreign sector	Total income
Production sector	Intermediate goods demand	Household demand for goods and services	Government demand for goods and services	Export goods demand	R1
Household	Wages, interest, profit and entrepreneurship		Government transfers	Government transfers	R2
Government sector	Sales tax	Personal Income tax		Import tariff, Government transfers	R3
Foreign sector	Import goods demand	Import goods demand for consumption	Import goods demand for consumption		R4
Total expense	C1	C2	C3	C4	

From above table, data in each row shows total income of each entry for example data in the first row shows income from production sector that received from selling goods and providing services to other production sector to produce other product, selling goods and providing services to household and government sector for consumption and the rest of products are exported.

The data in each column represents expense of each entry for example data in the first column show expense of production sector which is composed of buying goods from other production sector to produce goods, pay wages to household, pay tax to government and import good from foreign sector.

5.3.2 Calculation of impact to macroeconomic by using Social Accounting Matrix Model

From formulated social accounting matrix model, impact to macroeconomics induced from transport investment can be calculated to assess and prioritize by following steps.

Step 1

1. Form A: The purpose of form is to let project owner show detail of project and perform self assessment. The form shall contain operation expense which can be categorized into 12 types then it shall be analyzed for macroeconomic impact. The list of 12 types of expense as shown as follows.

1. Project survey and design cost
2. Agricultural products compensation cost
3. Land and building expropriation compensation cost
4. Construction cost
5. Construction supervision cost
6. Operation cost
7. Project maintenance cost
8. Management and administration cost
9. Environmental related cost
10. Equipment purchasing cost
11. Equipment rental cost
12. Other cost

Step 2

Expense information in transport investment from step 1 is calculated for impact to macroeconomic by using social accounting matrix. The developed model can show the connectivity of expense that can be transformed to income and circulate to each economic sector as shown in connection of social accounting matrix. Thus impact of investment can be calculated.

5.3.5 Example of calculation of impact on macroeconomics

The case study shows the project of master plan development and design of mass transit construction in Chiangmai. In this case study, analysis of impact to macroeconomic for master plan development and design of mass transit construction in Chiangmai was carried out. After evaluate the cost of project construction, expense can be grouped into type as shown in table 5.3-2

Table 5.3-2 Investment in project construction

Item	Expense (Million Baht)
1. Design cost	20.38
2. Land and building expropriation compensation cost	220.00
3. Construction cost	1,570.97
4. Environmental related cost	39.56
5. Construction supervision cost	39.27
6. Project maintenance cost	432.04
Total cost	**2,322.22**

In the initial stage of investment impact to macroeconomic analysis, cost (expense) shall be categorized and classified in assigned entry of preliminaries social accounting matrix to justify the circulation of income in each economic sector. It is found that expense in table 5.3.3 shall be circulated to connected economic sector as shown in social accounting matrix. As the expense connectivity in table 5.3-2 can be estimated how much it would transform to circulated income to each economic sector in connectivity list in social accounting matrix, investment impact calculation can be executed in similar mean as well.

In the calculation process the cost (expense) of project operation shall be grouped by mention steps. The impact analysis of project can be calculated from mention social accounting matrix detail incorporated with macroeconomic impact calculation in each aspect as shown in these following.

Calculation result

The calculation result of transport operation impact by developed social accounting matrix program shows that project of master plan development and design of mass transit construction in Chiangmai would have the impact on Gross Domestic Product, household income and labor sector's income as follows.

(1) Changes of Gross Domestic Product: GDP

After analyzing the result, it is found that expense from project operation will have the effect on economic system that there will be increases in production, manufacturer's income and household income. This will lead to 0.05 percent rise of Gross Domestic Product (calculated from GDP in 2006) or

equal to 1,557.98 million Baht. The impact of project budget utilization will cause an increase in Gross Domestic Product with the rate of change 1.67 Baht to 1 Baht invested. In other word, 1 Baht investment in economic system through multiplier mechanism will cause a rise in employment. Eventually, gross national income will increase to 1.67 Baht which is considered almost twice of 1 Baht investment.

(2) Changes of household income

It is found that, impact from project operation expense will increase household income both directly and indirectly. The total amount is 1,534.31 million Baht or it increases the rate of change of household income 0.02 percent. This impact from project budget utilization will have effect on household income with rate of change 0.66 Baht to 1 Baht invested.

(3) Changes of labor sector's income

According to calculation of impact of project budget utilization to employment rate, it is found that labor sector's income shall increase 642.51 million Baht or an increase of 0.01 percent. This is caused by direct impact of project budget utilization to labor and by relating to construction sector that also have the major effect on labor by project budget utilization. The impact from project budget utilization will increase labor sector's income with rate of change 0.28 Baht to 1 Baht invested.

Apart from calculation of impact to macroeconomic in part 1, part 2 of report presents impact of transport investment to other economic sector which consist of impact to labor factor, capital factor, business sector and production sector. In addition, the production sector can be subdivided into agriculture, manufacturing, construction, service and others respectively[1].

[1] The program is developed to show calculation result in order that the analysis tool is provided for project evaluator to analyze impact to production sector. The result shall be used to determine or analyze and additional prioritize the project in the future to predict impact to income of each production sector. The model can also indicate impact of project budget to increase of income of production sector in terms of mean, quantity or proportion. The difference shall be varied in inter-industrial linkage and multiplier of each production sector.

Table 5.3-3 Impact on macroeconomics in each economic sector

Unit: Million Baht

	Impact	Rate of change (percent)	Rate of change per 1 Baht
Gross Domestic Product (GDP)	3,880.40	0.05	1.67
Labor factor	642.51	0.01	0.28
Capital factor	915.67	0.01	0.39
Household	1,534.31	0.02	0.66
Business Sector	361.26	0.00	0.16
Agriculture	793.07	0.01	0.34
Manufacturing	185.17	0.00	0.08
Construction	2,006.95	0.03	0.86
Service	112.15	0.00	0.05
Other	1,250.41	0.02	0.54

Source: From calculation

Table 5.3-4 Investment prioritization by score rating

Criteria of prioritization	Weight of criteria based on time period and condition		
	1-3 Year	When KPI database is ready	When NTM* is ready
Financial Internal Rate of Return (FIRR)	10	10	10
Economic Internal Rate of Return (EIRR)	15	10	10
Social Accounting Matrix (SAM)	15	15	10
Impact to overall transport system	Unable to assess	Unable to assess	15
Conformity of strategic plan	35	40	30
Outcome efficiency	25	25	25
Total score	100	100	100
Past performance of organization	Unable to apply		
Total score (risk adjusted)			

*NTM = National Transport Model

6. The Performance Assessment Rating Tool and the Performance-based Budgeting System

The last component of the integrated system design for assessing and prioritizing investment project is Performance Assessment Rating Tool, or in short, PART. It is designed to evaluate performance level by analyzing budget utilization. It was applied by Bureau of the budget for the purpose of organizations' performance assessment, organization management, co-operation of national strategies and evaluation of outcomes or output according to performance-based budgeting system. With reference to Cabinet resolution on 18 March 2008, budget allocating analysis tool is applied in organizations, state enterprises and other organizations. As a result, Performance Assessment Rating Tool: PART is assigned as the analysis tool

Consequently, to comply with the government policy, PART has to be incorporated in planning and management of investment in transport of involved organizations through out the processes of budget allocating and project investment planning.

6.1 Background and composition of PART

Bureau of the budget developed performance assessment tool for budget utilization analysis, PART, in order to motivate strategic performance-based budgeting process most efficiently and effectively for the people and country. By using most up-to-date knowledge and technology, PART is aimed to analyze connectivity of project plan with national strategies and to systematically investigate relationships among outcome, project performance, project activities and budget utilization. In addition, PART shall be incorporated in the whole budget allocating system. Prior to this, it shall be self assessed for the reason of preparation before the processes of budget utilization, work performance monitoring and evaluation after end of project are carried out. The performance of organizations shall be assessed by Bureau of the budget annually by using PART as analysis tool. The results shall be included in budget allocating process of the following year. Strategic performance-based budgeting system is focused on project performance with respect to strategies, effectiveness and economic plan. Therefore, performance assessment system is comprised of many analysis tools which depend on objective of each particular assessment. PART is one of analysis tools to evaluate and connect budget utilization in every level varies from success of national strategic goal, Ministry's service goal, outputs of organizations and outputs of major activities.

The analysis result shall be used as feed back of information technology for decision making of Bureau of the budget in budget allocation and for government in policy planning. This analysis tool can be

used in every stages of assessment which are pre-evaluation, interim evaluation and post- evaluation. Composition of performance assessment tools, PART, is made of 5 aspects which divided into 30 questions as follows.

Aspect A Purpose and Design

Organization objectives shall be monitored whether the goal is correctly consistence with high level strategic goal based on concept of cascade of strategic performance-based budgeting. The questions related to this aspect are listed as follows.

A-1 Is the understanding of national strategic goal, Ministry's service goal and Ministry's strategies responsible by your organization being accomplished? Please explain.

A-2 Does the organization service goal agrees with and suitable for the high level goal? Please explain.

A-3 Does the organization define the requirement, problems or interest of target group? Please explain.

A-4 Does the major output of the organization fulfills the requirement, problem or interest of target group and high level goal? Please explain.

A-5 Does the output of the organization considered the output of other government or private organization to avoid overlapping? In case of the overlapping with other organization, is it to distinguish the output from others, and how to?

A-6 Does the organization consider obstacles and limitation such as laws, rules, organizations' regulation and factors in working processes that affected the output? Please explain.

Aspect B Strategic Planning

Changes of organization objectives into action plans shall be monitored whether it is consistency, appropriate and feasible in practice. Following questions are comprised of this aspect.

B-1 Does the organization prepare the action plans that represent connectivity and transfer the mission based on government's objective (National strategic goal) into outcomes, outputs and activities respectively? Please explain.

B-2 Does the action plans define long-term output level? Please explain.

B-3 Does the organization action plans define long-term goal that link to success of challenging outcome (higher effectiveness of Ministry's service)? Please explain.

B-4 Does the organization action plans categorize the target of output annually? Please explain.

B-5 Does the organization action plans prepare the co-operation among government and private organizations? Please explain.

B-6 Does the organization action plans set up the performance assessment plan that covers the necessary contents of continuously development by self assessment and by independent evaluator? Please explain.

B-7 Does the organization allocate analysis process of changing of National strategy, Ministry's strategy and/or laws and related regulations with regards to organization action plans review? Please explain.

Aspect C Performance Budget Cascade

Strategy based budget allocating shall be monitored in every level whether it is related and connected. Below questions are the components of this aspect.

C-1 Does the organization setup the target of annual output that reflect progress of output target achievement according to medium-term expenditure framework? Please explain.

C-2 Does the organization allocate main activities that link to required resources in order to achieve annual output target? Please explain.

C-3 Does the organization define progress indicators based on time frame of every main activity? Please explain.

C-4 Does the organization create the activity that calculates unit cost of output? Please explain.

C-5 does the organization consider past experience as a guideline to set up annual output target? Please explain.

Aspect D Management

The assigned action plans that implemented shall be monitored whether action plans are used as an operational guideline. The questions listed below are components of this aspect.

D-1 Does the output delivery unit of organization develop and manage the operation plan and annual budget utilization plan? Do the plans include sequences and time frame with regard to expected achievement of each output? Please explain.

D-2 Does the output delivery unit of organization carry out individual feedback system that is reliable within the specified period? Please explain.

D-3 Does the output delivery unit of organization apply collected data into management and improve the performance of organization? Please explain.

D-4 Does the output delivery unit of organization apply unit cost of output for management? Please explain.

D-5 Does the output delivery unit of organization provide process that facilitate performance evaluation and/or improve the organization performance effectively and economically? Please explain.

D-6 Does the output delivery unit of organization prepare report on financial auditing that represents effective financial management and follow the regulations? Please explain.

D-7 Does the output delivery unit of organization evaluate responsible person for output in term of output delivery effectively? Please explain.

Aspect E Evaluation of output and result

Performance shall be monitored whether it follows target of organization. The questions related to this aspect are listed as follows.

E-1 Please present the work progress by compare the results with long term target by using assigned indicators.

E-2 Please present the work progress by compare the results with annual output target by using assigned indicators.

E-3 Is there any higher performance effectiveness in the organization and is it economical or/and socially contributed? Please explain.

E-4 Is there any comparison of output and output target with similar organizations and private organizations? Please explain.

E-5 Is the assessment from independent assessor shows any achievement of output level and outcome? Please explain.

In summary, PART can be applied to assess 5 aspects of success as describe in different purposes as follows.

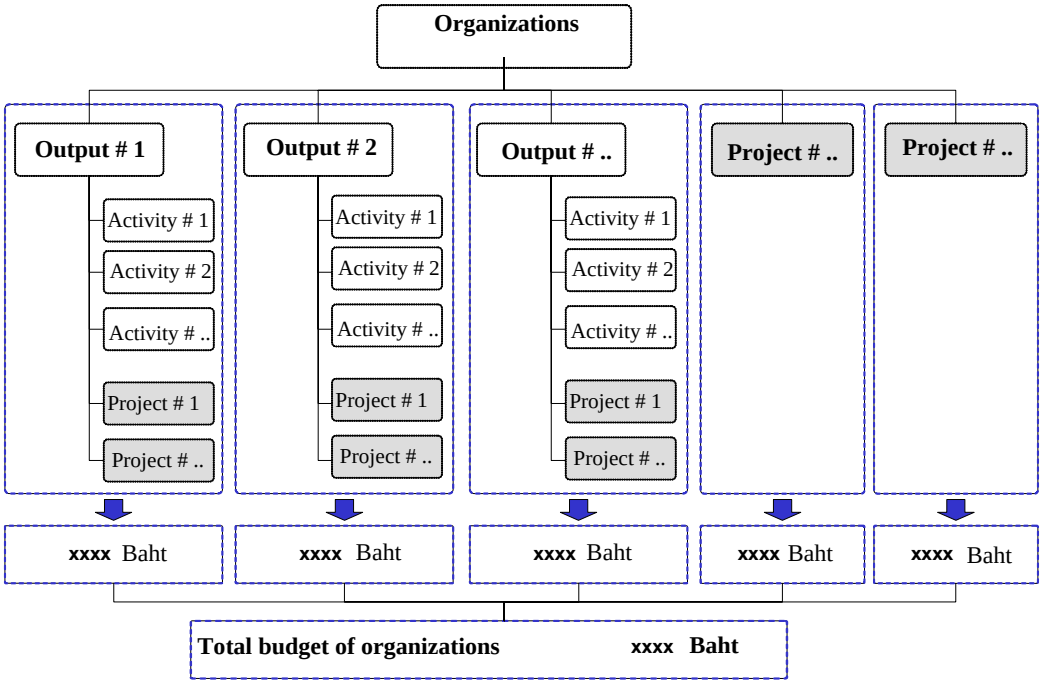
- Aspect A Purpose and Design: Organization objectives shall be monitored whether the goal is correctly consistence with high level strategic goal based on concept of cascade of strategic performance-based budgeting.
- Aspect B Strategic Planning: Changes of organization objectives into action plans shall be monitored whether it is consistency, appropriate and feasible in practice.
- Aspect C Performance Budget Cascade: Strategy based budget allocating shall be monitored in every level whether it is related and connected.

- Aspect D Management: The assigned action plans that implemented shall be monitored whether action plans are used as an operational guideline.
- Aspect E Evaluation of output and result: Performance shall be monitored whether it follows target of organization.

6.2 Assessment by PART using strategic performance-based budgeting system

Bureau of the budget made use of PART as a performance assessment tool of budget utilization with respect to strategic performance-based budgeting system. The assessment in organizations shall be made based on budget management structure as shown in figure 6.2-1. It is clear that every organization shall prepare budget requesting associated with organization output. In addition organizations shall designate output, indicators and output target according to the scope of each organization. Each output may contain activities that link to success as specified in the indicators and target. However, in some cases, investment related to output may be included to support the success of output as well. Concurrently, organizations can also initiate any investment in the same level as output if the project is likely to bring success of organization service's target. Finally, the total budget received by organizations shall be composed of budget of every output and projects.

Figure 6.2-1 Organizations' budget structure



Method of assessment by PART, created by Bureau of the budget, is designed to evaluate success of performance by analyzing organizations budget utilization with respect to budget allocation. Output and output level's projects shall be evaluated to reveal overview of government sector. Although project with level lower than output shall not be assessed. At the same time, Bureau of the budget and Advisor shall also evaluate organizations in the same principles. Three parts of assessment (organizations, Bureau of the budget and Advisor) shall be thoroughly investigate to rate the score of organizations. Finally, the result shall be used as detail information for following year's budget allocation.

6.3 Scope of PART's application in transport

PART shall be incorporated in the process of development of transport planning manual for transport investment planning and management by considering assessment questions. The process of investment in transport includes strategic performance-based budgeting system which divided into 3 stages: 1) Strategic planning, 2) Strategic based budget planning of organizations and 3) Monitoring and evaluation (as shown in figure 6.3-1). The scope shall be limited to planning and management of investment in transport that related to PART.

Figure 6.3-1 Scope of PART applications on transport investment

	Scope of project determination	Major issue	Connection with PART
Stage 1 Strategic planning of organizations (4-year strategic plan)	Organizations initiate/assign transport investment and required budget for 4-year period as transport investment shall be consistency with strategic direction which is Ministry's policy, target/indicator and organizations strategy	❖ Initiate and prepare transport investment for 4-year period ❖ Plan and prepare preliminary transport investment ❖ Analyze required budget of transport investment in 4-year period	**Aspect A** Purpose and Design **Aspect B** Strategic Planning **Aspect C** Performance Budget Cascade
Stage 2 Strategic based budget planning of organizations (Budget requesting)	Organizations initiate/assign transport investment by reviewing current investment for output, outcome and impact monitoring in both positive and negative issue for annual budget requesting	❖ Review/check/evaluate previous transport investment ❖ Initiate and prepare transport investment according to annual operation plan ❖ Carry out budget request	**Aspect A** Purpose and Design **Aspect B** Strategic Planning **Aspect C** Performance Budget Cascade
Stage 3 Monitoring and evaluation	Organizations monitor and evaluate transport investment to get the feedback and recommendation for organizations to prepare and revise transport investment	❖ Prepare operation plan and budget utilization plan of transport investment ❖ Monitor progress of work in transport investment	**Aspect D** Management **Aspect E** Evaluation of output and result

The scope of work carried out by the Advisor is shown in figure 6.3-1 which presents importance of different detail to be accomplished in each stage. In stage 1, main issue to be done is to initiate investment in transport for four-year period based on Government strategic plan. After that, the main issue in stage 2 is to initiate investment in transport for each fiscal year. It is clearly seen that both stages are linked to PART in 3 aspects which are aspect A, B and C.

The different role between organizations and Office of Transport and Traffic Policy and Planning (OTP) is organizations is responsible for operation, initiation and proposal of investment in transport within the assigned scope, whereas the OTP take care of analysis and determination for suitability of country's transport in each stage. These differences are shown in figure 6.3-2.

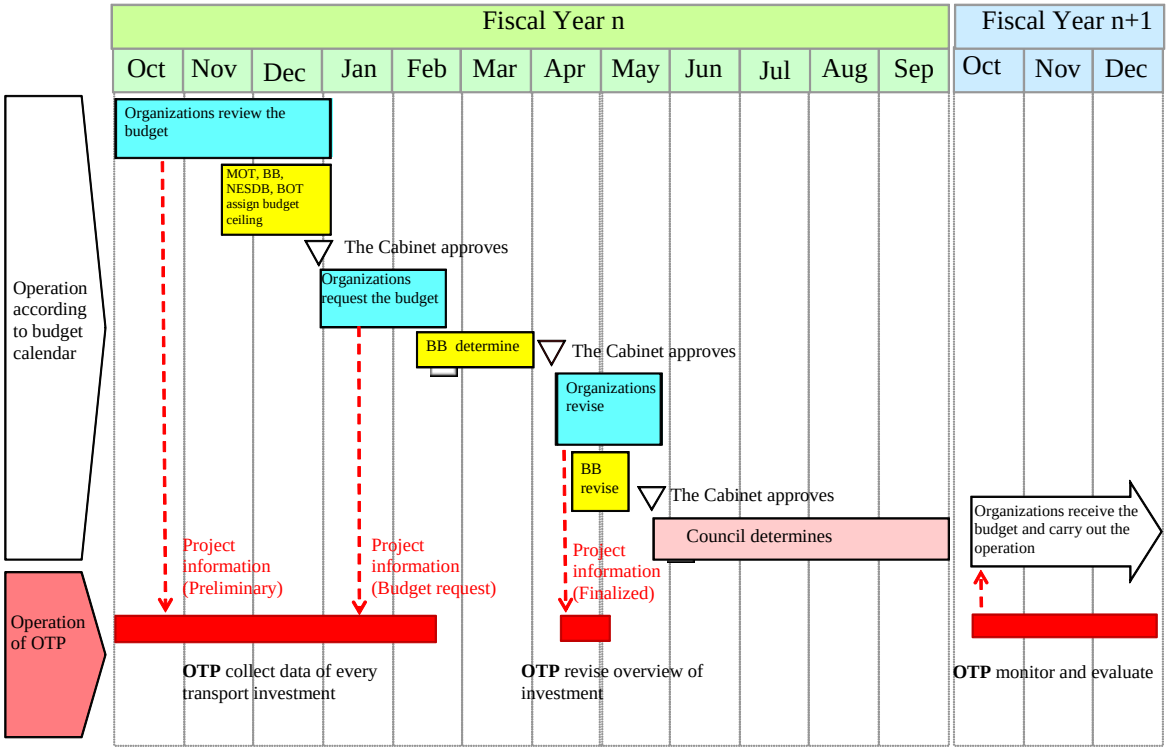
Figure 6.3-2 Roles of organizations and OTP

	Role of Planning and Management		Connection with PART
	Organizations	OTP	
Stage 1 Strategic planning of organizations (4-year strategic plan)	❖ Initiate and prepare transport investment for 4-year period ❖ Plan and prepare preliminary transport investment ❖ Analyze required budget of transport investment in 4-year period	❖ Check the initiates, analyze and plan for prelim. Transport investment ❖ Check for transport investment duplicate ❖ Analyze required budget of transport investment in 4-year period	**Aspect A** Purpose and Design **Aspect B** Strategic Planning **Aspect C** Performance Budget Cascade
Stage 2 Strategic based budget planning of organizations (Budget requesting)	❖ Review/check/evaluate previous transport investment ❖ Initiate and prepare transport investment according to annual operation plan ❖ Carry out budget request	❖ Check the initiates, analyze and plan for prelim. Transport investment ❖ Check for transport investment duplicate	**Aspect A** Purpose and Design **Aspect B** Strategic Planning **Aspect C** Performance Budget Cascade
Stage 3 Monitoring and evaluation	❖ Prepare operation plan and budget utilization plan of transport investment ❖ Monitor progress of work in transport investment	❖ Analyze and determine consistency of operation plan and budget utilization plan ❖ Monitor progress of work and evaluate economic aspect of transport investment	**Aspect D** Management **Aspect E** Evaluation of output and result

6.4 Analysis and determination guideline of investment in transport

After reviewing budget calendar, proposed to the Cabinet as a guideline in budget allocation of the whole fiscal year, main feature of operation in the budget calendar is shown in figure 6.4-1 with following details.

Figure 6.4-1 Process of transport investment determination



October – November : Organizations, state enterprises and other organizations co-operate with Bureau of the budget to review target setting, action plans, output, activities and achievement indicators of the previous fiscal year for the purpose of budget allocating preparation of the next fiscal year.

November – December: Ministry of Finance, Bureau of the budget, Office of the national economic and social development board and Bank of Thailand hold a meeting to review the expected revenue and calculate ceiling of budget as well as budget structure in the fiscal year.

December : The Cabinet approve of budget policy, budget ceiling, budget structure in the fiscal year, allocating strategy in accordance with Government strategic plan, the required minimum budget and budget obligation.

January-February : Organizations, state enterprises and other organizations comply with the policy from Deputy Prime Minister or Minister of each organization to prepare to budget detail and make a budget request for the fiscal year.

February-March : Bureau of the budget analyze and prepare budget detail of the fiscal year then propose to the Cabinet.

April : The Cabinet approves of budget detail and issue criteria of budget management revision of the fiscal year

April : Organizations, state enterprises and other organizations to revise budget detail of the fiscal year as specified by the Cabinet then transfer to Bureau of the budget.

April : Bureau of the budget modifies budget detail of the fiscal year to propose to the Cabinet.

April – May : The Cabinet approves of budget modification then issue the budget legislation and propose to House of Representatives.

June-September : House of Representatives and Senator put in the process of determination

September : Issue the budget legislation of fiscal year ……..

Every organization shall comply with the specified budget calendar. OTP shall collect the data of transport investment from organizations, thus involved organization must have clear understanding of process executed by organizations. Table 6.4-1 shows appropriate period that organizations and OTP can interact.

Table 6.4-1 Major operation in each period in budget calendar

Time period	Operation based on budget calendar	Operation	
		Transport organization(organizations /state enterprise)	Office of Transport and Traffic Policy and Planning (OTP)
October – November	Organizations, state enterprises and other organizations co-operate with Bureau of the budget to review target setting, action plans, output, activities and achievement indicators of the previous fiscal year for the purpose of budget allocating preparation of the next fiscal year.	• Organizations review target, action plan, output, activity, transport investment and success indicator of previous year for budget request preparation	• OTP monitor and collect transport investment data (prelim) of organizations/state enterprise's current or new project • OTP preliminarily analyze transport investment • OTP give the recommendation to organizations/state enterprise

Table 6.4-1 Major operation in each period in budget calendar

Time period	Operation based on budget calendar	Operation	
		Transport organization(organizations /state enterprise)	Office of Transport and Traffic Policy and Planning (OTP)
January-February	Organizations, state enterprises and other organizations comply with the policy from Deputy Prime Minister or Minister of each organization to prepare to budget detail and make a budget request for the fiscal year.	● Organizations prepare budget detail and annual budget request including transport investment then submit to Bureau of the budget	● OTP co-ordinate and collect transport investment information on budget request of organizations ● OTP analyze in major aspect of overview transport investment o Strategy/Service delivery target of Ministry o Categorized in mode of transport ● OTP give the suggestion to Minister/organizations' leader/state enterprise's director
April	Organizations, state enterprises and other organizations to revise budget detail of the fiscal year as specified by the Cabinet then transfer to Bureau of the budget.	● Organizations revise budget request detail and transport investment then submit to Bureau of the budget	● OTP improve overview of transport investment ● OTP analyze in overview of major aspect of transport investment ● OTP give the suggestion to Minister/organizations' leader/state enterprise's director
October	Organizations receive annual budget	● Organizations receive annual budget to invest in transport	● OTP monitor and evaluate transport investment

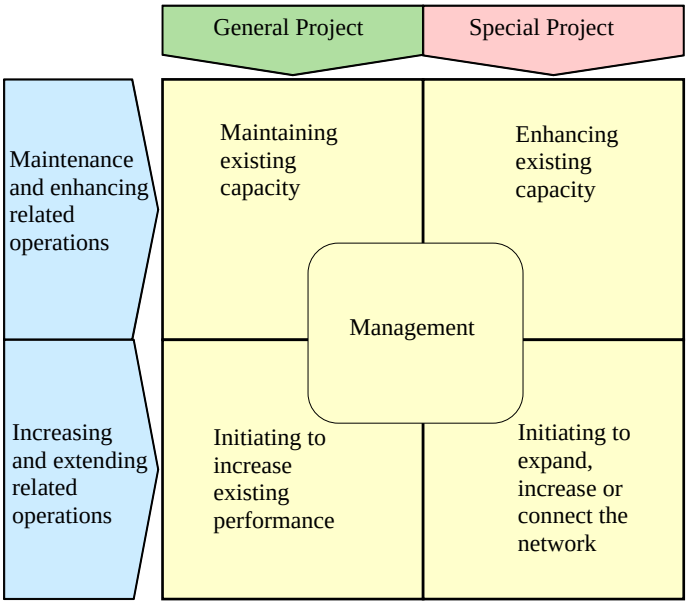
Analysis and determination guideline of investment in transport consists of 3 major components as follows.

6.4.1 Project classification

By reviewing investment in each mode of transport which is road, water, air and rail transport it is found that physical characteristic of each mode is different. Nevertheless, there are similarities in objectives or functions which can be classified by detail reviewing and analyzing as shown in figure 6.4-2. Total 5 sub-categories were classified by two types of budget allocated which are 1) General projects that utilize organizations' budget and 2) Special projects that are initiated by policies or strategies. Alternatively, function of transport is used as classification method, thus two functions, 1) Maintenance and enhancing related operations and 2) Increasing and extending related operations are classified. After analyzing the related factors, 5 sub-categories were classified which are;

1) Maintaining existing capacity
2) Enhancing existing capacity
3) Initiating to increase existing performance
4) Initiating to expand, increase or connect the network
5) Management

Figure 6.4-2 Type of project



After detail investigation of investment in each mode of transport, additional details classified into 5 sub-categories are summarized in table 6.4-2.

Table 6.4-2 Type of project

1. Maintaining existing capacity	2. Enhancing existing capacity	3. Initiating to increase existing performance	4. Initiating to expand, increase or connect the network	5. Management
❑ Scheduled maintenance ❑ Vehicles and existing equipments maintenance ❑ Buildings or offices maintenance	❑ Extend lane width or increase number of lanes ❑ Enhance the capacity and performance of vehicles/existing equipments ❑ Extension/expansion of buildings or offices	❑ Upgrade road surface or change to new material ❑ Upgrade vehicles/ equipments to increase their performance ❑ Renovate existing buildings or offices ❑ Security ❑ Energy saving/ alternative energy	❑ Construct/connect/expand new network ❑ Replace new vehicles/ equipment ❑ Construct new buildings or offices	❑ Management ❑ Human resource development ❑ Develop database ❑ Revise rules/standard

Common features in project details listed in the table can be applied to 4 modes of transport according to characteristic of each mode as following examples.

1. Maintaining existing capacity

1.1 Scheduled maintenance: Highway maintenance, surface maintenance, railways maintenance, bridges maintenance and runway/taxiway/aircraft ground handling area for example.

1.2 Vehicles and existing equipments maintenance: Bus maintenance, locomotive maintenance, ship maintenance, air craft maintenance, signal light maintenance, marine navigation maintenance and airport radar system maintenance for example.

1.3 Buildings or offices maintenance: Bus terminal maintenance, railway station/ junction maintenance, port maintenance, air port maintenance, depot/hangar maintenance, and other offices maintenance for example.

2. Enhancing existing capacity

2.1 Extend lane width or increase number of lanes: increase number of lanes from 2 to 4, addition of extra lanes, construct platform in train station, construct addition ports, extend runway/taxiway and increase aircraft ground handling area for example.

2.2 Enhance the capacity and performance of vehicles/existing equipments: improve performance of buses, upgrade standard train to air-conditioned train, upgrade ships and upgrade aircraft for example.

2.3 Extension/expansion of buildings or offices: extension of bus terminal, extension of port, extension of air port and extension/expansion of office buildings for example.

3. Initiating to increase existing quality

3.1 Upgrade road surface or change to new material: Replace highway surface, upgrade aircraft ground handling area from asphaltic concrete to reinforced concrete and change the ballast from timber to reinforced concrete for example.

3.2 Upgrade vehicles/equipments to increase their performance: Change buses' engine to natural gas compatible, change to aviation guidance system from analog to digital, upgrade guidance system in ports, upgrade radar system in airports and upgrade air traffic control system for example.

3.3 Renovate existing buildings or offices: Renovate train station's platform and Renovate airport terminal building for example.

3.4 Security: Install explosive detection system in bus terminal/ railway station/ air port and install CCTV at major intersections for example.

3.5 Energy saving/ alternative energy: Change buses' engine to natural gas compatible for example.

4. Initiating to expand, increase or connect the network

4.1 Construct/connect/expand new network: Construct new Asia highway, construct new highway, construct new bridge, construct new railway route and construct new air port for example.

4.2 Replace new vehicles/equipment: Replace new buses, replace new locomotives, replace new ships, replace new air craft, replace new signaling system and replace new traffic control system for example.

4.3 Construct new buildings or offices: Construct new bus terminal, construct new railway station, construct new port, construct new air port terminal and construct new office buildings for example.

5. Management

5.1 Management: Develop organization management system, develop knowledge management system, upgrade intelligent traffic control system and carry out other development plans for example.

5.2 Human resource development: Training and arrange workshops that support better understanding or better operational skill to staff for example.

5.3 Develop database: Upgrade information technology system and develop database for example.

5.4 Revise rules/standard: Revise transport rules/standard related to road, railway, water and air mode including user, service provider, concessionaire and regulator, improve highway, railway, water transport and air transport standard regulations for example.

6.4.2 Important information of project

Information collection of investment project in transport shall provide useful information for strategic information and other related technical information. This information shall be analyzed in every aspect which is mode of transport, strategy, Ministry service's target, indicators, responsible organizations and budget. Therefore systematically data records shall be created to get adequate and useful data for analysis. Then this report shall be use as decisive data for effectively transport strategic planning. Table 6.4-3 shows guideline of information collection of investment project in transport.

Table 6.4-3 Important information of investment in transport

1. Project	1.1 Project name			
	1.2 Objective			
	1.3 Responsible organization			
	1.4 Project duration			
	1.5 Budget			
2. Type of project	❑ Road	❑ Railway	❑ Water transport	❑ Air transport
3. Project characteristic	❑ 3.1 Maintaining existing capacity	❑ 3.1.1 Scheduled maintenance ❑ 3.1.2 Vehicles and existing equipments maintenance ❑ 3.1.3 Buildings or offices maintenance		
	❑ 3.2 Enhancing existing capacity	❑ 3.2.1 Extend lane width or increase number of lanes ❑ 3.2.2 Enhance the capacity and performance of vehicles/existing equipments ❑ 3.2.3 Extension/expansion of buildings or offices		
	❑ 3.3 Initiating to increase existing performance	❑ 3.3.1 Upgrade road surface or change to new material ❑ 3.3.2 Upgrade vehicles/equipments to increase their performance ❑ 3.3.3 Renovate existing buildings or offices ❑ 3.3.4 Security ❑ 3.3.5 Energy saving/ alternative energy		
	❑ 3.4 Initiating to expand, increase or connect the network	❑ 3.4.1 Construct/connect/expand new network ❑ 3.4.2 Replace new vehicles/equipment ❑ 3.4.3 Construct new buildings or offices		
	❑ 3.5 Management	❑ 3.5.1 Management ❑ 3.5.2 Human resource development ❑ 3.5.3 Develop database ❑ 3.5.4 Revise rules/standard		

Table 6.4-3 Important information of investment in transport

4. Connectivity to service delivery target/indicator	Service delivery target	Indicators	
	❑ 4.1 Development supporting of logistic and transport system to reduce cost	❑ 4.1.1 Road transport level indicator	❑
		❑ 4.1.2 Railway transport level indicator	❑
		❑ 4.1.3 Water transport level indicator	❑
		❑ 4.1.4 Air transport level indicator	❑
	❑ 4.2 Comprehensive development of transport's infrastructure and service	❑ 4.2.1 Road transport level indicator	❑
		❑ 4.2.2 Railway transport level indicator	❑
		❑ 4.2.3 Water transport level indicator	❑
		❑ 4.2.4 Air transport level indicator	❑
	❑ 4.3 Customers can use safe transport and traffic system	❑ 4.3.1 Road transport level indicator	❑
		❑ 4.3.2 Railway transport level indicator	❑
		❑ 4.3.3 Water transport level indicator	
		❑ 4.3.4 Air transport level indicator	❑
	❑ 4.4 Customers can use convenient and fast transport and traffic system	❑ 4.4.1 Road transport level indicator	❑
		❑ 4.4.2 Railway transport level indicator	❑
		❑ 4.4.3 Water transport level indicator	❑
		❑ 4.4.4 Air transport level indicator	❑

	❑ 4.5 Transport infrastructures are in good condition	❑ 4.5.1 Road transport level indicator	❑
		❑ 4.5.2 Railway transport level indicator	❑
		❑ 4.5.3 Water transport level indicator	❑
		❑ 4.5.4 Air transport level indicator	❑
	❑ 4.6 Development of transport system to reduce impact to environment	❑ 4.6.1 Road transport level indicator	❑
		❑ 4.6.2 Railway transport level indicator	❑
		❑ 4.6.3 Water transport level indicator	❑
		❑ 4.6.4 Air transport level indicator	❑

6.4.3 Important issue in determination and analysis of investment project in transport

Information collection of investment project in transport shall consider important strategic data completeness. For the reason of analysis effectiveness in every aspect that facilitate development of national transport system. The main organization to support Ministry of transport and government is OTP.

The main duty of OTP is to analyze and propose policies, strategies, measures and to manage strategic plan of transport development, traffic and safety. Therefore, information of investment project in transport from organizations and associated state enterprises shall be collected to build up database of investment project in transport for important aspect analysis.

Figure 6.4-3 Guideline of aspect of project analysis




Type of Project	Road	Railway	Water	Air
1. Maintaining existing capacity	Project…. Project….	Project…. Project….	Project…. Project….	Project…. Project….
2. Enhancing existing capacity	Project…. Project….	Project…. Project….	Project…. Project….	Project…. Proj…
3. Initiating to increase existing performance	Project…. Project….	Project…. Project….	Project…. Project….	Pr… Pr…
4. Initiating to expand, increase or connect the network	Project…. Project….	Project…. Project….	Project…. Project….	Project…. Project….
5. Management	Project…. Proj…	Project…. Project….	Project…. Project….	Project…. Project….

Determine based on type of project

Determine overview of each mode

Figure 6.4-3 shows the relationship of project aspect analysis present in matrix form and categorized into type of project and mode of transport. It shall be useful for OTP to build up project database of the whole transport system overview. Furthermore, it shall be significant data in project analysis, comprehensive management and project prioritization by consideration of type of major investment in transport as follows.

1) Maintaining existing capacity

2) Enhancing existing capacity

3) Initiating to increase existing performance

4) Initiating to expand, increase or connect the network

5) Management

In addition, OTP can analyze in detail of specific characteristics of each project initiated by organizations and state enterprises. For instance, if the project is involved with (1) Maintaining existing capacity, 3 components shall be investigated as follows.

1.1 Scheduled maintenance

1.2 Vehicles and existing equipments maintenance

1.3 Buildings or offices maintenance

Eventually, OTP can analyze the whole transport system overview and mode of transport overview. As an example of these question: what is the project type in each mode of transport, how many projects in each type, how is the budget allocated in each project and how much is the budget spent in mode of transport overview etc. Above mentioned analysis shall lead to project prioritization which can be beneficial for decision making in strategy for Ministers, organizations' director and state enterprises' executives.

Figure 6.4-4 Guideline of aspect of service providing target/indicators analysis




Service delivery target	Indicator	Road	Railway	Water	Air
4.1 Development supporting of logistic and transport system to reduce cost	❑….	Project…. Project….	Project…. Project….	Project…. Project….	Project…. Project….
4.2 Comprehensive development of transport's infrastructure and service	❑….	Project…. Project….	Project…. Project….	Project…. Project….	
4.3 Customers can use safe transport and traffic system	❑….	Project…. Project….	Project…. Project….	Project…. Project….	
4.4 Customers can use convenient and fast transport and traffic system	❑….	Project…. Project….	Project…. Project….	Project…. Project….	Project…. Project….
4.5 Transport infrastructures are in good condition	❑….	Project…. Project….	Project…. Project….	Project…. Project….	Project…. Project….
4.6 Development of transport system to reduce impact to environment	❑….		Project…. Project….	Project…. Project….	Project…. Project….

Determine based on connectivity with target/indicator

Determine overview of each mode

In figure 6.4-4, the matrix of relationship is categorized into service providing target/indicators and mode of transport. It shall be useful for OTP to build up project database to connect service providing target and Ministry's indicators. It is also considered necessary information for analysis and proposal of overview development strategy in transport, traffic and safety for Ministers, organizations' director and state enterprises' executives.

Detail analysis shall be made by OTP to investigate which major projects initiated by organizations and state enterprises can connect to any service providing target and to any indicators assigned by Ministry of transport. Further analysis can be made in budget aspect to determine the expense generated by service providing target and indicators. This is analysis shall be explained to Bureau of

the budget whether it is economical. Moreover, OTP can even monitor performance of project whether the target specified by Ministry's indicators is effected when the project finish and output is received.

Figure 6.4-5 Guideline of aspect of transport related organization analysis




	Organization	Road	Railway	Water	Air
Government organization	Department of highway	Project…. Project….	N/A	N/A	N/A
	Department of Civil Aviation	N/A	N/A	N/A	Project…. Proj…
	Department of …….	Project…. Project….	Project…. Project….	Project…. Project….	Pr… Pr…
State enterprise	State railway of Thailand	N/A	Project…. Project….	N/A	N/A
	Thai airways international	N/A	N/A	N/A	Project…. Project….
	……	Project…. Pr…	Project…. Project….	Project…. Project….	Project…. Project….

Determine based on organizations/ state enterprise

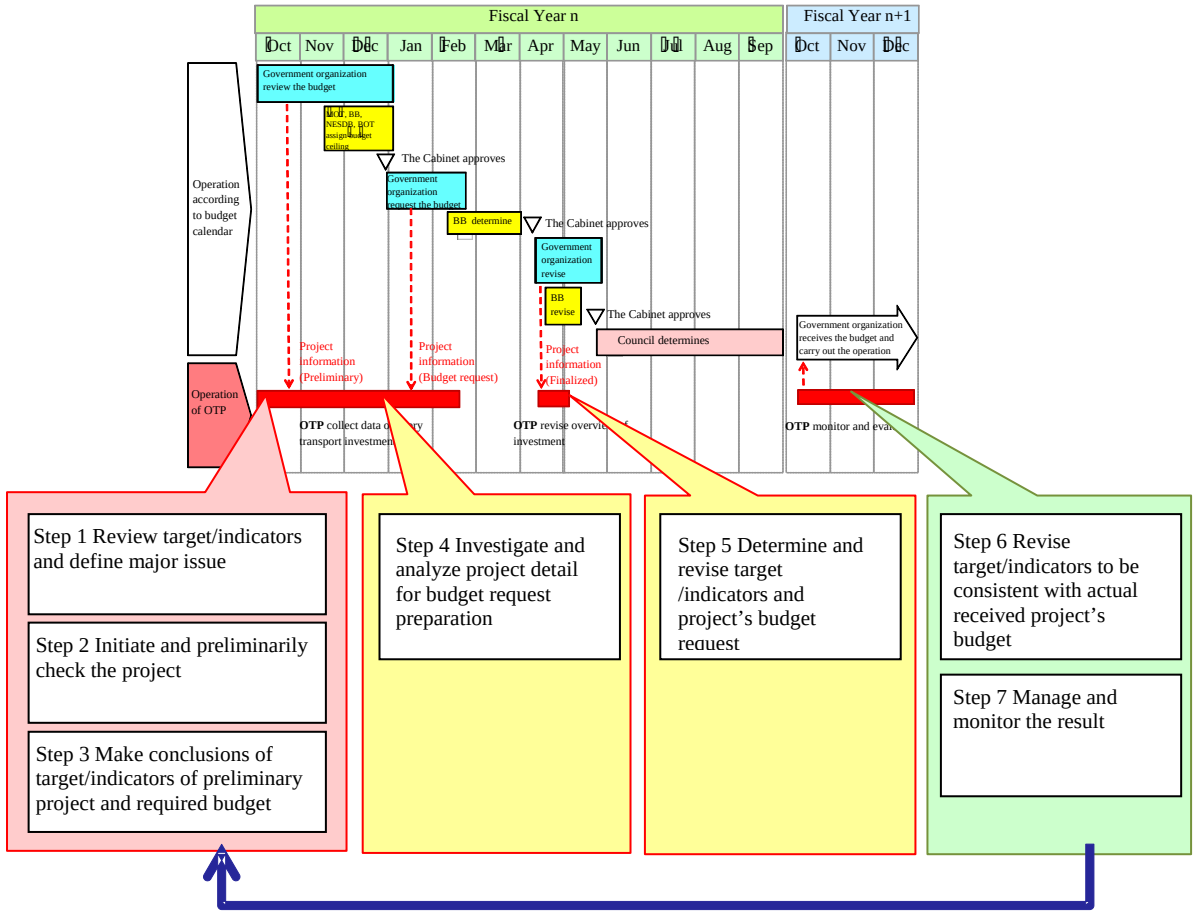
Determine overview of each mode

The relationship presented in matrix in figure 6.4-5 is categorized into transport related organization (organizations/state enterprises) and mode of transport. By using this data, project database that connect every transport related organization can be developed by OTP. This information can support OTP to analyze the overview of organizations whether what type of investment in each mode of transport, how many projects in each type, how much is the total budget required and is there any consistency, connectivity or duplication in the project initiated by organizations and state enterprise. As a result, OTP can give the strategic advice to organizations' director and state enterprises' executives to improve the development of national transport.

6.5 Manual development

Development of manual of investment in transport is carried out based on operational framework of budget calendar as shown in figure 6.5-1. Consequently, organizations can plan the investment in transport and measure level of success for the whole budget cycle which covers 5 aspects of PART.

Figure 6.5-1 Step of operation in budget calendar



It is clear that PART's 5 aspects of success level measurement is the operation for the whole strategic performance-based budget cycle. The responsible organization shall monitor, collect the operation data and carry out self-assessment in every step systematically and continuously. Thus, to ensure that planning and management of investment in transport shall be consistency operated with assessment by PART, the developed manual includes PART as a general government operation process as follows.

Part 1: Review strategic direction and prepare budget request of the project

Step 1 Review target/indicators and define major issue

Step 2 Initiate and preliminarily check the project

Step 3 Make conclusions of target/indicators of preliminary project and required budget

Step 4 Investigate and analyze project detail for budget request preparation

Part 2: Revise budget request

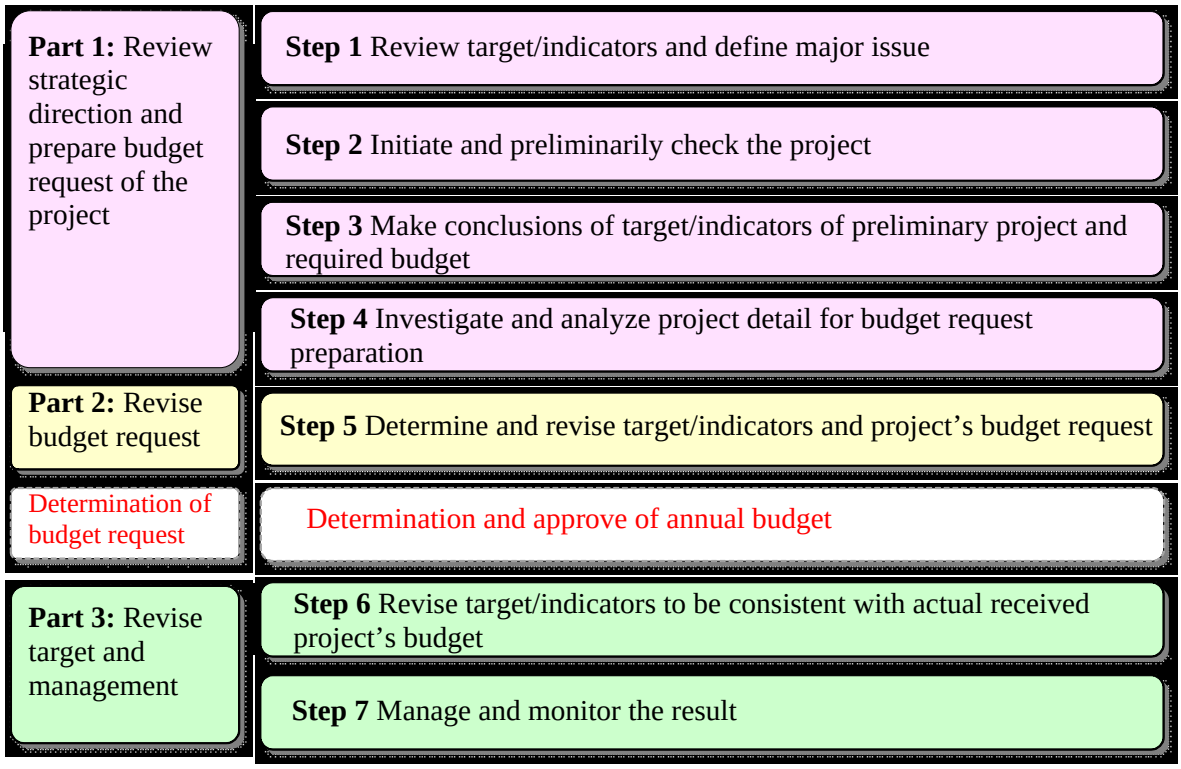
Step 5 Determine and revise target/indicators and project's budget request

Part 3: Revise target and management

Step 6 Revise target/indicators to be consistent with actual received project's budget

Step 7 Manage and monitor the result

Figure 6.5-2 Step of planning on investment in transport



Above mentioned scheduled operation process would benefit in practical wise to organizations/organization involved in planning and management in transport investment efficiently and effectively. In addition, it would give advantages to organizations and associated organization as follows.

- Organizations can apply analysis result of level of success in budget utilization in both aspects of organization and investment in transport responsible by organization for development as budget management tools to issue policies and adjust direction of operation. Additionally, it can also be used as solution for problems occurred during operation and information to operation plan for performance improvement in order to deliver output and transport investment to strategic target of Government effectively.
- Office of Transport and Traffic Policy and Planning can examine completeness of data of investment that is requested by organizations/organization in Ministry of transport. The source of data shall be traced as well as reliability and process of data obtaining of transport investment. Moreover, data can be grouped for comprehensive analysis and prioritization of transport investment in every mode of transport and country's overview. After the organization receives the budget, OTP can monitor progress of work and achievement of the project to create feedback data to Ministry of transport and Government as decisive strategic information.
- The Cabinet, the Legislation and Bureau of the budget can use the analysis result of level of success in budget utilization by organizations as decisive data in budget allocation process. The progress of work, operational problems of government can be monitored to utilize the budget efficiently, effectively, economically and practically to people.

When organizations initiate or apply investment in transport planning manual, draft manual can support data of PART manual from Bureau of the budget as well. Concurrently, OTP can use above mentioned draft manual to give suggestions, conduct an analysis and examine transport investment. As a result, strategic performance-based budget system can be executed.

7. Conclusion and recommendation from the study

Due to many existing problem in strategic planning, budget allocation and project evaluation, it is essential to design and create feasibility analysis system as well as develop transport investment prioritization. The special characteristic of the mentioned system design and development is the combination of comprehensive strategic planning, budget allocation and project evaluation. The system is enable to represent the importance and value in efficiency of resources utilization (budget and human resource), accountability and transparency. The core of the system consists of 3 major tools as follows.

(1) **Proposal of ministry level indicator development**

The purpose of the proposal is to define direction and guideline of service both quantitatively and qualitatively. The appropriate characteristics of indicator shall be considered from these following components. 1) Indicator is created on probability basis. 2) Indicator is complied with policy. 3) Indicator should be a support tool for a decision-making task. 5) Indicator should benefit in connecting between organization and related parties. As a result, indicator from this study is defined as outcome indicator which can reveal the status and operation performance of transport type that is related to the indicator.

In order to develop the ministry level indicator, transport database must be developed to cover data in strategy level and project level. Moreover, development of information technology system must be carried out to support transport investment planning.

(2) **Proposal of applying Social Accounting Matrix (SAM) Model to evaluate value and project prioritization of investment**

Due to its capability in investment analysis of each project in macroeconomic overview, the tool can be further develop and applied to budget management system of Ministry of transport in certain level that is limited by present database. It is necessary to develop the database in the future to increase the accuracy of SAM calculation for economic impact. Concurrently, project prioritization can be applied with other criteria for coming budget allocation which are Financial Internal Rate of Return criteria (FIRR), Economic Internal Rate of Return criteria (EIRR) and strategy consistency of the project.

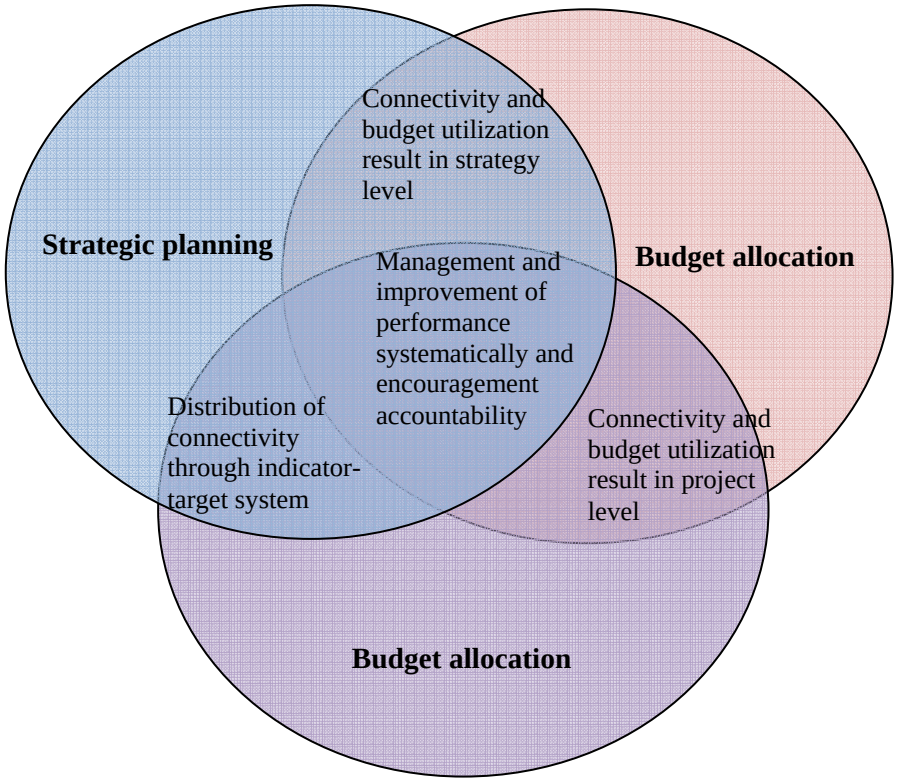
In the future, after the developing of transport model, which can analyze transport impact to overall transport system and cover to other mode of transport, has been done, the model is

capable to be part of criteria for project prioritization. Since the tool can be used to perform comparative quantitative analysis between plan/project of different mode of transport.

(3) Proposal of using Performance Assessment Rating Tool (PART)

The objective of using outcome from investment is to develop credibility assessment system and strict budget utilization audit system. In addition it can be used as monitoring tool to control project operation to be consistent with the strategy after the project's budget has been approved. It can also be used as database in creditability assessment in each organization for budget allocation in the next fiscal year.

Figure 7-1: Comprehensive system of strategic plan, budget allocation and project



After analyzing overview of feasibility and project prioritization, the major point to be considered is concept and design of combining comprehensive strategic plan, budget allocation and project monitoring. It is found that, this comprehensive system shall provide systematically management and improvement of performance, encouragement of organization's accountability and transparency in budget allocation process of investment. Eventually transport sector of the country shall be developed consistently with the assigned strategic target.