

Propose Model of IT Project Selection and Prioritization: Study Case - Bank Indonesia

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Keywords: Project Selection, Project Prioritization, IT Project Selection, IT Project Prioritization.

Abstract: The abstract should summarize the contents of the paper and should contain at least 70 and at most 200 words. It should be set in 9-point font size, justified and should have a hanging indent of 2-centimeter. There should be a space before of 12-point and after of 30-point.

1 INTRODUCTION

At present information technology (IT) is experiencing very rapid development where its development is unavoidable. The development of this information technology, not only can help our way of life become more modern in everyday life, but the development of current technology also supports the business world. The use of IT is an essential factor in achieving company goals thereby increasing the company's IT needs. The company's IT needs that continue to grow indirectly result in increased corporate spending for investment in the Information Technology sector or commonly referred to as IT spending. IT investment capital is higher than investment in other fields (Yorukoglu, 1998).

On the other hand, some research evidence that the amount of IT investment isn't balanced the benefit or the contribution of IT to the enterprise. Thus giving rise to the views of IT Skeptics stating that it is estimated 68% of the company's projects do not run on time or budget, and after working on the project does not provide support for business objectives as promised (Jeffery and Leliveld, 2004). The views of IT Skeptics is confirmed by IT Paradox theory, which shows that the benefits of IT cannot be measured indeed (Brynjolfsson, 1993). The company has limited resources, knowledge, and capabilities, so the selection of technology or IT projects is essential for management. The choice of the right resources derived from dominant resources owned and controlled by the company determines the level of success of the contribution of information technology used to the achievement of company goals (Subriadi, 2013).

Companies need to set priorities given that IT investment will have an impact on companies when companies invest and also need to find ways to encourage companies to achieve faster business goals to overcome IT paradox (H. Lee., 2016). Therefore it is necessary to do the in-depth analysis before determining the IT investment due to the accuracy of IT planning and development is an essential key for the company's competitive advantage (Wen and Shih, 2006) (SUBRIADI et al., 2013).

The same problem also occurred at Bank Indonesia. Bank Indonesia has a vital role in state finance. Therefore, having a superior performance is a commitment to Bank Indonesia. Every year, BI receives many projects to be realized, but BI has limited resources. For BI to be able to choose which projects must be achieved is a challenge.

In the case of research objects, management needs to carry out the process of selecting and prioritizing IT projects to facilitate the selection of IT projects and ensure that IT projects realized will support the achievement of the company's business objectives. Making a good selection of projects can significantly improve an organization's ability to execute strategies and improve results. Therefore, the purpose of this study is to develop a model that supports the selection and prioritization process in research objects. that need to be improved, look for practical examples related to the implementation of these processes in various other organizations, and implement frameworks related to prioritization processes as a reference for improvement. The results of the study are a model of IT project selection and prioritization.

2 PROJECT SELECTION FRAMEWORK

Project selection is a strategic decision because it must be aligned with the organization's business strategy to ensure the maximum return of a selected portfolio. Selection and priority processes are carried out among many alternatives to ensure that the project chosen is right is a complex issue, which requires clear and definite criteria. Various literature states that there are more than 100 techniques that can be used by organizations to support the selection and prioritization process in their project portfolio. In general, organizations will use more than one method but a set of techniques and tools that are appropriate for their organization (Cooper et al., 2001). Because of the variety of techniques that can be used, organizations or companies need to adopt or develop a framework or integration between processes and methods and tools [9]. Although the project portfolio selection process is considered very important, it has not yet developed as a series of clear and formal project selection processes (Pennypacker and Dye, 2002). Many researchers and practitioners are aware of these shortcomings and are interested in conducting research and developing a framework or process integration with specific techniques and tools. Referring to the results of the previous study (Le and Nguyen, 2008) which states that each framework has its advantages and disadvantages, and makes a clear contribution to project selection in the organization.

2.1 Integrated Framework for Project Selection by NP Archer dan Ghasemzadeh (1999)

Integrated framework for project selection is a framework developed by (Archer and Ghasemzadeh, 1999). Unlike other frameworks, this framework supports the portfolio selection process explicitly and focuses on procedures and the use of tools and methodologies that help project selection. This framework consists of several stages which can be seen in figure 1.

Each stage in the framework will achieve several objectives and produce input for the next several steps (Archer and Ghasemzadeh, 1999). Archer defines the framework to be a Process Stage, Selection Stage, Activity, and Potential Methodologies, which facilitates the process of adopting the framework.

Project portfolio selection: N P Archer and F Ghasemzadeh

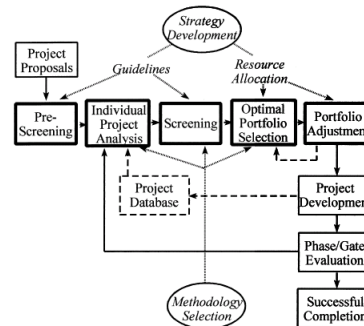


Figure 1: Integrated Framework for Project Selection

2.2 Framework by Project Management Institute

The PMI (Project Management Institute) is a portfolio-related standard known as good practice related to the implementation of portfolio management. This standard is a complement to the Project Management Body of Knowledge (PMBOK) (Institute, 2008).

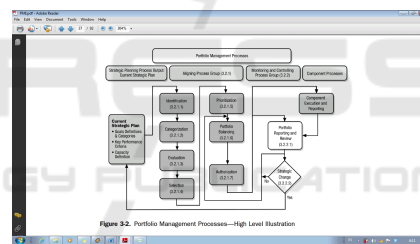


Figure 2: Portfolio Management Process

The standard developed by PMI divides portfolio management into seven stages, namely:

1. Identification: At this stage, information collected regarding the project that is already running and the list of proposed projects.
2. Categorization: At this stage, the classification of each project is carried out into several categories based on the strategic plan.
3. Evaluation: At this stage, the review of each project is carried out based on predetermined criteria.
4. Selection: This stage is an essential process in compiling a list of projects that have gone through an evaluation process and are ready to be input in the prioritization stage.
5. Prioritization: The main objective of this process is to determine the ranking of each project in a particular category of strategy or financing, in-

vestment time frame, the risk versus return profile, and organizational focus.

6. Portfolio Balancing: The purpose of this stage is to produce a portfolio by compiling projects that have the best potential to support the organization’s strategic initiatives in achieving strategic objectives.’
7. Authorization: The main aim of this process is to formally determine the financial and human resource allocation of the company to develop business cases or execute projects and to communicate the results of portfolio balancing decisions.

In applying the standard, Government Investment in China found that the stages in the rule could not facilitate strategic objective correlation with the project, so they added one step in the standard, namely the Identify The Government Strategic Objective stage (Yu et al., 2008).

2.3 Framework by Cooper

Cooper compiled a selection framework consisting of 2 levels. The first level is the level for determining decisions related to the strategic portfolio (strategic bucket) or strategy mapping. The second level, known as the tactical level portfolio, will use different techniques. At this level, it can use stage/gate techniques and complementary PPMs.

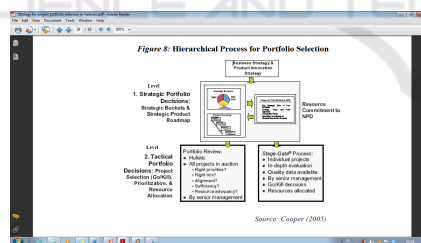


Figure 3: Process hierarchy in project selection by Cooper

2.4 Framework by Englund and Graham (1999)

The framework developed by Englund and Graham is a framework that refers to the 'mental decision-making process' approach. This approach has a different concept from the framework developed by (Archer and Ghasemzadeh, 1999). In figure 4 shows that the framework by (Englund and Graham, 1999), which divide into four stages consisting of:

1. What the organization should do
2. What the organization can do

3. Analyze and decide on a project
4. Implement the plan

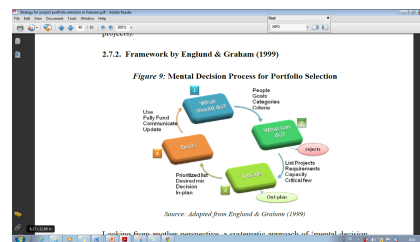


Figure 4: Framework Englund and Graham

3 RESEARCH METHOD

3.1 Framework Analysis

In general, each stage in this framework is similar to other frameworks. However, the framework is more focused on the management portfolio, not the project selection and prioritization process. (Le and Nguyen, 2008) states that each framework has its advantages and disadvantages, and makes a clear contribution to project selection in the organization (Le and Nguyen, 2008). In general, there are no differences or conflicts from the frameworks described. However, each framework has different perspectives and approaches.

Based on the exploration framework conducted by (Archer and Ghasemzadeh, 1999), An integrated framework for project selection was chosen as the basis for modeling. The following are descriptions of reasons that support the selection of the framework:

1. The framework is developed based on a decision-making process that helps decision-makers in making decisions and is different from other frameworks
2. It is a framework designed with specific objectives in project selection
3. Compiled with flexibility, both activities, tools, and methodologies used to be tailored to all types of organizations and projects that are relevant to applicability across organizations

Integrated Framework initiated by NP Archer will divide each job into several stages, and each stage will show certain achievements and will generate input for the next stage. These sequential stages will assist the decision-maker in carrying out project selection with sequential logic to support decision making. This framework has three main phases; strategic consideration (helping to guard the strategic focus and overall

budget of the project), individual project evaluation (evaluating projects independently of other projects), and portfolio selection (project selection that refers to project parameters, inter-project interactions, resource constraints, and other dependencies).

In developing this framework, NP Archer and F Ghasemzadeh prioritize flexibility for each organization in implementing this framework to suit the needs of the organization but still provide direction in its stages to support the process flow. Based on the analysis conducted, found several problems, namely: (1) The naming of less representative stage of selection. The naming of stages in the selection and prioritization process in the Integrated framework for project selection is so common that it is difficult to understand and does not represent the activities in the stages. (2) This framework was developed in general to facilitate the process of project selection and prioritization without reference to specific projects or types of organizations. The result is an explanation of the activities to be carried out therein are also generally classified. (3) In its framework, Archer includes a potential methodology to be applied by the company. However, the use of methodology is closely related to corporate preferences of what methodology is easy to use and by its experience and culture.

3.2 Existing Conditions on the Research Object

Implementation of the selection and prioritization process at the research object is implemented in the IT Steering Committee mechanism. Information Technology Steering Committee is an administrative committee that serves to conduct review, supervision, and prioritization of IT projects. However, its application to the research object is still experiencing problems. Figure 5 is a summary of the issues that occurred in the research object:

3.3 Design Model

Model compilation refers to the stages in the Integrated Framework for Project Selection. This arrangement is done by describing every step in the framework and adapted to the present condition in the research object as well as the result of the study of literature and empirical study. Here is a description of each of these steps:

1. Pre-Screening
Pre-screening is the initial stage of the project selection and prioritization process. What needs to be done at this stage is to ensure that the projects

No	Stage	Problem	Description	Recommend.
1	Project Assessment	Assessment of project scope clarity	Project coverage clarity that includes too many components	Separation of criteria in clarity of project scope
2		Measuring the efficiency of human resources and budget	The appropriate counting mechanism does not do the measurement of efficiency	The use of numerical methods in calculating efficiency
3	Project Priorities	Completeness Criteria assessment	Incomplete criteria when compared to other Bank selection process	Rearrangement of project appraisal criteria
4		Matrix Not Optimal	The division of the box is too much to confuse the implementation	Selection of relevant matrices
5		The difference between Priority Sequence Determination	Determining reverse order priorities	Review of priority ordering
		No Matrix Integration with	Required integration matrix with	Preparation of Matrix Integration

Figure 5: Table problem selection and prioritization in research object

developed are in line with the focus of the portfolio strategy. One technique that can be used in strategy mapping is a strategic bucket. A strategic bucket is one technique to ensure the suitability of the strategy with a top-down approach that maps each project into which strategy it supports (Cooper et al., 2002). Activities in this stage include:

- (a) Mapping of strategy
Mapping of strategy is an activity to ensure that the project developed has alignment with the company's business strategy. Some techniques can be used for mapping of project strategy with business strategy, IT strategy, and primarily focus from IT portfolio, among by classifying IT project proposals with each of these strategies. An example of a technique that can be used is a strategic bucket that will classify each project based on which strategy it supports.
- (b) Project Elimination that is not following the strategy
At this stage, projects that do not fit the strategy or focus of enterprise IT development was eliminated. With these eliminations, it can reduce the burden of the number of projects that will go through the selection and prioritization process.
- (c) Determination of criteria
An essential activity in this stage is to deter-

mine the parameters or criteria used in assessing the project. The use of these criteria will be scattered in the Individual Project Analysis, Screening, and Optimal Portfolio Selection steps tailored to the needs of each stage.

2. Individual Project Analysis

In individual project analysis, individual project appraisal is conducted to find out the clarity and quality of the project in supporting the achievement of corporate strategy. This assessment is based on the parameters or criteria specified in the previous stages. Activities in the stages:

(a) Excavation of Project Information

In the individual project, the analysis will be carried out information extraction related to the proposed project that will be assessed with the work unit of the project proponent. The use of In-depth interview techniques to support individual project appraisal is based on the process as it is currently used by the IT Steering Committee team on the research object to clarify details of the project. The interview is based on predetermined criteria.

(b) Project Assessment

After an In-depth Interview, each member of the IT Steering Committee will conduct an assessment of the proposed project. Evaluation is done by Simplified Scoring Method technique. The consideration of using the scoring method is ease of use and has been similar to as is the implementation of research object so it will be easy to apply without special learning. The scoring scale used also refers to the agreement applied or determined.

3. Screening

Screening is an important part of the selection process and priorities because at this stage will be done second elimination. Activity in the screening stage:

(a) Determination of the Lower Boundary(threshold) of Each Project

At this stage of screening the decision of the lower limit or minimum value that must be met by a project to be passed. The lower limit of each criterion will be different from that determined by the management. The determination of this limitation is not done individually but based on the agreement of the strategic forum.

(b) Project Elimination

The next step after determining the threshold of each criterion is to eliminate the project that does not meet the lower limit using Ad Hoc Approach as profiles

method. The Ad Hoc Method Approach as Profiles is a method by including a lower threshold directly on the device used in the assessment process that was in the previous stage. In its application to the research objects, the tools used are spreadsheets. Therefore Ad Hoc Approach as Profiles is applied through the insertion of the lower bound on the spreadsheet form.

4. Optimal Portfolio Selection

In the Optimal Portfolio Selection stage, there is a comparison between projects from the assessment results on the criteria of filtering and criteria. Activities in this stage include:

(a) Project Prioritization Assessment (Prioritization)

The main objective in this phase is to optimize the IT portfolio by considering the correlation between projects and prioritizing the project group worker who has the potential to provide optimal value for the company. Project prioritization is carried out through the assessment of criteria about the interdependency of the project, resource struggles, technological conformity, and time, and the value or value of any previously considered project. The technique used in the assessment is the Scoring Method. The use of the scoring method is due to its ease of use. Besides the Scoring Method is used to adjust to the overall assessment process used previously because, at the end of the selection and prioritization process, all assessment forms will be incorporated as tools in conducting sensitivity analysis. The importance of project prioritization for organizations due to limited resources, money, and human resources to fund all projects(Turner, 2009).

(b) Mapping of Priority in Prioritization Matrix

A prioritization matrix is a tool used by a company to visualize prioritization results. Based on the results of literature review and empirical study several types of matrices can be used in mapping priorities, including the nine boxes matrix as used by Bank Indonesia and 2x2 matrix as used by Bank Mandiri and Banque de France. Based on the results of the study related to the advantages and disadvantages of each matrix, the 2x2 matrix was proposed. The 2x2 matrix selection refers to the mapping of IT portfolio dimensions implemented by the Fortune 500 consumer package-goods company in Best Practice in IT Portfolio Management[2]. The selection of 2x2 matrix usage is also applied by Bank Mandiri and Banque de France because of its simple tendency and can map

firmly with the division of 4 different criteria. Referring to the literature review in Best Practice in IT Management Portfolio priority mapping priority will be based on risk (risk) and its contribution to the business (value to the business). Based on these two main factors, the next project is categorized into four categories: High Priority (Funding Priority), Medium Priority (Difficult to Execute), Low Priority (Fund Selectively) and Do Not Fund. Figure 6 shows the 2x2 matrix that will be used in the prioritization process.

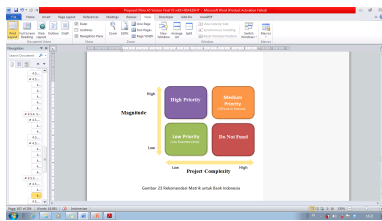


Figure 6: Matrix Recommendation

5. Portfolio Adjustment

The final output of the overall stage is to present the overall view of the selection and prioritization process, which is complemented by the characteristics of each project. In addition to showing the overview, Archer (1999) also emphasized the importance of allowing decision-makers to make final adjustments before making a final decision related to the portfolio. Activities in this stage are:

(a) Sensitivity Analysis

Sensitivity Analysis is the stage that must be in the portfolio adjustment; it is because before the final decision is taken, decision-makers need to get a chance to review and change the results of the previous stages. One of the tools that can be used in doing sensitivity analysis is spreadsheets in Excel (J. Malligan., 2011). Sensitivity analysis can be done by collecting the entire criteria and results of a project assessment calculation in a Spreadsheet (Ms. Excel) to provide data records during the process if required by IT Steering Committee participants and facilitate the process of what-if analysis if the IT Steering Committee participants want to make changes to the composition of the project.

(b) Project Categorization and Portfolio Visualization

At this stage also done categorization of projects based on specific criteria. The main objective of this categorization is to get an overview or visibility of the entire project plan by displaying relevant information related to

the project. Visualization of project categorization in the portfolio can be done by using Bubble Graph matrix.

4 RESULT

The formulation of the selection and prioritization model was carried out by the process of analyzing the existing framework and verifying the research object. The results of making this model can be seen in Figure 8. This model handles several local issues related to the selection and prioritization process of IT projects found in research objects. The following Figure 7 is a summary of locality issues related to the selection and prioritization process.

No	Step	local issues
1.	Strategy Alignment	The focus of the strategy changes, it needs a strategy alignment assessment Referral strategy is too general
2.	Assessment	Investment in research objects is divided into project investments and infrastructure investments
3.	Filtration	Assessment is done in the group decision Determination of the lower limit can only be done at the beginning of the process
4.	Prioritization	The prioritization matrix does not function optimally Determination of priority order is reversed
5.	Visualization	A process that has never been implemented

Figure 7: Table of a local issue.

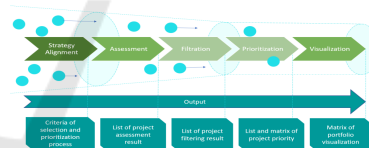


Figure 8: Proposed Model

Based on the description above then obtained the model of prioritization and project selection as follows:

1. Strategy Alignment

This stage was proposed from the Pre-Screening stage from the framework by Archer. This stage is the stage to ensure the project fits the strategic focus, guarding the overall process, and eliminating projects that do not meet the criteria. Input at this stage is the main strategy of the research object, the project proposal document, and the list of selection criteria and prioritization. At this stage, project mapping and project elimination that are inconsistent with strategies and criteria are performed using scoring methods. So it can generate a list of proposed projects that are by the busi-

ness strategy and IT and list the agreed criteria and techniques to use.

2. Assessment

This stage was proposed from the Individual Project Analysis stage from the framework by Archer. This stage is the stage of calculating the assessment criteria determined for each project. Input at this stage is a list of proposed projects that have been through strategy mapping and List criteria used in the assessment. This stage is used to explore project information and project appraisal by conducting an in-depth interview and scoring method to produce a list of interview results and assessment results from each project.

3. Filtration

This stage is a project elimination stage that does not meet the specified value. The input of this stage is the result of individual assessment. The process undertaken is the determination of the lower bound, the collection of project appraisal results and project elimination using ad hoc approach as profiles and scoring method to generate a list of projects that have been through the project assessment and filtering process.

4. Prioritization

This stage is the stage of consideration of the correlation between projects in an integrated way to optimize the portfolio. Input at this stage is a list of proposed projects that have been through assessment and filtering and a list of prioritization criteria. The process undertaken in this step projects prioritization and project mapping in the prioritization matrix using the scoring method and 2x2 matrix to generate the priority ranking of the project based on the assessment of the prioritization process and the project priority results in the prioritization matrix.

5. Visualization

This stage is the stage of allowing the decision-maker to make changes and display the overview of the portfolio. The inputs at this stage are the entire assessment form, the project appraisal result, and the project priority outcome. The process is sensitivity analysis and portfolio visualization with spreadsheet set of scoring method form and bubble graph matrix to produce a list of projects to be implemented and portfolio visualization matrices.

The model is validated against research objects. This validation aims to determine the suitability of the framework with the conditions in the research object. The validation results are the final model of selection

and prioritization of the IT project. The final model can be seen in Figure 9.

Step	Input	Process	Technique	Output
Strategy Alignment	-Main Strategy -Strategic Plan -Strategic Forum Results -Project proposal document -List of selection and prioritization criteria	Assessment of Strategy Alignment Project Elimination that does not meet the minimum strategy alignment value strategy Determination and socialization of criteria and techniques Determination of the Threshold of each criterion	Scoring Method	-List of proposed projects that are aligned with business and IT strategies -List of criteria and techniques that have been agreed to be used
Assessment	-List of proposed projects through strategic mapping -List of criteria used in the assessment	Extracting Project Information Project Assessment	In-depth Interview Scoring Method	List of interview results and assessment results of each project
Filtration	Results of individual project evaluations from each IT Steering Committee participant	1. Collection of project evaluation results 2. Elimination of the project	Adhoc approach as profiles Scoring Method	List of projects that have gone through the project assessment and filtering process
Prioritization	-List of proposed projects that have gone through assessment and filtering -List of Prioritization criteria	1. Project Prioritization 2. Project mapping in the prioritization matrix	Scoring Method Matrix 2x2	-Project priority list based on the assessment of the prioritization process -Project priority results in the prioritization matrix -List of definitions of criteria used in the prioritization process
Visualization	-The overall form of assessment The results of the project assessment -Results of project prioritization	Sensitivity Analysis Portfolio Visualization	Spreadsheet a collection of form Scoring Methods Matrix Aggregate Project Plan	-List of projects that will be implemented -Portfolio visualization matrix

Figure 9: Table of the final model of selection and prioritization IT projects.

5 CONCLUSIONS

Based on the study, several frameworks can support the process of selection and prioritization, but none of which is declared as best practice so that the necessary process of adjustment to the organization. This model uses An Integrated Framework for Project Selection as a reference framework for the next developed into a conceptual model.

Based on the result of the exploration of the selected framework, there are some deficiencies in the framework, such as the names in the stages that are considered less representative and the need for detailed activities in each stage, conceptual model proposes with the following details: 1) Strategy Alignment, 2) Assessment, 3) Filtration, 4) Prioritization, and 5) Visualization. Each stage consists of certain activities that refer to the results of the empirical study and literature review.

This model is created by adopting wisdom and successfully implemented in the research object. The success of the model implementation is proven by verifying the research object. Aspects of local wisdom in this model include: (1) Different IT development focuses each year so that a strategic alignment assessment process is needed, (2) Commonly inclined strategy directives, (3) Unoptimal matrices, and (4) Determination of reverse priority sequences. Referring to the importance of culture, process, experience, and governance in supporting the optimization of the portfolio selection process, it is necessary to extract

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