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IT Project Portfolio Selection using Analytic Hierarchy Process

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[1]Arturo Rivera Chávez

ABSTRACT

Based on the concepts of decision support system (DSS), a framework is presented for IT portfolio selection, which could be adaptable in different degrees to the needs of the different stakeholders of the company. This framework provides a flexible, expandable and interactive DSS to select IT projects for portfolio management A case is showed to demonstrate the practical application of the proposed approach.

Key words: AHP, DSS, IT, Project Portfolio

SELECCIÓN DE UN PORTAFOLIO DE UN PROYECTO IT USANDO EL PROCESO DE JERARQUÍA ANALÍTICA

RESUMEN

Basados en los conceptos de sistemas de soporte a decisiones (DSS), se presenta un esquema para la selección de proyectos de tecnologías de información, el cual puede ser adaptado en diversos grados a las necesidades de los stakeholders de una empresa. Este esquema provee una flexible, expandible e interactivo DSS para la selección de proyectos IT. Se presenta un caso para demostrar la aplicación práctica de nuestra propuesta.

Palabras clave: AHP, DSS, IT, Project Portfolio

INTRODUCTION

Choosing the adequate project has an important effect in an organization. If it's done properly, processes will function more efficiently, employees will feel satisfied for making improvements and shareholders will see the benefit.

Many organizations have been making serious efforts to analyze a large set of project proposals. Project portfolio selection is a periodic activity that has for objective to meet company's objective without violating constraints such as budget, time etc.

Project selection approaches are needed because they help organisations to choose the right projects in order to be successful and efficient in the use of its resources. They also provide the organisation with a list of prioritized projects that therefore will increase the chance of success because those approaches take into account the company's strategic goals and stakeholders interests

Inside that category we have IT projects that are the more sensible ones because most of the times the analysis of those projects takes into account many qualitative variables. It's widely known that IT projects are the major improvement keys of all kind of firms. Therefore choosing the right IT projects to invest in could make the difference between a firm success or failure.

In that paper we are going to present our model using AHP as a tool to integrate all the variables involved in the decision process.

PROPOSED ANALYSIS FRAMEWORK

Our proposed analysis framework is composed of the following steps:

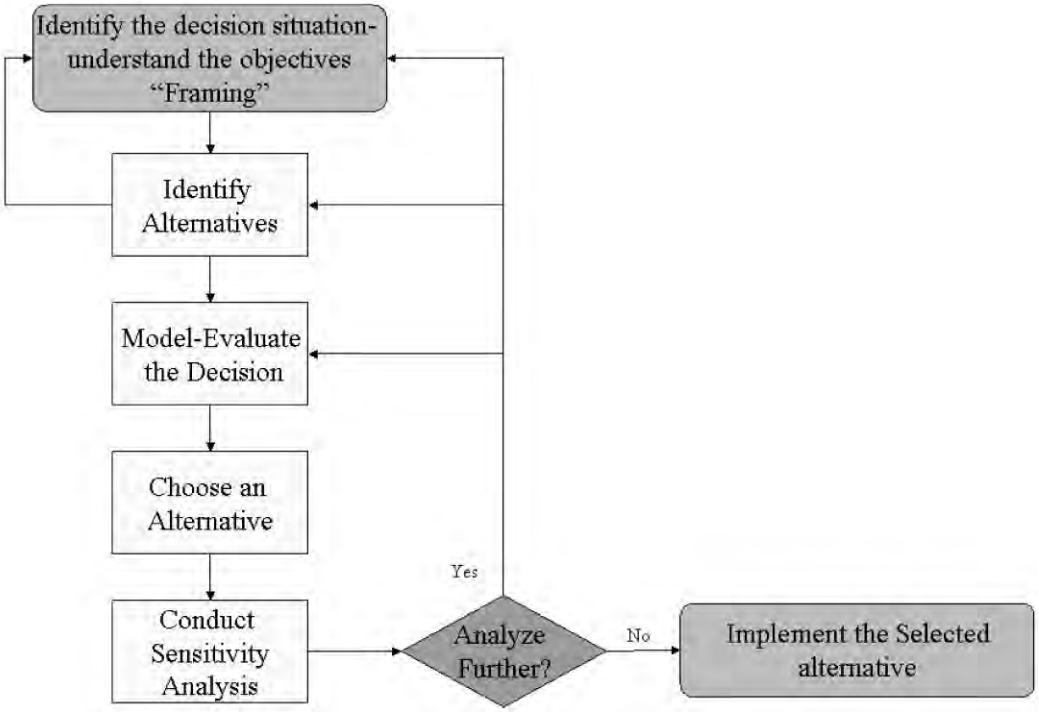
(1) Identify the overall goal. What are you trying to accomplish? What is the main question?

(2) Identify the criteria of the overall goal, which may be specified in terms of ranges of values of parameters or in terms of verbal intensities such as high, medium, low.

(3) Model Evaluate Decision by identifying the vehicle that is going to be used in order to make the selection of the project.

1 Magíster en Administración - ESC Rouen (Francia). Gerente General de Advisory Team Peru (http://www.ateamperu.com). Email: afriverac@hotmail.com

Fig. 1: Framework Proposed Flowchart



(4) Choose an alternative by selecting a project within the portfolio using the criteria defined in the item number two. We applied the selected criteria to all projects subject of evaluation.

(5) Conduct Sensitivity Analysis; in this phase different criteria's can be changed slightly or greatly depending on the volatility of the criteria. The main purpose of this phase is to study and evaluate the result of the changes and how it impacts the final result of a project.

(6) Implement selected alternative; in this phase the selected project is implemented. Based on the decided resources to be allocated, the time horizons to take into account, the predefined objectives are achieved by the project implementation.

APPLICATION

Nowadays all companies in every industry rely on IT systems to manage their core processes. Among those we have the telecommunication companies that rely on technology and IT systems to maintain or improve their market position.

Those parameters (technology and systems) made the telecommunication sector very competitive because they are involved in constant change and evolution. Telecommunication Companies (Telcos) offer mainly services to their customers therefore most of their project portfolio consists of the following:

- Creation of technology: To offer new or improved services to their customers
- Expansion of Infrastructure: To increase geographically the covering of their service.
- IT Systems: To support and control the services offered through the infrastructure.

In the Telecommunication industry, the identification and selection of IT projects has become and important issue that needs to be addressed in our analysis. It's needed a tool that can provide an accurate evaluation of IT projects in function of the company strategic goals. Nowadays, most of the Telcos in order to choose an IT project take into account the following factors:

- Economical benefits (Return on Investment)
- Strategic Reasons (Competitors threat, Mission alignment, etc.).

Economical benefits can be evaluated in a quantitative manner but most of the times are not enough in order to justify the implementation of an IT project because it's not considered the hidden effects of its implementation.

Strategic Reasons is a qualitative approach that can not be evaluated with conventional tools and are

most of the times decided from the top management team. Those factors are used when the economical benefits are not enough to justify the selection and further implementation of a project.

There are other factors as partnership with suppliers, obsolescence of equipments, regulatory compliances, etc. The problem is that in those cases there is no tool in order to measure those subjective factors.

Proposal

There are many criterias in order to choose an IT project. We can classify them into the following major categories:

- **Intangible:** Those criteria that can not be measured in an objective way. Among them we can mention factors such as Political, Social, Environmental, etc
- **Tangible:** Those criteria that can be measured in some degree in an objective way. Among them we can mention factors such as Economical, Technical, etc

It's important tom mention that it is not the precision of measurement on a particular factor that determines the validity of a decision but the importance we attach to the factors involved. In our case we are going to use AHP as the system tool that is going to implement our model. The key objective in the model is to identify the main variables and assigns them the degree of importance that at the end will synthesize that diverse information into a value that will let us make the best decision.

To choose our model we are going to apply the proposed framework as illustrated in Figure 1.

Framework's steps

Step 1. Identify the decision situation and understanding the objectives ' Framing'
The criteria of choosing a project could be fully covered by analyzing stakeholder requirements and their interrelationships. The different criteria needed within the context of stakeholders are the following:

- **Customers:** Increase Service Satisfaction, Price reduction
- **Shareholders:** Increase profitability (Short or Long term), Strategic Fit, Opportunity costs, etc.
- **Employees:** Use of the best practices (Benchmark), Organizational Readiness (Culture), etc.
- **Suppliers:** Solution provided for strategic partners, Reduced time and costs, etc.
- **Government:** Compliant of regulations, expansion of the services to a non covered communities, social responsibility.

Step 2. Identify Alternatives
In this step creative options and scenario alternatives are developed using different information sources and techniques. In our case we know that the alternatives are in function of the project portfolio by itself. We are going to mention some set of alternatives that could be applied to different project portfolio for a Telco.

We propose the following sets of alternatives:

Shareholders: Increase profitability (Return on Investment)
Employees: Organizational Readiness (Culture)
Suppliers: Solution provided for strategic partners

In that scenario we focus in the profitability of the shareholders (main factor) but also we focused in the organization culture and suppliers those are factors related with the improvement of the supply chain. That scenario could be used in projects that could improve the worker environment and work efficiency (RRHH, Manufacturing, Procurement, etc.).

Customers: Increase Service Satisfaction
Shareholders: Increase profitability (Return over Investment)
Employees: Use of the best practices (Benchmark)

In that scenario we focus in the profitability of the shareholders (main factor) but also we focused in the customer satisfaction and the use of best practices those factors are related with the long term goals of the business. That scenario could be used in projects that improve our operations and create a long final value (CRM, IT Projects, etc)

Step 3. Model-Evaluate the decision
Based in our previous analysis we need a tool that would be capable of deliver a quantitative result. All parameters must be classified in a manner that they could give us a number. In order to evaluate our parameters we are going to use AHP as a tool to select the project.

Step 4. Choose an alternative
At this stage the choice of an alternative is done. The choice will be made according to the satisfaction of criteria and global objectives of the business. Also the final choice will be done according to relative return on investment in relation to other alternatives.

In order to evaluate IT projects we are going to use the following criteria

- Customer Satisfaction
- Return on Investment
- Benchmark

In function of the company's vision and mission those factors will have a different weight into the final decision of the project choice. That weight has to be defined in every company context.

In the following graph we show the results of a specific application for a TELCO where customer satisfaction criteria is the first place followed by Return on Investment and benchmark in the second position.

As we can see in the chart in figure 2 the new system on sales is the selected one because it is close to fulfilling the customer satisfaction criteria that is the most important one in our case.

Fig. 2: Final Evaluation Results

	Customer Satisfaction	Return On Investment	Benchmark	
New System Sales	0,66	0,34	0,29	
New System Finance	0,10	0,53	0,52	
Upgrade System Operations	0,24	0,12	0,18	
Priorities	0,50	0,25	0,25	
New System Sales	**0,33**	**0,09**	**0,07**	**0,49**
New System Finance	**0,05**	**0,13**	**0,13**	**0,31**
Upgrade System Operations	**0,12**	**0,03**	**0,05**	**0,20**

Step 5. Conduct Sensitivity Analysis
In this phase the sensitivity analysis is performed to measure how small differences in certain aspects or criteria's of the project will impact the final result of a chosen alternative.

This phase may cause decision makers to consider revaluating general criteria's, alternatives or ways of implementing. In that part we can vary the assigned values in AHP to know the outputs in a fastest way but the rules and weights of the variables keep the same value.

Step 6. Implement selected alternative
In this phase the selected alternative is implemented using the allocated resources and chosen methodology for realizing the project

CONCLUSION

We can affirm that nowadays IT project selection has become a key factor to all organizations. The selection of IT projects most of the times are focused in non economical factors such as customers, culture, etc.

In our proposed methodology (AHP based framework) is important to consider stakeholder points of view because it would cover all possible environments (In specific situations one factor could be more important than others).

The weights of the subjective factors are more likely to change than the objective ones that's why our proposed model with AHP could be applied under a changing scenario. It's advisable to understand how the process of evaluation is in order to apply the results with the best approach.

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