

## **USING ALIGNMENT WITH CORPORATE STRATEGY FOR THE SELECTION OF A PROJECT PORTFOLIO BASED ON ANP**

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### **ABSTRACT**

In this paper a new approach to prioritize project portfolio in an efficient and reliable way is presented. The research methodology is based on a combination of a synthesis of the literature across the diverse fields of project management, project alignment, multicriteria decision methods and a parallel analysis of an industrial case study.

The paper introduces a rigorous methodology with acceptable complexity which seeks to assist managers of the National Electricity Corporation of Venezuela (Corpoelec) in their yearly resources' assignment on their projects portfolio. The aim being to determine the degree of alignment of each project to corporate strategy based on the judgments of a group of experts on the expected contribution of the projects to the business strategic objectives. The model presented can be used both as a descriptive and a prescriptive model.

The approach presented uses project prioritization based on the multi-criteria decision-making technique called Analytic Network Process. Thus the corporate strategic objectives will be used as prioritization criteria to obtain the Relative Alignment Index (RAI).

Keywords: ANP, decision making, project portfolio, Strategic Alignment of Projects.

### **1. Introduction**

Organizations using projects as ways to develop corporate strategies believe that the most complex phase of the process is strategy implementation. Cause of this complexity is failing in establishing adequate relationships between business strategy and project portfolio management, that is called "strategic alignment". This issue can be analyzed using the general model proposed by Meskendahl (2010) and can be seen as disconnection between Strategic Orientation and Project Portfolio Structuring. According to Mankins and Steele (2005), this disconnection may cause organizations to barely accomplish a 63% of the total potential value of their strategies or, as suggested by Johnson (2004), only 44% of the corporate strategy is actually implemented. Since these

results are evident in the execution phase of a project, organizations have focused on project portfolio management and the direct relationships between the projects of the portfolio and the strategic objectives of the organization (Artto and Dietrich, 2004; Dietrich and Lehtonen, 2005).

## **2. Literature Review**

Project prioritization consists on assigning priority or rank order to projects within a portfolio based on a set of priority criteria, whose diversity and classification has been addressed by several authors. These studies have determined the influence of portfolio prioritization as a key factor for business success (Fricke et al., 2000).

Project prioritization is a multidimensional process because it involves a wide range of criteria: technical, economic, social, political and environmental (Meade, 2002; Dey, 2006), and the complex relationships among them. It should consider the interdependence of the projects in the portfolio to assess not only the importance of the projects for the achievement of business strategy, but also the influence of certain projects on the other projects of the same portfolio (Killen and Kjaer, 2012).

Alignment is a concept addressed in the literature on project portfolio management (Srivannaboon and Milosevic, 2006) and is defined as the degree to which a project contributes to business strategy.

Several authors and researchers have addressed the prioritization of projects in engineering using MCDA techniques. Most MCDA techniques assume the criteria have not dependencies between them. In this case -the projects in a portfolio- are strongly related, as suggested by Killen and Kjaer (2012). A method based on ANP may capture these relationships whose analysis with other multicriteria techniques might be incomplete since they are not able to consider influences among strategic objectives and projects.

## **3. Hypotheses/Objectives**

In this paper we want to go one step further and present a model to address these shortcomings based on the following assumptions:

- a) Project prioritization is a multidimensional process (Meade, 2002)
- b) Project prioritization should consider the interdependence of the projects in the portfolio to assess not only the importance of the projects for the achievement of business strategy, but also the influence of certain projects on the other projects of the same portfolio (Killen and Kjaer, 2012)
- c) The information required for project prioritization can be qualitative, subjective and probabilistically or lexically uncertain (Ghapanchi et al, 2012); consequently the prioritization process involves making estimates.
- d) Experience and knowledge of the agents involved in the prioritization process is as important as the methodology itself; therefore a key factor is the right selection of experts.

In this paper, we propose a way to rank projects of company's portfolio according of their strategic alignment. That means, to measure the estimated contribution of a given project to the achievement of the company's strategy. According to its level of alignment each project will be ranked.

## **4. Research Design/Methodology**

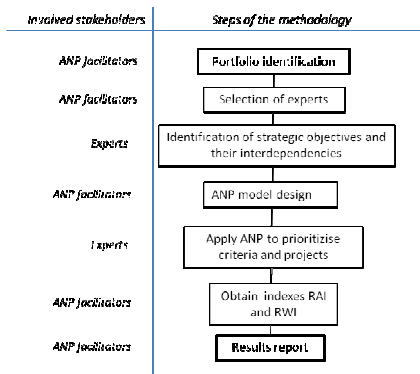


Figure 1. Proposed Methodology

The Relative Alignment Index (RAI) is defined as the normalized dimensionless priority value of each project obtained with ANP using the strategic objectives of the organization as prioritization criteria, and the Relative Weight Index (RWI) is defined as the dimensionless priority value of each criterion over the others obtained in ANP-step (v). The steps of the proposed methodology are:

*Step (i). Project identification*

Identify projects portfolio that possibly contribute to business strategy. Projects included in Technology Master Plan portfolio are shown in Table 1.

Table 1. Technology Master Plan Portfolio. Source: compiled by authors.

Code	Project	Description
PT001	Corpoelec Unique Business Management System	Implementation of a unique business management system (ERP) administered by ATIT Corpoelec, that consolidates the administrative support functions of the old operators.
PT002	Adaptation of the system that supports the commercial management of Corpoelec	Adequacy of infrastructures and computer systems of the commercial offices with the highest sales revenues and correction of 9 faults identified in OPEN system (SGC Adecoeca, etc)
PT003	Corpoelec Data Network Integration system	Updating and Integration of the different data networks of the old electrical operators into one national network run by ATIT Corpoelec
PT004	Integration of Corpoelec Telephone Systems	Updating and Integration of the telephone systems of the old electrical operators in a single national telephone system administered by ATIT Corpoelec
PT005	Integration of Corpoelec Radio Communication Systems	Updating and Integration of the radio systems of the old electrical operators in a single national radio communication network administered by ATIT Corpoelec
PT006	Services Management system	Implementation of a single Services Management system (incident management, requirements management, monitoring, help desk, etc.) for all systems and services of ATIT Corpoelec.
PT007	Global Data Center	Adaptation of a Global Data Center and Design, procurement, construction and implementation of a Support Data Center for the support of all systems and services of ATIT Corpoelec
PT008	Integration of Corpoelec data transport systems	Updating and integration of the different data transport systems of the old electrical operators in a single national data transport network administered by ATIT Corpoelec
PT009	Knowledge Management System	Implementation of a document and knowledge management system for Corpoelec
PT010	Operations Management System	Implementation of an operations management system for the management of Generation Plants, the National Office, Regional Offices and Distribution Offices nationwide.
PT015	Corpoelec unique email system	Implementation of a unique email system (@ corpoelec.gob.ve) that replaces of the email systems of the old operators.

*Step (ii). Selection of experts*

They should have enough expertise to understand the problem on stake and know the company from different perspectives.

Experts were interviewed and they were informed on the ANP methodology and on the characteristics of the problem to solve and were asked to participate in the whole procedure.

Table 2. Selected experts. Source: compiled by authors

Expert #	Objectives	Position
1	strategic	General Manager of the Office of Technology and Information Systems of MPPEE
2	tactical	Corporate Coordinator of Automation, Technology, and Telecommunications
3	tactical	Leader of AT&T Projects
4	operational	Leader of the Operations Unit

*Step (iii). Identification of strategic objectives and their relationships*

The strategic objectives were part of the general corporate strategy of Corpoelec. These objectives are:

Financial Perspective	Users and Stakeholders Perspective	Internal Processes Perspective	Learning and Innovation Perspective
1. Consolidate Corpoelec as a public service company.	3. Commitment with safety and labor conditions.	5. Guarantee the electric energy supply.	7. Technical and human development of employees
2. Leverage new financial and environmental value.	4. Social and community improvement.	6. Efficient use of energy Maximization.	8. Promotion of the use of Green Energy Sources.
			9. Promotion of the research and development management.

Figure 2. Corpoelec Strategic Goals. Source: compiled by authors

The four Balanced Scorecard (BSC) perspectives are used in this methodology to systematically formulate a set of strategies and strategic objectives that help the company achieve its general goals. The relationships among the strategic objectives were obtained with the help of the experts.

*Step (iv). ANP model design and application*

Corporate strategic objectives will be used as prioritization criteria for the ANP model. The BSC management system will be used to cluster these criteria. Judgments of the experts will be elicited by means of questionnaires and processed in order to obtain results. The main step in this methodology is the determination of the influence of some elements over other. To achieve that a face-to-face meeting with the four experts was hold meeting to determine the relationships between objectives. The results were obtained by consensus among experts.

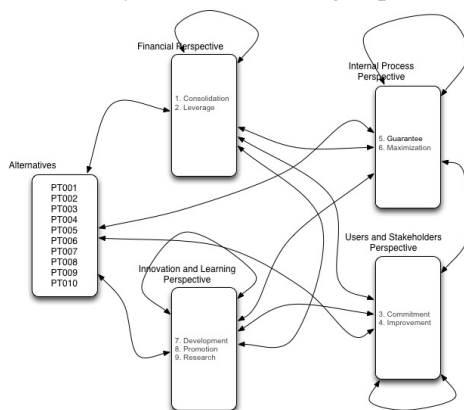


Figure 3. ANP network for the case study. Source: compiled by authors

All this data were computed with software Superdecisions which allowed us to obtain the individual results as well as the consistency index (CI) that was less than 0.1 for each expert. As said before and according to Saaty, these individual results were aggregated by means of the geometric mean to obtain the group results.

Step (v). Obtaining indexes RAI and RWI

The Relative Alignment Index (RAI) for each project (alternative) and the Relative Weight Index (RWI) for each strategic objective (criterion) will be obtained.

5. Data/Model Analysis

Table 3. Limit Supermatrix

Limit Supermatrix																				
	PT001	PT002	PT003	PT004	PT005	PT006	PT007	PT008	PT009	PT010	PT015	Development	Research	Promotion	Leverage	Consolidatio	Guarantee	Maximizatio	Commitmen	Improven
PT001	0,01491	0,01491	0,01491	0,01491	0,01491	0,01491	0,01491	0,01491	0,01491	0,01491	0,01491	0,01491	0,01491	0,01491	0,01491	0,01491	0,01491	0,01491	0,01491	0,01491
PT002	0,02596	0,02596	0,02596	0,02596	0,02596	0,02596	0,02596	0,02596	0,02596	0,02596	0,02596	0,02596	0,02596	0,02596	0,02596	0,02596	0,02596	0,02596	0,02596	0,02596
PT003	0,01488	0,01488	0,01488	0,01488	0,01488	0,01488	0,01488	0,01488	0,01488	0,01488	0,01488	0,01488	0,01488	0,01488	0,01488	0,01488	0,01488	0,01488	0,01488	0,01488
PT004	0,00897	0,00897	0,00897	0,00897	0,00897	0,00897	0,00897	0,00897	0,00897	0,00897	0,00897	0,00897	0,00897	0,00897	0,00897	0,00897	0,00897	0,00897	0,00897	0,00897
PT005	0,00896	0,00896	0,00896	0,00896	0,00896	0,00896	0,00896	0,00896	0,00896	0,00896	0,00896	0,00896	0,00896	0,00896	0,00896	0,00896	0,00896	0,00896	0,00896	0,00896
PT006	0,00645	0,00645	0,00645	0,00645	0,00645	0,00645	0,00645	0,00645	0,00645	0,00645	0,00645	0,00645	0,00645	0,00645	0,00645	0,00645	0,00645	0,00645	0,00645	0,00645
PT007	0,00904	0,00904	0,00904	0,00904	0,00904	0,00904	0,00904	0,00904	0,00904	0,00904	0,00904	0,00904	0,00904	0,00904	0,00904	0,00904	0,00904	0,00904	0,00904	0,00904
PT008	0,01088	0,01088	0,01088	0,01088	0,01088	0,01088	0,01088	0,01088	0,01088	0,01088	0,01088	0,01088	0,01088	0,01088	0,01088	0,01088	0,01088	0,01088	0,01088	0,01088
PT009	0,00959	0,00959	0,00959	0,00959	0,00959	0,00959	0,00959	0,00959	0,00959	0,00959	0,00959	0,00959	0,00959	0,00959	0,00959	0,00959	0,00959	0,00959	0,00959	0,00959
PT010	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087
PT015	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095
Development	0,04748	0,04748	0,04748	0,04748	0,04748	0,04748	0,04748	0,04748	0,04748	0,04748	0,04748	0,04748	0,04748	0,04748	0,04748	0,04748	0,04748	0,04748	0,04748	0,04748
Research	0,01826	0,01826	0,01826	0,01826	0,01826	0,01826	0,01826	0,01826	0,01826	0,01826	0,01826	0,01826	0,01826	0,01826	0,01826	0,01826	0,01826	0,01826	0,01826	0,01826
Promotion	0,00915	0,00915	0,00915	0,00915	0,00915	0,00915	0,00915	0,00915	0,00915	0,00915	0,00915	0,00915	0,00915	0,00915	0,00915	0,00915	0,00915	0,00915	0,00915	0,00915
Leverage	0,1633	0,1633	0,1633	0,1633	0,1633	0,1633	0,1633	0,1633	0,1633	0,1633	0,1633	0,1633	0,1633	0,1633	0,1633	0,1633	0,1633	0,1633	0,1633	0,1633
Consolidation	0,0672	0,0672	0,0672	0,0672	0,0672	0,0672	0,0672	0,0672	0,0672	0,0672	0,0672	0,0672	0,0672	0,0672	0,0672	0,0672	0,0672	0,0672	0,0672	0,0672
Guarantee	0,03937	0,03937	0,03937	0,03937	0,03937	0,03937	0,03937	0,03937	0,03937	0,03937	0,03937	0,03937	0,03937	0,03937	0,03937	0,03937	0,03937	0,03937	0,03937	0,03937
Maximization	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515	0,0515
Commitment	0,02793	0,02793	0,02793	0,02793	0,02793	0,02793	0,02793	0,02793	0,02793	0,02793	0,02793	0,02793	0,02793	0,02793	0,02793	0,02793	0,02793	0,02793	0,02793	0,02793
Improvement	0,45715	0,45715	0,45715	0,45715	0,45715	0,45715	0,45715	0,45715	0,45715	0,45715	0,45715	0,45715	0,45715	0,45715	0,45715	0,45715	0,45715	0,45715	0,45715	0,45715

Table 4. Ranking of projects according to their RAI

Project	Normalized RAI
PT002	0.203
PT001	0.11661
PT003	0.1164
PT008	0.08513
PT009	0.07504
PT015	0.07432
PT007	0.07069
PT004	0.07014
PT005	0.07011
PT010	0.06808
PT006	0.05047

Table 5. Ranking of Objectives according to RWI

Level	Strategic Objectives		RWI (%)
Financial	O1	CONSOLIDATION	7.28
	O2	LEVERAGE	17.71
Users and Stakeholders	O3	COMMITMENT	1.43
	O4	IMPROVEMENT	23.56
Internal processes	O5	GUARANTEE	10.83
	O6	MAXIMIZATION	14.16
Learning and Innovation	O7	DEVELOPMENT	18.07
	O8	PROMOTION	3.48
	O9	RESEARCH	3.44

6. Conclusions

This paper proposes a new methodology for the prioritization of a portfolio of projects based on their expected contribution to the strategic objectives of an organization. The model provides a ranking of projects ordered by their degree of contribution to the achievement of strategic objectives according to the opinion of a group of experts.

The model has been used to analyse the projects portfolio of the Venezuelan corporation Corporación Eléctrica Nacional S.A., particularly to prioritize the Technology Master Plan projects.

The case study also allowed us to determine that according to the priority order of the strategic objectives, the most important projects for the corporation are those that aim to improve commercial management, i.e. the projects that directly generate business value, integration of the company unifying its administrative and management systems and the promotion of an updated technological infrastructure.

7. Key References

Dey, P.K., (2006). Integrated project evaluation and selection using multiple-attribute decision-making technique. *International Journal of Production Economics* 103, 90-103.

*IJAHP Article: Mu, Saaty/A Style Guide for Paper Proposals To Be Submitted to the International Symposium of the Analytic Hierarchy Process 2014, Washington D.C., U.S.A.*

Fricke, S.E., Shenhar, A.J., Technol, S., Bloomington, M.N., (2000). Managing multiple engineering projects in a manufacturing support environment. *IEEE Transactions on Engineering Management* 47 (2), 258–268.

Killen, C.P., Kjaer, C. (2012). Understanding project interdependencies: The role of visual representation, culture and process. *International Journal of Project Management*. 30(5), 554-566.

Meade L M, Presley A. (2002). R & D Project Selection using the Analytic Hierarchy Process. *IEEE Transactions Engineering Management*. 49(1), 59-66.

Srivannaboon, S., Milosevic, D.Z., (2006). A two-way influence between business strategy and project management. *International Journal of Project Management* 24 (6), 493–505.