A methodological framework for Selection highways under Public Private Partnerships context in developing countries

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Abstract**:** This paper presents a methodology based on Multi-Criteria Analysis for selecting highways for Public Private Partnership (PPP) program in developing countries. In order to create a win-win scheme this methodology tried to balance public and private sector interests. On the public sector side, it ensures that PPP will contribute for society's well-being calls for a structure that maintains the improvement of highway conditions and contribute for national development. On the other hand private sector receives a guarantee to obtain fair revenue considering its investments. In this sense, not only operational criteria (travel volume, pavement condition) are evaluated but also social, political and economic criteria. This methodology was applied in the Minas Gerais state, Brazil. Results show that highways selected for PPP program combine both attractiveness to private sector and contribution for nation's development.

Topic Area: H2 Public / Private Partnerships and Major Infrastructure Projects

Key Words: Public-Private Partnership, Strategic Planning, Multi-Criteria Analysis, Project Evaluation

1. INTRODUCTION

There is a widespread agreement the most developing countries need urgently transportation infrastructure programs to ensure that new economic activities have the ideal conditions for supporting continuous development. In these countries, fast economic growth and population increase require large amount of governmental financing for building or updating transportation facilities. Traditionally, public sector has financed and operated transportation projects using resources from governmental funds. However, recently, the disparity between the capacity to generate resources and the demand for new facilities forces governments to look for new alternatives.

Among these alternatives, highway projects have employed Public Private Partnership (PPP) as an investment source to finance, design, build, operate and maintain infrastructure and services. The relevance of the highway system, which in almost every country is the main mode transporting the majority of passenger and freight has boosted PPP initiatives around the world as reported by Gomez-Ibanez and Meyer (1993) and Engel *et al*. (1997). Properly structured PPP can provide more efficient outcomes than those provided by either the public or private sector alone. It is often claimed the private sector, with its wide range of managerial, commercial, and technical skills, can reputedly perform certain tasks more efficiently than the government, thereby offering potentially huge benefits to the public (Zhang *et al*., 2001).

Despite avowed advantages, recent international experiences of PPP programs have shown that extensive planning actions are required in order to guarantee the minimum level of risk (World Bank, 1999; Fisher and Babbar, 1996; Menckhoff and Zegras, 1999). As PPP projects require long-term contracts, external factors such as economical, political and social problems can affect definitions previously established between involved parties. Especially in developing countries, this situation has to be carefully considered, since external factors can deeply affect the program (Kuranami, 1998). Then, conflicts may occur between private and public sectors due to disagreements on criteria, level of services, revenues, etc (Shaw *et al.*, 1996). Eventually, these conflicts can also affect users, since modifications during the program may change the private sector's revenues (Ribeiro *et al.*, 2001).

The highway or its segment that participates in a PPP program has to gather together conditions that will balance public and private sector interests. The public sector is usually interested in cost-effective and timely implementation of the investment following the standards and safety regulations and providing a better service to users. On the other hand, private sector receives guarantees to obtain fair revenue considering its investments (Tsamboulas *et al.*, 2000). In order to conduct this task, planners face the challenge of generating useful information for the selection of highways that creates a win-win environment in PPP.

Traditionally, the assessment on the appropriateness of highway projects has been mostly based on economic appraisal. It is mainly geared towards the evaluation of travel costs and the revenues of direct investments, maximizing the net benefits in resource terms, (Willis *et al.*, 1998; Lee, 2000). Nevertheless, as noticed by May (1998), this approach is based directly on the values that individuals assign to their journeys focus solely on the solving problem assessment without any consideration on the wider implication of these solutions. This problem-oriented vision has been used to evaluate traffic congestion and road construction in day-to-day operations. Additionally, according to Munoz-Loustaunau and Sussman (1999), there are complex and dynamic relationships, which make mandatory the consideration of social, political and economical issues into the planning process.

This paper describes and applies a methodology for the selection of highways project in a PPP context. In order to create an instrument for decision-making activities, we propose a methodology to identify highways (or highway segments) to be considered as part of a PPP project. This methodology is based upon a strategic planning approach and Multi-Criteria Analysis (MCA) in which several intervening factors (such as political, socio-economical factors) are assessed, and at the same time, it also generates the interaction of several PPP players (public, private and users).

This paper is divided into five sections. After a brief introduction, section two describes the theoretical assumptions to reach the methodology. Next, we discuss the general conceptual underpinning of the methodological framework. In the fourth section, a case study in Brazil is presented and the applicability and practicability of the proposed methodology are verified. Finally, section five summarize the results and discusses prospective directions for this research.

2. THEORETICAL ASSUMPTIONS

Two main theoretical assumptions are defined for the selection of PPP highway. The first assumption is that PPP program has to contribute for the national development. Especially in developing countries, a PPP program has to encourage the development of the network and consequently the economy of the surrounding areas. Infrastructure plays a critical role on promoting economic growth through enhancing productivity, improving competitiveness, linking people and organizations and contributing to environmental sustainability. Considering that provision of adequate infrastructure and economic growth are highly interrelated, we assume that any change on infrastructure conditions (highway system) will create a better environment that will support growing and appearance of activities (industrial, commercial, cultural, etc). Thus, the political and economical characteristics of the areas around the highway are important to be considered. Hence, PPP projects have to maximize the development of the nation considering internal (operational) and external (political, economical and social) factors.

The second assumption is that the PPP has to be attractive to private investments. The argument that PPP project might increase overall investment in the economy by providing access to new capital is more credible in developing countries, especially because their capital markets are typically less sophisticated and integrated with world capital markets (Gomez-Ibanez and Meyer, 1993). However, the environment is often uncertain and risky in these countries, making it difficult to attract new investments. Selection of the highway has to guarantee the revenue back to private investor.

In this sense, the priority of a highway in PPP program depends on the combined optimization of private sector attractiveness and the contribution to nation development. Further, attractiveness is represented through the consideration of operational characteristics, whereas development is expressed in terms of political and socio-economical characteristics.

3. METHODOLOGY FOR SELECTING HIGHWAYS IN DEVELOPING COUNTRIES

The methodological phases are described aiming to obtain the priorities for selection of highways in a PPP context. As in developing countries, the lack of data and resource to evaluate project is a very likely scenario, this methodology focuses on generating an instrument, which requires the provision of useful and effective information without extensive data collection. The description of the methodology is divided into five phases.

(1) Phase I: Formation of the database

Required data comprehends information about the characteristics of the highway under analysis. As this methodology is devoted to strategic planning (macro-analysis), a high level of details on highway characteristics is not fundamental to reach the priorities of each highway under analysis.

For each highway segment *i*, a set of characteristics $\vec{C}_i$ that describes its political, socioeconomic and physical/operational conditions is obtained as defined in the Equation 1.

$$\vec{C}_i = \left\{ \vec{P}_i ; \vec{S}_i ; \vec{H}_i \right\} \tag{1}$$

where

$\vec{P}_i$ is the political characteristics vector for segment *i*;

$\vec{S}_i$ is the socioeconomic characteristics vector for segment *i*;

$\vec{H}_i$ is the physical and operational of the highway characteristics vector for segment *i*;

Preferably, the data for all highway characteristics $\vec{C}_i$ has to be collected in the same period of the year in order to establish a common basis for analysis. As a result of the data collection, a database containing all highway segments under analysis is obtained and stored as defined in the Equation 2.

$$\vec{C} = \left\{ \vec{C}_1; \vec{C}_2; \ldots, \vec{C}_i; \ldots, \vec{C}_m \right\} \tag{2}$$

where

$\vec{C}$ is the highway characteristics vector for all m segments.

(2) Phase II: Selection of Alternatives

Considering highway network, the selection of alternatives contributes to reduce the range of possibilities to be analyzed. Here we select only highway segments that have minimum condition to be transfered to private companies and it leads to the decrease on the amount of data required for analysis.

In this process of selection of alternatives, various procedures can be applied depending on the level of data aggregation (kilometers, miles, jurisdictions, etc). The aggregation procedure groups segments i on a set of alternatives $\vec{A}$ as defined in the Equation 3.

$$\vec{A} = \left\{ A_1; A_2; \ldots, A_j; \ldots, A_n \right\} \tag{3}$$

where j $\in$ $\{1, 2, \ldots, j, \ldots, n\}$

(3) Phase III: Definition of impacts related to criteria (judgments)

As part of a MCA, this phase firstly focus on the relative weights between criteria. These weights reflect the relative importance of the criterion, which depends on the preferences of the planners. Specifically for this methodology, a set of weights W, as presented in Equation 4, is obtained based upon the discussion of decision-makers, planners, private investors and users.

$$\vec{W} = \left[\vec{W}_P; \vec{W}_H \right] \tag{4}$$

where

$\vec{W}$ - is a vector of weights;

$\vec{W}_P$ - is a weight vector of Political and Socioeconomic characteristics;

$\vec{W}_H$ - is a weight vector of the criterion Highway characteristics.

Next, for each alternative A_j and criterion c, where c is one of the political, socioeconomic and highway characteristics expressed in the vector W, impacts e_{jc} for each c are determined considering the database $\vec{C}_i$ developed in the phase I. Computing each impact e_{jc} into a function f_c, which depends on the type of model employed in the MCA, a priority values u_{jc} interpreted as goal-achievement scores are obtained as shown in Equation 5.

$$u_{jc} = f_c\left(e_{jc}\right) \tag{5}$$

where each function f_c provides a directly proportional transformation of impact e_{jc} into u_{jc}, specifically for this methodology.

Thus, to obtain u_{jc}, the impacts e_{jc} of each criterion c are valued according to the theoretical assumptions previously defined (section 2).

(4) Phase IV: Computing impacts (Priorization)
Considering the results of u_{jc}, a partial priority Z_{jc} is computed by applying Equation 6, which expresses the relative importance of each alternative *j* and criterion *c*.

$$Z_{jc} = u_{jc} * W_c \tag{6}$$

Final alternative priority P_j is computed based on the Equation 7 as follows.

$$P_j = \sum_c Z_{jc} \tag{7}$$

(5) Phase V: Analysis of priorities
Based upon the results from the application of Equation 7, the priorities for all are obtained. These priorities show the potential of each alternative to be transferred to private companies through a PPP program. More specifically, alternatives or group of alternatives with high P_j will be identified as strongly recommend to be transferred, since they combine characteristics highway, political and socioeconomic conditions, according to the paradigms described in section 2. On the other hand, low P_j will indicate alternatives or group of alternatives that are mostly not suitable for transference under a PPP program.

4. CASE STUDY

The case study was conducted in Brazil due to its continental dimension and acknowledged role as a leading nation in South America. Brazil is the Fifth biggest country in the world occupies 8,6 million Km^2. The population is approximately 160 million people and economically has the biggest Gross Domestic Product in Latin America. Specifically regarding the highway system, Brazilian Highway Network (BHN) has 1,5 million Km, which responds for 65% of freight transportation and 95% of passenger's displacements.

Aiming to finance the highway network, Brazilian government has been conducting a PPP program based upon concession contracts. Concession is the temporary transference of recuperation and maintenance services in exchange for exploration rights such as payment of toll feel (Silva, 2000). Since the beginning of the Brazilian Highways Concession Program (BHCP), four federal highways and one bridge were transferred to private sector.

After this first experience, new highway segments were planned for future transference by state governments. Among them, Minas Gerais (MG) state can be highlighted. With the population around 17,8 million people, being 14,6 million living in urban area and 3,2 million living in rural area. MG's economy is mostly based on the extraction of minerals to supply metallurgy industries, and the agriculture activities, which the highway system has important component. To attend a large variety of activities, a vast network system has been developed over the years. MG state has the longest network highway paved system in Brazil (272,527 Km).

However, recently the paved highway system has shown great signs of deterioration and in partial collapse. Additionally, periodical maintenance has not been conducted due to the lack of resources. Aspiring to change this situation, state planning agencies have been transferring highways to private companies. In the first stage, they have been planned to transfer 3,976 kilometers of federal, state and municipal highways, which still in a planning process.

The proposed methodology of the previous section is applied to generate information for decision-makers to select concession highways. Thus, this information will indicate the priority of each highway segment to be selected as a concession highway in MG.

Firstly, it is important to choose the MCA method that will be used in the priorization analysis. We selected the Analytic Hierarchy Process (AHP) developed by Saaty (1980). AHP is a popular decision-making tool for multi-criteria decision-making problems. This technique is particularly interesting due to the establishment of a hierarchy for decision and quite simple participation of decision markers. It provides a method to assess goals and objectives by decomposing the problem into measurable pieces for evaluations using a hierarchical structure and comparative judgments. The description of the results of the case study follows the framework of the proposed methodology.

(1) Formation of the database

Aiming to represent the assumptions proposed in the section 2 and based on analysis of criteria employed in highway project evaluations (Lam and Tam, 1998; Talvitie, 1999; Hastak and Abu-Mallouh, 2001), we first specify a set of characteristics $\vec{C}$ Equation 8:

$$C_i = \{TV_i; PC_i; FH_i; DG_i; GDP_i\} \tag{8}$$

where,

TV: Traffic Volume represents the number of users on the highway under analysis per kilometer. It is a criterion devoted to generate minimum conditions for the participation of private capital. It is assumed that the highest *TV* identifies the highway that offers the attractiveness in terms of revenue for private investment since this is a concession contract;

PC: Physical Characteristics represents physical condition of the highway, which is related both to the level of investment to be required from private sector and to the necessity of recuperation of the highway in order to attend users' expectation (public interest). It is assumed that if pavement condition is considered good, then concession of the segment under analysis is not urgent neither repair is required immediately. On the other side, highways segments in severe condition will need urgent repairs;

FH: Function of the Highway is devoted to express how the highway under analysis contributes for the network system as a whole. It is stated that highways that link capital cities are more important than the others, since they have fundamental importance on connecting areas that provide passing for industrial and agricultural products. On the other hand, highways linking small cities have minor importance, because their contribution for the system is reduced;

DG: Demography expresses demographical characteristics along the extension of the highway. It helps to highlight the status of the population, in order to identify deficient areas in terms of investments that may be affected by concession of highway. Regions with high number of population show that they are already saturated. Oppositely, regions with less population call for investments to improve them. Therefore, they might be priorized when conducting the concession of the highway; and

GDP: Gross Domestic Product shows how active is the economy of a region / city that is influenced by the highway under analysis. Based on this criterion, it can be verified the necessity of creation of infrastructure conditions for development. As it is essential to stimulate areas that present low values of GDP, it is expected that a concession road might bring economical development for areas that lack of it. In the other side, cities, that already present high level of economical activities expressed by a high GDP, are not urgently suitable for additional improvements and investments.

For this research, highway characteristics were colleted from Governmental agencies (National Highway Agency; Statistical and Census Bureau; Ministry of Economy) as present in the Table 1.

(2) Selection of Alternatives

Taking into consideration the $\vec{C}$ collected in the previous phase, in this phase we identified the set of alternatives A_j and conducted the aggregation of $\vec{C}_i$ onto $\vec{C}_j$. The selection of alternatives was based on the qualification used in the Highway National Department in Brazil including constructed and paved highways and the highest level of jurisdiction. The alternatives selected are present in Table 1.

Table 1- Selected Alternatives

A_j	Name	Length (Km)	PC_j Condition	TV_j (flow*10^3)	FR_j	DG_j (Population 10^3)	GDP_j (\$US* 10^6)
1	BR-352	524.50	Severe	2.6	big cities with municipal cities	341	129
2	BR-040	563.60	Moderate	8.5	capitals cities	2,577	3
2	BR-040	265.10	Moderate	10.5	capitals cities	2,995	3
3	BR-116	817.30	Moderate	4.3	capitals cities	818	112
4	BR-146	621.80	Severe	2.7	between municipal cities	612	242
5	BR-122	286.20	Severe	2.7	big cities with municipal cities	305	549
6	BR-135	778.10	Moderate	5.9	big cities	106	520
7	BR-153	246.50	Poor	2.3	big cities	89	298
8	BR-460	84.30	Severe	2.0	big cities with municipal cities	68	66
9	BR-369	272.90	Poor	1.3	big cities with municipal cities	219	124
10	BR-381	450.00	Moderate	7.7	capitals cities	2,827	1,658
10	BR-381	488.10	Moderate	17.2	capitals cities	2,761	1,987
11	BR-383	396.40	Moderate	2.6	big cities with municipal cities	419	95
12	BR-393	47.90	Moderate	1.2	big cities with municipal cities	38	52
13	BR-356	265.30	Poor	5.1	capital and big cities	245	4,180
14	BR-365	878.70	Poor	2.7	capital and big cities	575	220
15	BR-120	784.40	Moderate	1.8	big cities	790	77
16	BR-354	764.50	Severe	2.0	big cities	623	114
17	BR-267	532.80	Moderate	3.0	big cities with municipal cities	1,136	195
18	BR-262	316.80	Moderate	5.1	the capitals cities	2,551	1,639
18	BR-262	683.00	Minor damage	3.7	links the capitals cities	3,645	1,028
19	BR-265	705.60	Poor	1.8	big cities	634	81
20	BR-418	178.30	Moderate	1.2	big cities with municipal cities	194	147
21	BR-452	305.00	Poor	2.9	big cities with municipal cities	635	435
22	BR-458	144.90	Severe	5.0	big cities with municipal cities	225	857
23	BR-491	263.60	Moderate	2.5	big cities with municipal cities	317	126
24	BR-259	590.60	Moderate	2.0	big cities with municipal cities	397	163
25	BR-154	205.30	Severe	1.3	big cities with municipal cities	108	119
26	BR-251	937.70	Poor	2.4	between municipal cities	466	205
27	BR-367	623.30	Moderate	0.9	big cities with municipal cities	191	43
28	BR-494	373.20	Moderate	2.8	between municipal cities	359	138
29	BR-496	135.70	Poor	1.3	between municipal cities	108	213
30	BR-497	333.70	Poor	1.3	big cities in side the state	579	556

(3) Definition of impacts related to criteria (judgments)
Based on AHP's framework the judgment was conducted in two levels. Firstly, a group of decision-makers including staffs from the Ministry of Transport, Road Controlling Agency, private companies and community participated in this phase. Considering a hierarchical structure as showing in Figure 1, they were asked, through a questionnaire, to conduct the pair-wise judgment between criteria. They were asked to judge and fill the importance of each criterion (*TV*, *PC*, *FH*, *DG* and *GDP*) Taking into consideration the fundamental scale 1 to 9, suggested for Saaty (1980), which criterion with the same importance receive 1 and extremely important criteria over another are valued as 9. The results of the relative weights *W* of questionnaires were *TV*= 39.7%; *PC*= 7.8%; *DG*= 24.7%; *FH*= 3.0%; *GDP*= 24.7%.

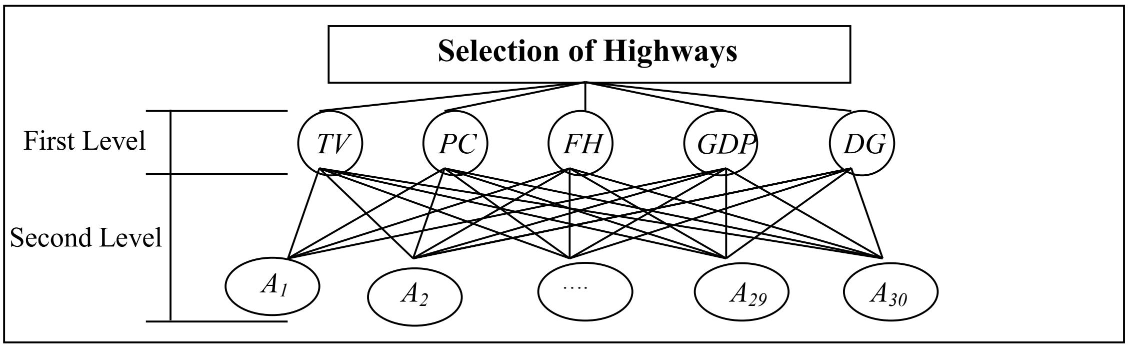

Figure 1- Hierarchical structure for concession of highway analysis

In the second level, judgments to obtain the relative impact e_{jc} were determined considering the specification of characteristics $\vec{C}$ previously established (Formation of database phase I) and Table 1. The description of the relative importance of each alternative A_j and the criterion c are present in the Table 2.

Table2- Relative importance of each characteristic

Criterion	Description	Relative Importance	Criterion	Description	Relative Importance
TVj	High Traffic	High	DG_j	Great Population	Low
	High-medium Traffic	High-medium		Medium-high Population	Medium-low
	Medium Traffic	Medium		Medium Population	Medium
	Medium-low Traffic	Medium-low		Medium-low Population	High-medium
	Low	Low		Low Population	High
FRi	capitals cities	High	GDP_j	Great GDP value	Low
	capital and big cities	High-medium		Medium-high GDP value	Medium-low
	Big cities in side the state	Medium		Medium GDP value	Medium
	big cities with municipal cities	Medium-low		Medium-low GDP value	High-medium
	municipal cities	Low		Low GDP value	High
PCj	Severe condition	High			
	Poor condition	High-medium			
	Moderate defects	Medium			
	Minor damage	Medium-low			
	No damage	Low			

To compute e_{jc} impacts for all j alternatives and c criteria, we applied Equation 9 to obtain u_{jc}.

$$u_{jc} = \frac{\sum e_{jc}}{\sum_{j} \sum_{c} e_{jc}} \tag{9}$$

(4) Computing impacts (Priorization)

Considering the results of u_{jc} and the results of the relative weights judgment a partial priority Z_{jc} were computed (Equation 6). Finally, from the partial priority, the priority P_j for each j was reached using Equation (7). Results are shown on Table 3 and Figure 2.

Table 3- Final Priorities

A_j	u_{jTV}	u_{jPC}	u_{jDG}	u_{jFR}	u_{jGDP}	P_j (%)	
3	2.17	0.94	6.77	6.95	5.6	4.2	I
1	2.17	6.66	4.57	1.5	5.6	3.95	II
16	0.46	6.66	6.77	3.49	5.6	3.87	
19	0.46	4.23	6.77	3.49	5.6	3.68	
8	5.09	6.66	2.42	1.5	1.64	3.59	
22	6.63	6.66	0.82	1.5	0.67	3.57	
11	2.17	0.94	4.57	1.5	5.6	3.5	
15	0.46	0.94	6.77	3.49	5.6	3.42	
27	0.46	0.94	6.77	1.5	5.6	3.36	
10.1	6.63	0.94	0.82	6.95	0.67	3.28	
6	3.78	0.94	2.42	3.49	3.6	3.17	III
14	0.46	4.23	4.57	3.62	5.6	3.14	
2.1	6.63	0.94	0.46	6.95	0.34	3.11	
23	3.78	0.94	2.42	1.5	3.6	3.11	
28	3.78	0.94	2.42	0.54	3.6	3.08	
26	0.46	4.23	4.57	0.54	5.6	3.05	
17	2.17	0.94	4.57	1.5	3.6	3	
7	3.78	4.23	2.42	3.49	1.64	2.94	
25	2.17	6.66	2.42	1.5	3.6	2.92	
21	3.78	4.23	2.42	1.5	1.64	2.88	
29	3.78	4.23	2.42	0.54	1.64	2.85	
24	0.46	0.94	4.57	1.5	5.6	2.82	
12	5.09	0.94	0.82	1.5	1.64	2.75	
4	0.46	6.66	4.57	0.54	3.6	2.74	
9	2.17	4.23	2.42	1.5	3.6	2.73	
5	3.78	6.66	0.82	1.5	1.64	2.68	
2	5.09	0.94	0.82	6.95	0.67	2.67	
10	5.09	0.94	0.82	6.95	0.67	2.67	
18	5.09	0.94	0.82	6.95	0.67	2.67	
13	5.09	4.23	0.46	3.62	0.34	2.66	
20	3.78	0.94	2.42	1.5	1.64	2.62	
18.1	2.17	0.36	2.42	6.95	1.64	2.1	IV
30	0.46	4.23	0.82	3.49	1.64	1.23	V

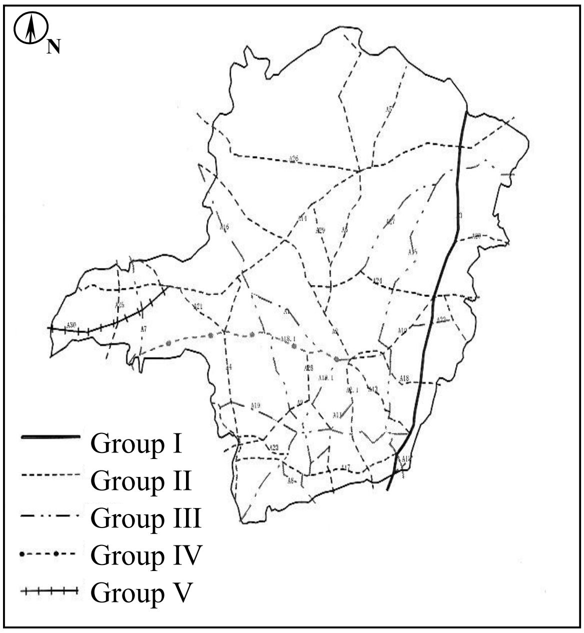

Figure 2- Final priorities P_j of all alternatives

(5) Analysis of priorities

Results displayed on Table 3 and Figure 2 show distinct levels of priority for the highway concession in the MG State. For the sake of this analysis, let us divide P_j values into five groups of priority as presented in Figure 2. In a case-by-case analysis, it can be verified that only the Groups (I) and (II) are indicated for future analysis and possible concession. Alternative 3 is an example of highway combining all characteristics for participating in a concession program. Despite its average performance in terms of *TV* and *PC*, it has a great priority due to *DG*, *FH* and *GDP* values. Especially regarding *TV* criterion and its economical effects, one can easily realize that this alternative has a potential in terms of demand since it is an important corridor connecting northwest and southeast regions of Brazil.

Group II, its performance is due not only to *TV*'s contribution, but also the participation of other criteria such as *GDP*, *DG* and *PC* criteria, providing equilibrium for all cases of this group. It can be subdivided into two sub-groups according to *TV* values. In the first sub-group (alternatives 8, 22 and 10.1), high *TV* is the main factor contributing for P_j. The reason for high values of *TV*'s is a concentrated traffic demand in a very limited extension in areas mostly dedicated to industrial production. The second sub-group (alternatives 1, 16, 11, 7, 15 and 27) presents high priorities in *GDP*, *DG* and *PC* criteria, because of the nature of the regions where these highways are passing through, i.e., low levels of population and economical activities. However, they are strategically important for national development because potential target for investments that may generate attractive outcomes.

In the Group III, equilibrium among the criteria is observed. We conclude that these highways are in regions already developed or saturated, which means that they do not need urgent resources. Despite the necessity of pavement maintenance (alternatives 14, 26, 25, 21, 29, 4, 9, 5 and 13) and some cases with high *TV* (alternatives 2.1, 18, 12, 10, 2 and 13), they will not generate large scale of developments in a long-term perspective. Lastly, groups IV and V do not gather not gather sufficient conditions (economical attractiveness and developmental purposes) for conducting a concession program.

Finally, the results show the real condition of each highway segment to be transfered to private sector. They can combine groups of priorities in order to target their task. Additionally, through the results, MG's decision maker can have a vision of the whole network system reaching future scenarios in a long-term perspective.

5. CONCLUSION

This research proposed a methodology in order to evaluate highways for concession projects. In this sense, this paper attempted to contribute to help decision-makers in the strategic level. The methodology is an instrument that provides information for macro appraisals based on MCA framework. The results from the application of the methodology, in the case study, show that it can be useful for decision making in MG state. This methodology provides a more efficient use of resources (data, personnel, time, money, equipments) and it generates outputs (priorities of highway for concession) that are devoted to create future scenarios for national development. Moreover, the results can be an input for micro or economic analysis, in the next stage, decreasing the volume of data normally required in highway project evaluation. This methodology could be used primarily by the public sector, and it aims to assist both the private and public sectors in reaching an agreement of financing a highway project in a macro scenarios.

The experience obtained in this research suggests some topics for future improvements and researches as following:

- Use of other methods for Highway Project Evaluation, in order to explore different tools for the selection of concession highways;
- Incorporation into the proposed methodology of new criterion for expressing network influences on the selection of concession highways; and

- Conduct additional researches towards the study of techniques for choosing most suitable and skilled decision-makers for the selection of concession highways.

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