A STUDY ON AIRPORT INVESTMENT PRIORITIZATION SCHEME

Felicisimo C. PANGILINAN, Jr.
Sr. Transportat Dev't. Officer
Air Transport Planning Division
Department of Transportation
and Communications
Columbia Tower, Ortigas Ave.
1554 - Mandaluyong City
PHILIPPINES
Fax: (+632) 727-1703

Dr. Toshinori NEMOTO
Professor
Faculty of Economics
Fukuoka University
Nanakuma 8-19-1,
Jonan-Ku,
Fukuoka, 814-01
JAPAN
Fax: (+81) 92-864-2905

Dr. Olegario G. VILLORIA, Jr.
Associate Professor
National Center for
Transportation Studies
University of the Philippines
P.O. Box. 154. UPPO,
1101-Diliman, Quezon City
PHILIPPINES
Fax: (+632) 929-0494

Abstract: Prioritization, as used by planners and managers, is a systematic process of allocating the scarce resources to achieve an optimum result. This study has identified various decision parameters and factors that could be used in determining the priority rating of an airport and a project. Selection of parameters was determined from the responses of a perception survey of individuals who are involved directly and indirectly in the decision-making process of airport development. A procedure based on a scoring model approach, was developed utilizing the identified decision variables that could measure the degree of need, urgency and desirability of an airport and project, taking into consideration the multiplicity of transport investment goals. It was found by this study that although the decision makers come from the different interest group could decide harmoniously.

1. INTRODUCTION

In planning for the development of the whole airport system, the question on the availability of the required investment capital is always at the backdrop. This is very true for developing countries like the Philippines, where the national government is facing with a problem on the scarcity of resources to improve, develop and maintain transportation infrastructure, such as an airport. As always, the usual problem exists, i.e., the available fund is not enough to suffice the total development needs of the whole airport system.

There are still a lot of things to be done to completely develop the aviation sector in order to fully respond to the country's need for an efficient air transport system that is responsive to the national economic objective. As outlined in the Civil Aviation Master Plan (CAMP), several number of airports have to be further develop, improve and provided with necessary infrastructure and air navigation facilities, to at least, conform with the minimum international standard (for safety) as recommended by the International Civil Aviation Organization (ICAO)[1].

However, the provision of these infrastructures, facilities and equipment will require huge capital investment from the government. As shown in table 1, it is estimated that the needed airport improvement/development would cost the government a total of approximately ₱[2]14.70 Billion over the next five years (1996-2000). The locally funded projects alone,

[1] Republic of the Philippines. Department of Transportations and Communications. Civil Aviation Master Plan, Final Report, vol. I. July 1992. chap. 7.

[2] ₱ means Peso, the currency of the Philippines (1US$=approx. ₱28)

wherein funds will be sourced by the government from domestic revenues, the financial requirement reaches ₱5.22 Billion.

Given the limited availability of government financial resources, *there is therefore a need to rationalize the investment pattern, i.e., allocation of funds for the different airport improvement/development works, and maximize the resources and get the maximum benefit that could be derived from such investment.* Further, even if the infrastructure fund itself is enough, its misallocation would obviously result in a suboptimization of the expected benefits that the fund can yield[3].

1.1 The Aerodromes (Airports) System.

At present there are a total of 233 airports in the country. Airports in the Philippines are categorized as national, private and military. The concern of this study, however, is focused mainly on the 87 national airport which are classified according to the Aeronautical Information Publication (AIP) as shown in table-1 below.

Table-1
Number and Classification of National Airports

Number	Classification	Application[4]
5	International Airport	used for the operation of aircraft engaged in international air navigation;
12	Trunkline Airport	Services the principal commercial centers of the country. It is primarily used by jet aircrafts;
37	Secondary Airport	Services the principal towns and cities with regular traffic densities;
33	Feeder Airport	Serving towns and rural communities with limited traffic potential;

Source: Philippine Aeronautical Information Publication

Out of the total number of airports only 41 are currently being served by a scheduled airline's operation that is being dominated by the Philippine Airlines (PAL). Of this number, 18 airports can accommodate jet aircraft and 25 has Fokker-50 (F-50) as its critical aircraft. The remaining airports that are mostly of secondary and feeder classification, are used by the general aviation operators, that mostly uses small aircraft (vary from single to multi-engine and turbo-propeller type

1.2 Domestic Air Traffic Performance

For the last ten years (1986-1995), the overall domestic passenger traffic indicates an average annual growth rate of 4.21%. As shown in figure-1., an upward trend was seen from 1986 to 1989 followed by a drop towards 1992. However, an upward recovery trend

[3] Toshinori Nemoto and Olegario G. Villoria Jr., Financial Reforms Towards Sustaining a Healthy Transportation Infrastructure. A paper presented at the TSSP 3rd Conference, Quezon City, Metro Manila, 14 July 1995. pp. 5.

[4] The exact meaning of the various airport classification is not published in the AIP. The definition provided herein was taken from the Final Report of the National Transportation Planning Project (NTPP-VII-I, August 1982) as categorized and classified by the then Bureau of Air Transportation (now Air Transportation Office).

can be observed starting 1993. By the end of 1995, there were already 10.4 Million recorded passengers.

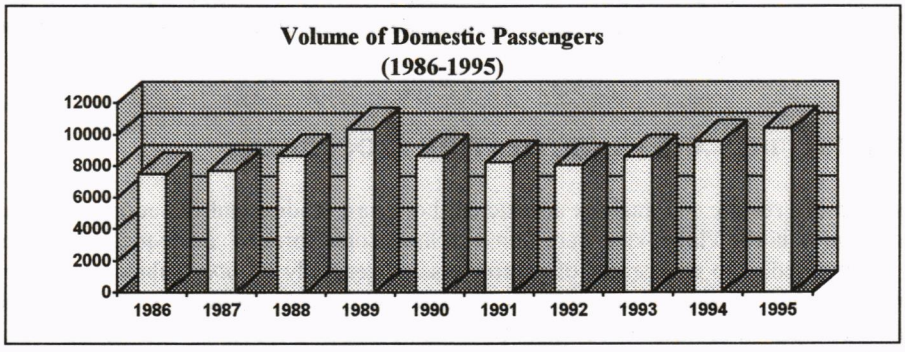

Figure-1

In terms of cargo in general, there is a rising trend in traffic volume being depicted. Figure 2 shows that from 99 tons in 1986, it increases to 184 tons in 1995 or an annual average growth rate of 8.14%. Although there were some reversals between the periods 1988-89 and 1990-91 and the slight decline between 1993-94 of -2.7%, these fluctuations are not too pronounced taking into consideration the overall picture.

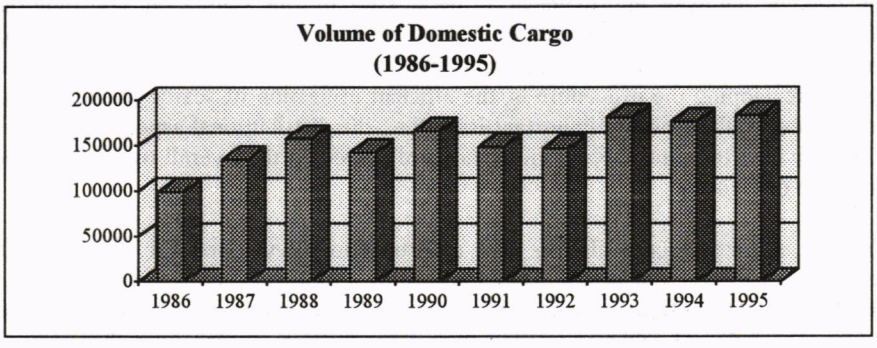

Figure-2

1.3 Present System of Project Prioritization

In general, airports like any other transport projects are prioritized on the basis of its relevance to the government's priority considerations/areas as stated in the overall development plans. Specifically, transport projects costing ₱300 Million and above are subjected to detailed feasibility studies and approval by the Investment Coordinating Committee (ICC) and by the Board of National Economic and Development Authority (NEDA) chaired by His Excellency the President. For projects costing less than ₱300 million but more than ₱10 Million, the same are also subjected to feasibility studies but need not pass the ICC and do not requires NEDA Board approval. In both cases, priority is dictated by their degree of economic viability among others.

Meanwhile, those projects with less than ₱10 Million cost are also prioritized based on criteria set by the Planning Service of the Department of Transportation and

Communications (DOTC). This prioritization considers the volume of passengers, number of aircraft movement; proximity to another airport; degree of isolation of the area concern and economic/development potential. In all cases, the objective of the prioritization is to make the maximum use of the government's scarce resources, that will give maximum timely benefits to the country.

2. PAST STUDIES AND PRIORITIZATION PROCEDURES

Based on the review and analysis conducted, both past studies and the adopted scheme of prioritization in the Philippines were found to have some form of inadequacies in terms of the inputs used. The assessment of parameters are generally *ad hoc* (subjective) in nature, example of this are that of the DOTC's Scheme and the SAUTI study (1975)[5]. Economic evaluation were also utilized in some procedures such as the one used by the National Transportation Planning Project (NTPP)[6] and the Critical Investment Analysis (CIA)[7]. However, problems surrounding the valuation of cost and benefits, failure to accommodate unquantifiable (non-monetary) issues, the absence of explicit distributional considerations and increasing inadequacies of welfare economics as a basis of evaluation that may led to considerable discredit of the technique were not able to be avoided. Some of the formulated scheme fall short in supporting the transport development objectives.

A procedure develop by King K. Mak and Paul S. Jones (1976) for the Georgia Department of Transportation (GDOT) U.S.A. was also reviewed. The study involves a priority analysis for ranking highway improvement project. One of the significant contribution of the procedure was the inclusion of intangible parameters such as socio-economic, environmental, continuity factors and political inputs.The only concern of Mak and Jones here in developing the procedure is, the efficient utilization of scarce financial resources at project level only. Another important issue, i.e., the distributional aspect were not covered. This may lead to some skepticism in terms of achieving the overall transport objectives of the State of Georgia.

Another interesting case also, is that of procedures developed for the different county councils in England and Wales. This demand for a new evaluation methodologies surfaced after the COBA[8] suffered considerable criticism from economist, planners, and the general public. The different counties develop their procedures in varying form, but in general with similar approaches, i.e., points rating 'scheme appraisal' system using a series of criteria to which points were allocated. Although a number of issues were raised against these procedures, it has gained widespread acceptance due to significant development as shown by its characteristics.

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[5] The objective of this study is to establish through an intermodal analysis, the relative priority airports within the region.

[6] The project aims to asses the likely future investment requirements in airport facilities using a computer-based technique, that relates directly to the geometry of the airport and air service network. The measure is based on least-cost allocation of passenger traffic to modes and routes.

[7] This evaluation scheme was developed by a small group of DOTC Transportation Planning Staff and used to prioritized the CY 1989 and the 1990 Annual Infrastructure Program. The concept is economic, using the Net Present Value (NPV) as indicator.

[8] COBA is a computer based approach of project appraisal introduced in 1972. It is very similar to the traditional cost-benefit analysis. It assesses the comparative economic costs and benefits of alternative proposals based upon estimates of the changes in travel time, operating and accident cost.

3.0 IDENTIFICATION OF EVALUATING FACTORS AND PARAMETERS

To determine the pertinent airport parameters and project factors and at the same time, to establish the relative importance of the parameters in terms of weighting factors, a set of questionnaires was formulated with the following objectives: 1)To serve as an identification process to select the pertinent parameters from the long list; and, 2) To provide basis for determining an initial set of weighting factors.

The set of questionnaires was sent to a selected group of persons (respondents), previously identified, who are directly and/or indirectly involved in the planning and/or evaluation and appraisal of an airport (or development projects). These are the following:

1) Department of Transportation and Communications (DOTC)
   (Including the Air Transportation Office)
2) Department of Tourism (DOT)
3) Department of Trade and Industry (DTI)
4) National Economic and Development Authority (NEDA)
5) Philippine Airlines (PAL)

The respondent were asked to evaluate the importance and relevance of the pertinent airport parameters and project factors on a scale of 0 to 10. Zero (0) denotes no importance or inappropriateness and ten (10) signifies extreme importance of the parameters/factors in their decision making process.

A total of 202 persons were identified as the prospective respondent for this survey nationwide. These represents five (5) government agencies and one private entity. The overall response rate was considered high at 70.30%. An attempt was also made to survey and get the perception of the Members of the House of Representatives, specially those who belongs to the powerful Committee on Appropriations and Committee of Transportation and Communications. However, out of fifty two (52) questionnaires sent, only five (5) Congressmen replied.Results of the survey are shown in the following figures.

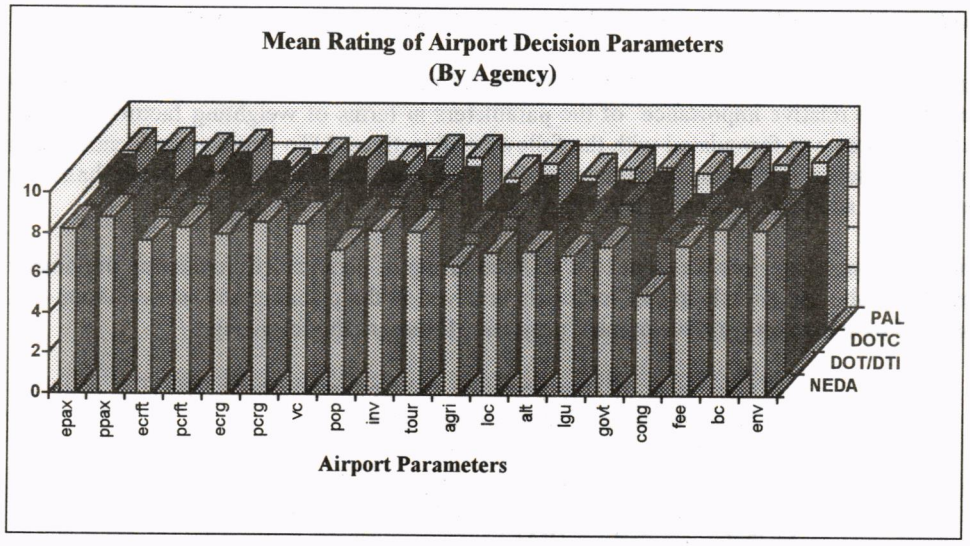


Figure-3

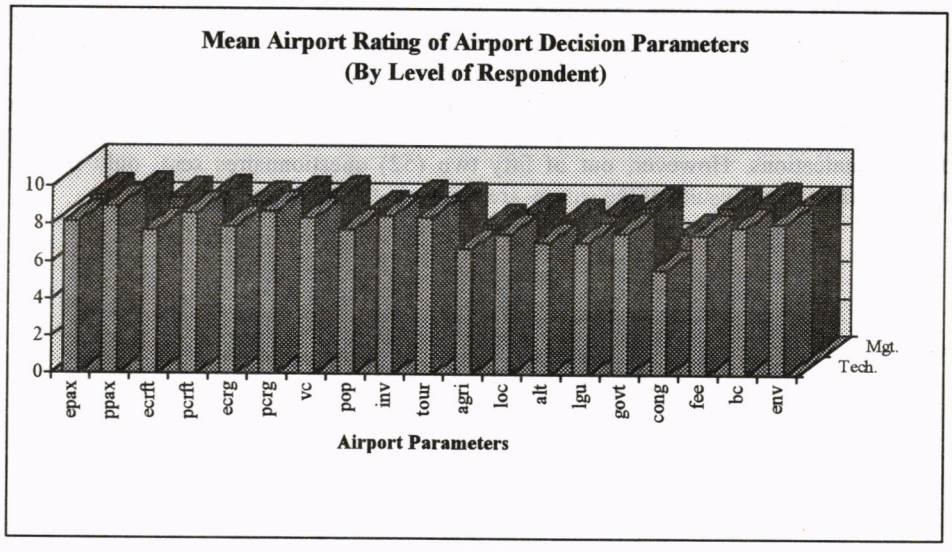


Figure-4

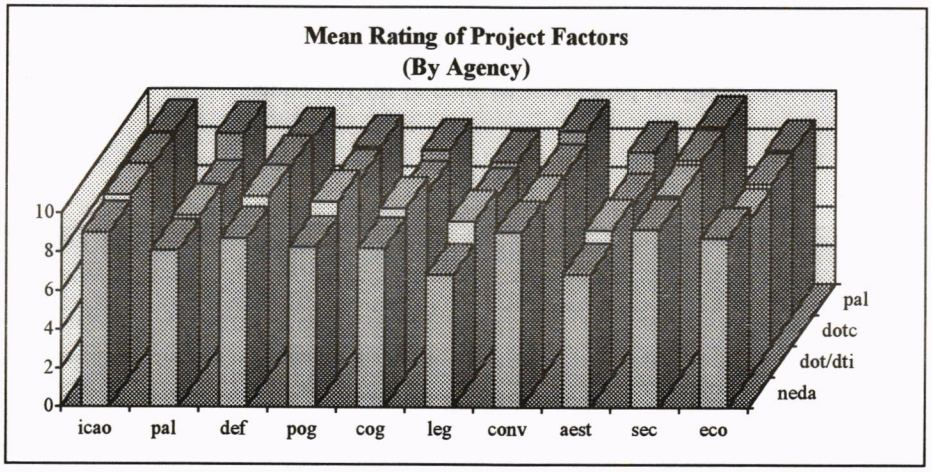


Figure-5

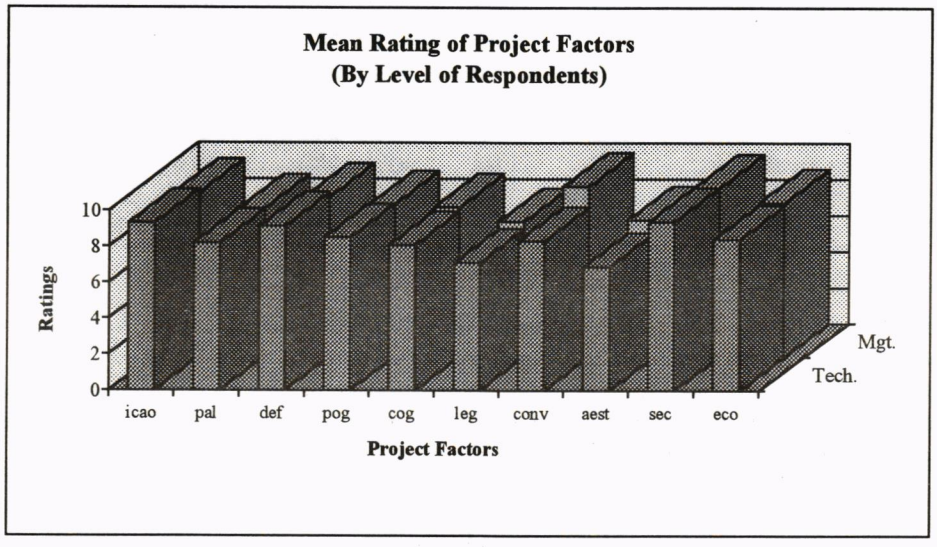


Figure-6

3.1 Statistical Tests on Airport Parameters

The first test conducted was the analyses of variance. This is to determine if the mean rating of the four groups of agencies, NEDA, DTI/DOT, DOTC/ATO and PAL differ from each other. The result as shown in table-2 below, indicates that except for one parameter, that is *the needs identified by Peoples' Representatives*, the mean rating given by the four agencies have no significant statistical difference. The same test was conducted on the data analyzing

the rating given by respondents coming from the technical level and those who belongs to the management level. The results as shown reveal that there is no statistical difference among the means of all airport parameters as rated by the respondents.

Table-2
Results of Testing the Airport Parameter's Mean Rating

No.	Airport Parameters	Code	Different Agencies (anova)	Tech./Mgt. Level (T-Test)
1	Existing passenger volume	epax	NO sig. difference	NO sig. difference
2	Projected passenger volume	ppax	NO sig. difference	NO sig. difference
3	Existing aircraft movement	ecrft	NO sig. difference	NO sig. difference
4	Projected aircraft movement	pcrft	NO sig. difference	NO sig. difference
5	Existing cargo volume	ecrg	NO sig. difference	NO sig. difference
6	Projected cargo volume	pcrg	NO sig. difference	NO sig. difference
7	Volume/capacity ratio	vc	NO sig. difference	NO sig. difference
8	Population of service area	pop	NO sig. difference	NO sig. difference
9	Business/commercial activity	inv	NO sig. difference	NO sig. difference
10	Tourism activity	tour	NO sig. difference	NO sig. difference
11	Agricultural production	agri	NO sig. difference	NO sig. difference
12	Geographic location	loc	NO sig. difference	NO sig. difference
13	Presence of alternative transport	alt	NO sig. difference	NO sig. difference
14	Local Govt Unit[9] Plans & Programs	lgu	NO sig. difference	NO sig. difference
15	Other Agency's Plans & Programs	govt	NO sig. difference	NO sig. difference
16	Identified by Peoples' Representative[10]	cong	NO sig. difference	*WITH sig. difference*
17	Airport Revenue	fee	NO sig. difference	NO sig. difference
18	Economic factors	eco	NO sig. difference	NO sig. difference
19	Environmental issues	env	NO sig. difference	NO sig. difference

In order to determine which of the agencies differs in rating the parameter *Identified by people's Representative*, a *t*-test was conducted. The outcome (table-3) shows that it is NEDA paired with the other agency, has consistently signifies its mean rating difference. This results confirm the indications given in figure-3 where, congressional parameter receives a low mean rating of 5.03 from NEDA respondents.

Table-3
Result of t-test for Parameter: Need Identified by Peoples' Representative

	NEDA	DOT/DTI	DOTC/ATO
DOT/DTI	*With sig. difference*	NO sig. difference	NO sig. difference
DOTC/ATO	*With sig. difference*	NO sig. difference	
PAL	*With sig. difference*		

[9] The Local Government Units (LGU) being referred to herein are the Provincial, City and Municipal government offices

[10] As used in this paper, Peoples' Representative means the duly elected members of the House of Representatives or the Congress

On the other hand, on the basis of the rating given by the respondents to the different airport parameters, a ranking of paramaters could also be deduced. This is assuming at the moment that the rating given by the different respondent for a particular parameter is a value indicating its rank from among the nineteen parameters. Spearman's rank correlation coefficient was determined to check whether there is a correlation in their ranking. Table-4 shows that the different pairs of agency yields a positive value of r_s which means that they do agree in ranking the various airport parameters.

Table-4
Spearman's Rank Correlation Coefficient *r*

	ALL	PAL	DOTC/ATO	DOT/DTI
NEDA	0.89649	0.73430	0.80298	0.61599
DOT/DTI	0.85150	0.78971	0.72308	
DOTC/ATO	0.90917	0.76933		
PAL	0.89152			

3.2 Comparison of DOTC Prioritization and the Results of the Survey

The present DOTC Procedure evaluates and determine the priority rating of a particular national airports based on five parameters. The respective weigths are shown in table-5. It could be easily observed that passenger volume and aircraft movement constitute the dominating factor, wherein, these two factors alone could decide the rating of a given airport.

Table-5
Parameters and Weights of DOTC Prioritization Scheme

No.	Parameters	Rel. Wt.
1	Passenger volume	50.00%
2	Aircraft movement	30.00%
3	Service to development center	7.50%
4	Dev't. potential/plan of the area	7.50%
5	Geographic location	5.00%
	Total =	100.00%

On the otherhand, the survey in this study resulted in the selection of nineteen airport decision parameters. Given this number, it would be not be appropriate to compare the parameters used by the DOTC and the parameters selected in this study. However, to make the two comparable with each other, some of the parameters in this study, were grouped together to form an equivalent set similar with that of the DOTC. The result is shown in table-6.

Table-6
Relative Weights of Parameters(This Study)

Parameters	Relative weight[11]	Combined rel. wt.
Passenger volume	5.59%	5.59%
Aircraft movement	5.40%	5.40%
Volume of investment	5.57%	
Tourism activity	5.51%	20.81%
Agricultural production	4.60%	
Population of service area	5.13%	
Local government plans	4.90%	
Other agencies' plans	5.20%	15.49%
Economic Aspect	5.40%	
Location	5.04%	5.04%
Others	47.68%	47.68%
Total =	100.00%	100.00%

Looking at figure-7 obvious difference can be seen. The DOTC prioritization relies heavily on the volume of passengers and aircraft movement,. The result of the survey indicates that the planners, aside from recommending the inclusion of other decision variables which will constitute 47.68%, they are further assigning higher importance to factors that would explain the economic development of an area. This could be measured in terms of population, volume of commercial investment, tourism activities, and agricultural production. These factors if combined, will accumulate a relative weight of 20.81%. Meanwhile, Plans of the local government units, other national agencies (such as DOT, DTI, etc.) and the economic relevance of an airport, were also given higher weight of 15.49%.

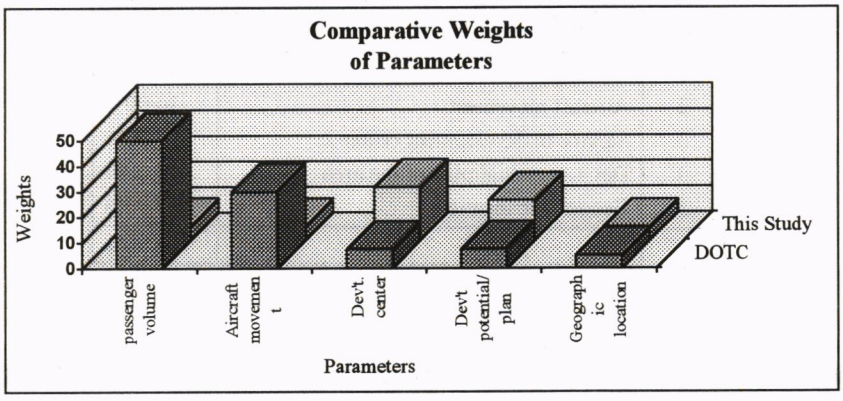


Figure 7

[11] Relative weight is based on the overall rating given by respondents in the survey

3.3 Statistical Test on Project Factors

Comparing the mean rating of the four agencies to determine statistical differences, the test (analysis of variance) concluded a rejection of the null hypothesis (i.e., No significant statistical difference) on the mean ratings of the four factors pertaining to *airline's plan, requiring legal matters, provision of aesthetics* and *upgrading security*, as shown in table-7. While from the point of view of the technical and management level respondents, the test (t - test) yields a rejection of the null hypothesis that, there is no significant statistical difference on the mean rating given by the two groups. Rejection was found on the factor referring to the *provision of aesthetic effects* only (see table-7 below).

Table-7
Results of Testing the Project Factors

No.	Airport Parameters	Code	Four Agencies (anova)	Tech./Mgt. Level (t-test)
1	Conformance to ICAO Standards	icao	NO sig. difference	NO sig. difference
2	Correspond with Airline's Plan	pal	*WITH sig. difference*	NO sig. difference
3	Correction of Deficiency	def	NO sig. difference	NO sig. difference
4	As part of on-going project	pog	NO sig. difference	NO sig. difference
5	To complement on-going project	cog	NO sig. difference	NO sig. difference
6	Required by legal matters	leg	*WITH sig. difference*	NO sig. difference
7	Provision of comfort & convenience	conv	NO sig. difference	NO sig. difference
8	To provide aesthetic effects	aest	*WITH sig. difference*	*WITH sig. difference*
9	To upgrade security	sec	*WITH sig. difference*	NO sig. difference
10	Economic aspects	eco	NO sig. difference	NO sig. difference

Further examining each of the factors that resulted in statistical difference, and subjecting it to further analysis (using *t* test), reveals the following results:

a) The mean rating given by respondents from PAL to the two factors namely "*need to correspond with airlines fleet upgrading plan*" and "*security upgrading*", when paired with other agency, shows that it differs significantly from other agency's mean rating (see table-8 and table-9);

Table-8
Result of t-test for Factor: Airlines' Fleet Upgrading Plan

	NEDA	DOT/DTI	DOTC/ATO
PAL	*With sig. difference*	*With sig. difference*	*With sig. difference*
DOTC/ATO	NO sig. difference	NO sig. difference	
DOT/DTI	NO sig. difference		

Table-9
Result of t-test for Factor: Security Upgrading

	NEDA	DOT/DTI	DOTC/ATO
PAL	*With sig. difference*	*With sig. difference*	*With sig. difference*
DOTC/ATO	NO sig. difference	NO sig. difference	
DOT/DTI	NO sig. difference		

b) Regarding the factor "*provision of aesthetic effects*", PAL's mean rating registered a significant difference with NEDA's and DOT's mean rating as shown in table-10 ;

Table-10
Result of t-test for Factor: Provision of Aesthetic Effects

	NEDA	DOT/DTI	DOTC/ATO
PAL	*With sig. difference*	NO sig. difference	*With sig. difference*
DOTC/ATO	NO sig. difference	NO sig. difference	
DOT/DTI	NO sig. difference		

c) NEDA's mean rating on the factor "*requirement of legal matters*" differs with DOT/DTI's and PAL's mean rating as shown in table-11.

Table-11
Result of t-test for Factor: Requirement of Legal Matters

	NEDA	DOT/DTI	DOTC/ATO
PAL	*With sig. difference*	NO sig. difference	NO sig. difference
DOTC/ATO	NO sig. difference	NO sig. difference	
DOT/DTI	*With sig. difference*		

In ranking the different project factors, the value of Spearman's Rank Correlation Coefficient for the four groups of agency were all positive ranging from 0.76 to 0.99 as shown in table-12. The test on the technical and management level also yielded a value belonging to the same range.

Table-12
Value of Spearman's Rank Correlation Coefficient *r*

	NEDA	DOT/DTI	DOTC/ATO	PAL
ALL	0.8909	0.9364	0.9970	0.8424
PAL	0.8061	0.8091	0.8273	
DOTC/ATO	0.9000	0.9455		
DOT/DTI	0.7606			

4. FORMULATION OF PRIORITIZATION PROCEDURE

The idea of developing the procedure was borned out of the need to provide a more robust basis of prioritizing the limited capital resources for the development of the whole airport system in the country. This need is explicitly stated in the objectives of this study. Framework of the procedure is shown in figure 8.

It is emphasized in this study that before we could arrive at the position of determining the priority rating of a particular airport or project, there are still some conditions to be met. For one, the commitment of fund intended for the sector should already be confirmed. A policy guidelines defining the distribution or the lump sum allocation of funds to the different classes of airports (i.e., trunkline, secondary and feeder) must already been established. As it is not expected that a feeder airport serving an area with low economic activity, although need was established, will have an equal chance of acquiring a share in the budgetary pie, with that of a trunkline airport.

4.1 Basic Guidelines in the Development of a Prioritization Scheme

Knowing the theoretical premise of government intervention in transport policy and based from the review of past studies, researches, experiences and procedures used both in the Philippines and in other countries, a guidelines in the development of a prioritization procedure could be formulated. For the priority scheme to be successful, it should contain the following characteristics:

1. Simplicity - The procedure should be simple enough to be clearly understood by even an inexperience staff and non-technical decision-makers;

2. Goal-Oriented - Output of the prioritization should be gear towards the attainment of the overall societal goals and objectives (e.g., economic efficiency and equity) as stated in the development plan;

3. Comprehensive/Multi-dimensional - Should be devised to permit the evaluation of a greater number of issues (factors and parameters) both the tangible (quantifiable) and the intangible (unquantifiable) ones;

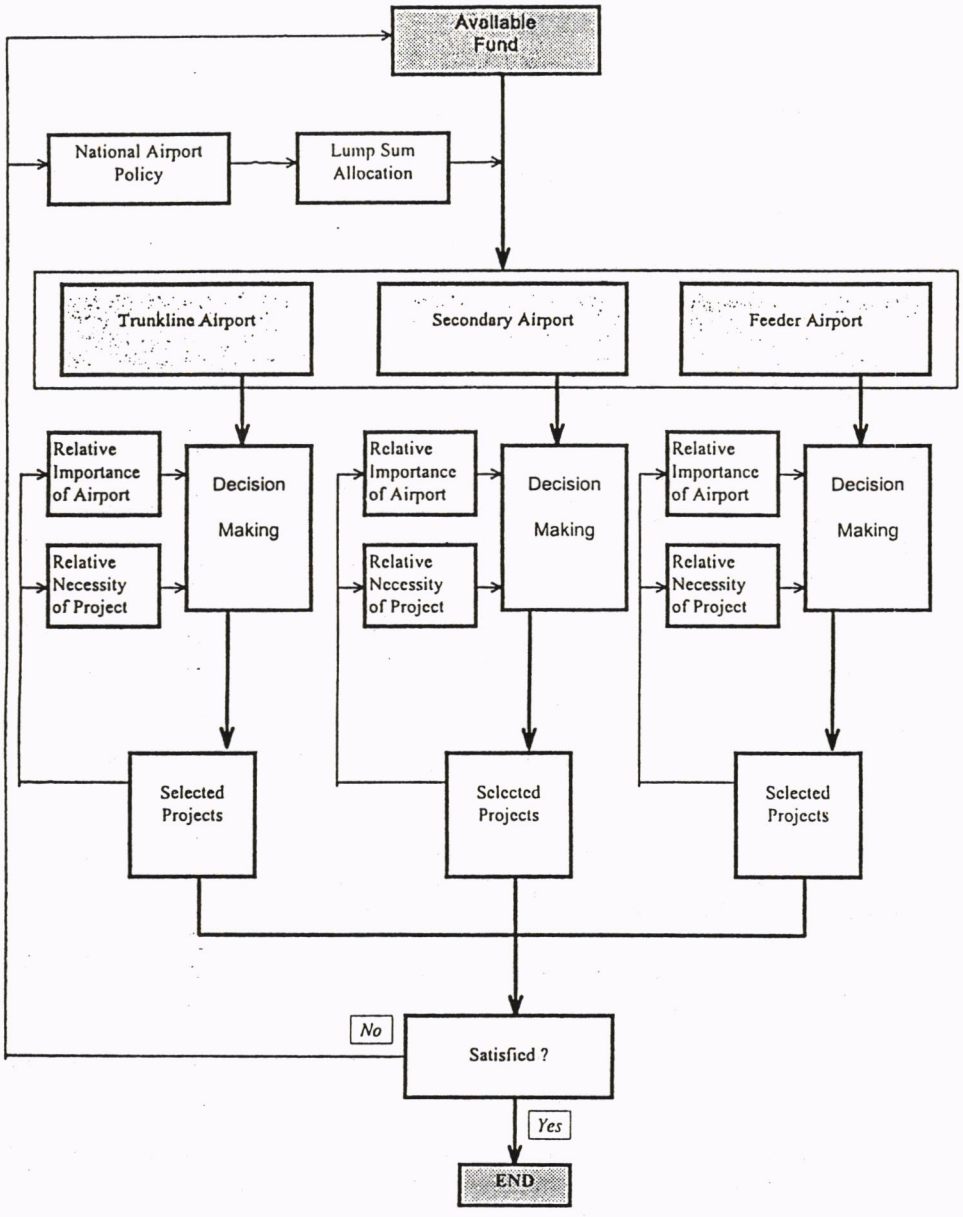
4. Objectivity - Although non-readily quantifiable inputs will be used, subjective judgements and opinion should be minimized;

5. Unbiased Aggregation - Allocation of weights and rating assignment should be based on scientific (or mathematical) process; and

6. Continuity in Planning Process - Provision of transition and drastic changes should be minimized in order not to sow confusion and distrust among the planners and the decision-makers who used to adopt the old scheme.

Although there are still other attributes that should be considered in the development, this proponent is proposing to try the six characteristics listed above, and employ it as the basic yardstick in measuring the effectiveness of a procedure. These characteristics served as a guiding tool in the selection of an appropriate model thatcould measure priority rating of a

Figure- 8
Framework of Proposed Prioritization Scheme



particular airport and/or project using different kinds of variables (determinants) both tangible as well as the intangible ones. Selection of evaluating parameters for airport and project prioritization was conducted at various stages in this study and the final stage is discussed in the following section.

4.2 Selection of Final Airport Parameters

Based on the result of the survey and the various tests and analysis conducted, final list of airport parameters were determined. However, it was noted that the nineteen parameters which were all selected by the respondents could still be grouped and simplified in order to reduced the number to at least a manageable level. Parameters belonging to the same category were combined that resulted in only ten parameters as shown in table-13 below.

Table-13
Selected and Proposed New Parameters

Based on Survey		Proposed	
No.	Parameters	No.	Combined Parameters
1. 2.	Existing passenger volume Projected passenger volume	1.	Projected passenger
3. 4.	Existing aircraft movement Projected aircraft movement	2.	Projected aircraft
5. 6.	Existing cargo volume Projected cargo volume	3.	Projected Cargo volume
7.	Volume/capacity ratio	4.	Need
8. 9. 10.	Volume of investment Volume of tourism traffic Population	5.	Economic Dev't
11. 12. 13.	Agricultural development Natl. Plan of other agencies Local Govt.Unit's Plan	6.	Plan
14. 15.	Airport Location Alternative mode of transport	7.	Accessibility
16. 17.	Airport revenue Cost-benefit analysis	8.	Income
18.	Environment	9.	Environment
19.	Congressional approval	10.	Political

Although the corresponding rating of each of the parameters, were so stated by the respondent, it was noted that, except for the decision parameter *needs identified by Peoples Respresentatives*, the overall mean rating of all of the variables do not differ much from each other. In the absence of any scientific (or mathematical) process in this study that could really determine the relative weights of the variables, all of them will be treated equally (i.e., any of the identified parameter is as important as the other). This reasoning was then applied to the ten new parameters. Each of which, will be treated with equal importance, i.e., will have the same relative weights.

4.3 Airport Prioritization Model

The scoring model approach was chosen for the proposed scheme. This model was preferred taking into consideration, among others, its simplicity over other approaches, which is, as discussed in the literature review of this study, is one of the characteristics of a good prioritization technique. The model will follow the findings of this study that,

Airport priority = f (*projected passenger, cargo and aircraft volume, need, economic development of the area, plans of other agencies, accessibility conditions of the area, income to be derived, environmental factors, and political realities*)

The model is expressed mathematically as follows:

$$API_j = \sum_{i=1}^{n} W_i R_{ij} \tag{1}$$

where,

API_j = overall score or rating of airport j;

W_i = weighting factor (relative importance) of the ith parameter

R_{ij} = individual score or rating of the ith parameter of airport j

Considering that all the parameters will have the same weights, the model proposed in this study will be:

$$API_j = \sum_{i=1}^{n} R_{ij} \tag{2}$$

4.4 Selection of Final Project Factors

The process of selection discussed in section 4.2, were also applied here. The ten factors identified and selected by the various respondents were group together on the basis of the project's purpose. This groupings reduces the number of factors to be considered in prioritizing the various airport projects. The proposed new factors are shown in table-14 below. The new project factors will also be treated with equal importance, i.e., equal weights.

Table-14
Selected and Proposed Project Factors

Based on Survey		Proposed	
No.	Factors	No.	Combined Factors
1.	ICAO Standards	1.	Need
2.	Airlines Plan		
3.	Deficiency		
4.	Part of on-going project	2.	Continuity
5.	Support to other project		
6.	Legal requirement		
7.	Provision of convenience	3.	Convenience
8.	Provision of aesthetics		
9.	Upgrade security	4.	Security
10.	Economic factor	5.	Economic

4.5 Project Prioritization Model

Same with the airport model, a point scoring approach is herein proposed also for the project factor prioritization scheme. Based on the findings of this study:

Project Priority = f(*need, continuity, convenience, security and economic factors*)

In mathematical form, $$PPI_j = \sum_{i=1}^{n} W_i R_{ij} \quad (3)$$

where,

PPI_j = overall score or rating of project j;

W_i = weighting factor (relative importance) of the ith parameter

R_{ij} = individual score or rating of the ith parameter of project j

Considering that all the project factors have the same weights, the model proposed in this study will be:

$$PPI_j = \sum_{i=1}^{n} R_{ij} \quad (4)$$

5. FINDINGS, OBSERVATIONS AND RECOMMENDATIONS

5.1 Findings

Almost all of the respondents, who are taking part in the decision making process of airport development, selected all the nineteen pre-identified airport parameters (selected by 97.89% of the respondents) and the ten project factors (chosen by 99.30%. of the respondents)

Both at the level of airport prioritization and project selection, planners of the different agencies sampled in this study shows some indications of agreement in the selection of parameters and factors to be used in the decision making process of airport development.

Almost all (97.89%) of the respondent selected all nineteen (19) pre-identified parameters, although at varying degree of acceptance (rating), that should be considered in airport development decision making process. This results indicates an improvement, if not a departure to the current DOTC prioritization procedure, where, there are only five (5) decision parameters used.

Another issue noted in the result of the survey was the importance given by the different respondent to projected variables. In all cases, projected passenger volume, aircraft movement and cargo were always rated higher than the existing passenger, aircraft and cargo volume. This findings opposes the prioritization scheme currently being used by the DOTC. In the said scheme, current data is utilized, while the results of the survey suggests a projected one.

The low rating given by respondent to the decision parameter *"needs identified by Peoples' Representatives"*, reflects the sentiments of the planners that, political factors in project decision making, although necessary to be considered, should not dominate the whole process.

In any airport undertaking, *"upgrading the security level of airport operations"*, and *"to conform with established international civil aviation standards and recommended practices"*, are the two factors that shared the top attention of the respondents in the decision making processes, while provision of convenience to airport users came in next to it.

The particular findings above, was confirmed when the respondent were asked to ranked the various projects according to its relative importance. The result shows that runway extension and provision of additional air navigational aids (which are considered both aimed at upgrading the level of safety) were two most common projects appearing on the top five selected by the respondent.

While those projects directed at *providing aesthetics and good visual effects* must be of low priority as suggested by the respondent in this survey. This is manifested by the low mean rating of only 7.31 given by the respondents.

The model developed, though simple, could measure among others, need, urgency and desirability (from the point of view of social, economic, and political dimension) of developing an airport and or project, which could be used as a guide in airport investment policy of the government.

5.2 Conclusions

It is the conclusion of this study that, in the development of any transport prioritization procedure or scheme, it is deemed important to take into consideration the different dimensions of the goals being aimed (as represented by various quantifiable and unquantifiable variables).

In application, it was shown in this study that a number of factors that could influence the decision-making processes in airport investment are used and can be acceptable to different concerned groups with conflicting interests and still achieved a harmonious result.

5.3 Observations and Suggestions

The existing prioritization scheme of the DOTC could be improved by incorporating additional decision parameters and factors that would establish the priority status of an airport or project.

For the prioritization procedure was developed by this study, there are still areas in this procedure that requires farther improvement.

Recommends the constant updating of data for planning purpose.

Political Factors as presented by *the needs identified by Peoples' Representatives* should be included in the decision making process, however it should not dominate the whole process.

5.4 Areas for Further Studies

Allocations of resources to the different classification of airports were not covered in this study. Some policy studies are still needed to determine and provide a basis of fiscal allocation among the different classification of airports.

Weight is an important component of a prioritization scheme, as this may change the direction and/or output of the procedure. There is therefore a need to establish a more definite way (scientific or mathematical) of determining the weights of a particular factor in order to reflect its degree of importance with respect to other variables being used.

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