

Analytical Network Process in Selection of 7PL

J. Praveena, M. Pramila Devi

Abstract This article aims in selection and evaluation of a Seventh Party Logistic provider (7PL) which integrates all the functions of a company globally. The procedure for selection is based on the criteria's and their relative priority weights. Analytical Network Process (ANP) is used in complex problems where Multi-criteria decision making is involved. After identification of criteria using ANP final selection is done. This paper is informative to researchers to understand and apply ANP to MCDM problems.

keyword- Analytical Network Process, Seventh party logistics, priority weight, criteria selection.

I. INTRODUCTION

Logistics is one of the complex problems which any industries find difficult to manage and maintain. With increasing global markets supply chain management faces many challenges.

The decision making is one of the important aspect for implementing logistics. Logistics outsourcing is growing trend now-a days. Decision makers faces many challenges in real time situations of selection for a given problem.

When it comes to scientific process of decision making can be represented as:

1. Identification of the problem.
2. Collection of quantitative data.
3. Analysis of data using scientific methods.
4. Structuring the alternatives which will suite the objective and result in solution to the problem.

Based on the business variety of services are needed, for which service providers are being used.

The services which mainly involve business-relationships, where clients and organization come together in such of logistics service provider [6]. Therefore, the client must identify exactly what are the needs from the provider. In management of logistics, criteria for the selection of a service provider is an important issue. However, the selection of a service provider, which satisfies requirement, should be identified. The complexity of identifying suitable service provider increases with the number of selection criteria been used.[9]

II. ANALYTICAL NETWORK PROCESS (ANP)

AHP and ANP are two methods to apply on MCDM-model. AHP modeling helps to solve a hierarchy while ANP can be used for complex problems which cannot be modeled using hierarchy process.

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Analytical Network Process modeling is used in MCDM. In Analytical Network Process, a network structure is used to represent decision comprising of different elements at each level. In a network, elements arrangement is not in any particular order, but are connected as pairs. The pairs wise comparisons of elements are paired according to the dominance between the member of an element. Many real world decision problems can be constructed using inter-dependencies. ANP is more objective and captures things that does not come to mind. Putting two observations together, ANP gives strong and effective decision making than AHP.

III. METHODOLOGY

The present method allows in evaluation of the providers in two stages i) Selection of criteria's and ii) an ANP-based modeling for selecting the 7PL service provider.

-Define objectives and services.

The objectives of service provider should be clearly defined. It should understand goals and sub-goals of the service provider to meet present and future needed of the company.

-Identify the provider useful

To identify the provider useful for the service, proper survey should be conducted. Then the user company should check and implement future operations. -- -

-To generate information from data

Once identifying the service provider and send to request for information, then data of the providers on the basis of information given by organizations and their readiness to take part in logistics operations with outsourcing. The user should evaluate the response keeping in mind based on logistic needs when there are two or more logistic provider.

-selection of best provider and its services as per agreements

Selection of the best provider is considered in this phase. Based on the evaluation and selection, all the weighted values are carried into matrices. Thus super matrix with weighted values is converted into convergent with final values, after rising to a sufficient power 2^{k+1} .

IV. RESULTS

The super matrix is generated from local matrix which shows the priority weights. The priority weights of the companies obtained from ANP modeling. The super matrix, which when rise to a sufficient power convergence, as a result of which company A with highest weights has to chosen as best.

The major advantage of this paper is that it operates on different issues in selection of 7PL using Analytical Network process.

Further shows that the inter-dependencies among various parameters can be effectively captured after applying ANP technique, which helps in context of outsourcing decisions.

V. CONCLUSIONS

This type of model can be applied to several sensitive analysis to evaluation the existing logistics process and to improve model with different fields that would develop better systems which can help the decision makers. Therefore, a significant model which is intelligent and user friendly can be designed on the basis of this model

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APPENDIX

Table: 1 Goals C.I = 0.17827

Goal	Manu	IS	QM	ES	SD	IC	IT	V	Priority
	u	C	T	C	M		S	L	
Manu	1	3	4	5	7	6	8	8	0.35967
ISC	1/3	1	2	3	5	6	7	9	0.21326
QM	1/4	1/2	1	4	3	2	5	7	0.14845
ESC	1/5	1/3	1/4	1	5	4	2	6	0.10999
SD	1/7	1/5	1/3	1/5	1	4	6	8	0.07883
IC	1/6	1/6	1/2	1/4	1/4	1	2	5	0.04353
ITS	1/8	1/7	1/5	1/2	1/6	1/2	1	3	0.02967

VL	1/8	1/9	1/7	1/6	1/8	1/5		1	0.01656
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Table: 2 Goal-1 C.I = 0.00484

Manu	Proc	Prod	WH	DIS	Priority
Proc	1	5	2	3	0.48288
Prod	1/5	1	1/3	1/2	0.08815
WH	1/2	2	1	2	0.27197
DIS	1/3	3	1/2	1	0.15699

Table: 3 Goal-2 C.I = 0.02076

ISC	IS	CR	CL	PR	Priority
IS	1	3	6	8	0.58677
CR	1/3	1	3	6	0.263344
CL	1/6	1/3	1	2	0.09583
PR	1/8	1/6	1/2	1	0.05393

Table: 4 Goal-3 C.I = 0.001847

ESC	SQ	SM	B/MT	Priority
SQ	1	5	7	0.64832
SM	1/5	1	4	0.22951
B/MT	1/7	1/4	1	0.12202

Table: 5 Goal-4 C.I = 0.061856

ESC	SQ	SM	B/MT	Priority
SQ	1	5	7	0.72229
SM	1/5	1	4	0.20498
B/MT	1/7	1/4	1	0.07271

Table: 6 Goal-5 C.I = 0.04480

SDM	CS	IC	I/E	PL	Priority
CS	1	3	6	8	0.61658
IC	1/3	1	3	6	0.21100
I/E	1/6	1/3	1	2	0.11826
PL	1/8	1/6	1/2	1	0.05414

Table: 7 Goal-6 C.I = 0.04480

Int.C	CR	If.Int	I.O.I	RL	Priority
CR	1	3	5	7	0.56658
If.nt	1/3	1	2	6	0.24403
I.O.I	1/5	1/2	1	4	0.13882
RL	1/7	1/6	1/4	1	0.04990

Table: 8 Goal-7 C.I = 0.06023

ITS	CD	I	D	CE	E	Priori
	R	Q	E	T	T	ty
CD	1	3	5	7	8	0.51238
IQ	1/3	1	3	4	6	0.24551
DE	1/5	1/3	1	3	6	0.13981
CE	1/7	1/4	1/3	1	2	0.06067
ET	1/8	1/6	1/6	1/2	1	0.03755

Table: 9 Goal-8 C.I = 0.03579

VL	Prt/PL	Pac	TM	L	Priority
Prt/PL	1	5	3	2	0.47977
Pac	1/5	1	1/3	1/2	0.09043
TM	1/3	1/3	1	1/2	0.17910
L	1/2	2	2	1	0.25068