



AN ANALYTICAL APPROACH FOR EVALUATION OF LAND RESOURCES MANAGEMENT IN CONSTRUCTION INDUSTRY – A MODEL STUDY

D. Prasanna Kumar

Associate Professor, Department of Management, Koneru Lakshmaiah Education Foundation,
Vaddeswaram, Guntur, Andhra Pradesh, India

A. Satish

Research Scholar, Department of Management, Koneru Lakshmaiah Education Foundation,
Vaddeswaram, Guntur, Andhra Pradesh, India

SS. Asadi

Associate Dean Academics & Professor, Department of Civil Engineering, Koneru
Lakshmaiah Education Foundation, Vaddeswaram, Guntur, Andhra Pradesh, India

ABSTRACT

Resource Management is playing important role in the construction projects such as cost, schedule etc. Land resources is also playing important role for the construction industry. Construction will be done on a site. The availability of land is very less with in the available area we need to built construction projects effectively. Selection of land is not a problem but the availability of facilities is major problem for the projects. The people who wants to live in the habitable zone may not be available of different facilities such as water, recreational areas etc., People expect more from the construction site. There must be a solid disposal place where the waste can be thrown away long away so the residents can be live habitably. The land use and land cover plays a important role. EIA had provided certain guidelines how to utilize land with certain specifications that not effect the environment. The construction projects releases heavy pollutants that effecting the environment so the Government provided guidelines to avoid environmental problems. In land use there must be usage of land must be specifically reported so that they can estimate how much greenery land has been left. In land cover how much area has been occupied with what structures had to been mentioned. The findings revealed that time is given most importance with respect to accessing etc., They are giving second priority as cost with respect to facilities, accessing, habitable zone and finally they are giving quality as it is important.

Key words: Resources management, construction project management, Land resources, AHP Model

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1. INTRODUCTION

Land resources refer to a delineable area of the earth's terrestrial surface encompassing all attributes of the biosphere immediately above or below this surface, including those of the near surface climate the soil and terrain forms the surface hydrology including shallow lakes, rivers, marshes and swamps the near surface sedimentary layers and associated groundwater and geohydrological reserve the plant and animal populations the human settlement pattern and physical result of past and present human activity (terracing water storage or drainage structures, roads and buildings. Land use is characterized by the arrangements, activities and inputs by people to produce change or maintain a certain land cover type. Land cover is the observed physical cover on the earth's surface. The basic functions of land in supporting human and other terrestrial ecosystems can be summarized as follows:

- A store of wealth for individuals, groups
- Production of food, fiber, fuel
- Provision of biological habitats for plants, animals
- Storehouse of minerals
- Raw materials for human use

The basic relationship of land population and management strategies is the potential production of arable land and its susceptibility to degradation are dependent on the management strategies employed and on inherent soil and other characteristics. In agricultural dependant societies the combination of factors determines potentially the population that can be supported and the standard of living. When population increases in a given area the increased demand on production can induce stress and consequent degradation of the land resource. If no other source of income can be tapped people standards of living decrease. However if improved management strategies are available either the standard of living may rise or more people can be supported at the same standard of living without deterioration of the natural resources base. It follows that an ample supply of land of suitable quality and appropriate production technologies are essential if the increasing demands of a growing population are to be met.

2. OBJECTIVES OF THE STUDY

The objectives of the studies as follow:

- To identify the issues involved in Land resources management in the construction projects and data collection through questionnaire survey from different construction companies.
- Data analysis with a technique or software and recommend solutions for the issues involved in resources management in construction projects.

3. METHODOLOGY

The first phase of research is literature review. To obtain the information and knowledge about the resources management in construction projects is to collection of different journals on resources management and sub disciplines such as Land resources. The research is done

based on the past researches and case studies conducted by previous researchers. In this phase the researches findings of problems in resources management in construction projects helps to know the past and present issues of the resources management in construction projects. The research work carried out by reading conference papers, books, project papers and mostly of journals. These helps in analyzing the issues and a procedure to find solution to that issue. It gives an idea using different techniques to analyze the issues and recommend a solution to those issues.

3.1. Data Collection

Data collection for the Land resources management is done using the qualitative research of different existing journals as stated in the objectives. Data collection will also gathered from the different officials of construction projects such as Engineers, Contractors, Project managers as suggestions given by the researchers in their research papers. The pilot survey was conducted to identify and ensure the effectiveness of the questionnaire survey.

In the literature review the research was focused on:

- The problems regarding the management of resources in construction companies that is responsible for the loss of profits to the construction companies.
- The methods/model used to analyze the issues and to recommend the best alternatives for the construction companies.

The pilot survey was a small methodological test which it will ensure that the proposed methods and procedures will work in practice before applying in large and expensive investigation. The aim of the data collection is to gather information regarding resources management in construction projects.

The aim of the data collection is to gather information related to the topic resources management and about the resources utilizing in the construction projects. The data collection was done in three ways as following:

- Questionnaire survey
- Journal Papers
- Literature survey

Questionnaire Survey

This is the main aspect in research where the valuable information is gathered from the officials of construction projects. The opinions of the people are honest while responding to the questionnaire survey regarding to the controversial issues in fact that their responses are anonymous. The questionnaire survey was distributed to the officials of some construction projects in vijayawada. The questionnaire survey will includes some set of questions in one section such as Land resources. In this section the respondents were asked about their background. The questions that had been asked were:

- Number of projects involved in;
- Years of experience in construction projects

3.2. Data Analysis

AHP Model

It is an multi criteria decision making technique used to take decisions on complex problems in which many variables or criteria are involved in the resources management issues. The observation and collection of data regarding resources management is done on some of construction companies.

The AHP Model was applied to the opinions of the officials of construction projects. Every problem has different criteria's and each criteria has different alternatives. This method is used to find the best alternative that will be implemented to resolve the issues of the resources management in construction projects. The alternatives were analyzed by the AHP Model under goes five steps to find the best alternatives.

AHP Model calculation for problems in construction projects

- Firstly the problem is decomposed in to Goal, criteria, sub criteria and alternatives in the form of questionnaire survey.
- Then the pairwise comparison's was done to the criteria's and alternatives and we find the importance in tends to extremely strong to equal. In this the officials of the construction projects gives their opinions for our questions.
- Then I made in to pairwise comparisons for alternatives and find the importance that which alternative weighs more.

AHP is an two stage process:

- Decomposing the complexity
- Synthesizing the relations

There are five basic elements involved in AHP Method they are

- Hierarchy construction
- Pair wise comparisons
- Relative Weight calculation
- Aggregation of Relative Weights
- Consistency Ratio

$$CR = \frac{CI}{RI} \quad CI = \frac{\lambda_{max} - n}{n - 1}$$

Where as CR = Consistency Ratio

CI = Consistency Index

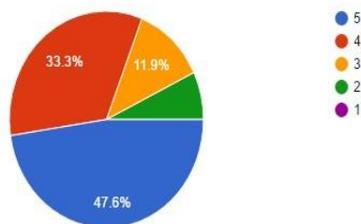
RI = Relative Index

An Analytical Approach for Evaluation of Land Resources Management in Construction Industry
– A Model Study

S.NO	CRITERIA	EXTREMEY IMPORTANT (5)	VERY IMPORTANT (4)	NEUTRAL (3)	LOW IMPORTANT (2)	NOT AT ALL IMPORTANT (1)
1	Is storage facility needed to store materials					
2	Is houses to build in habitable zone					
3	Is vegetation is important in construction area					
4	Is it important to do soil test on construction area at different locations					
5	Is land use is important to consider					
6	Is recreational parks is important near constructions					
7	Is important to consider remote sensing data for construction					
8	Is important to have an laboratory analysis near construction area					
9	Is it important to locate a site to dump the construction waste					
10	Is it important to plan alternative drainage patterns					

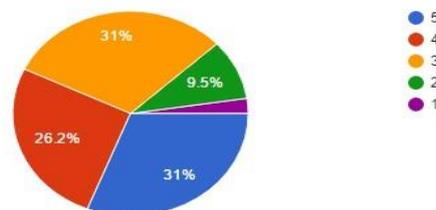
Is storage facility needed to store materials?

42 responses



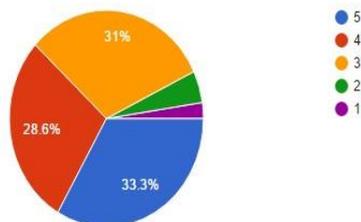
is land cost is important to consider?

42 responses



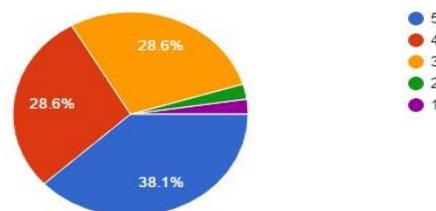
Is houses to build in habitable zone?

42 responses

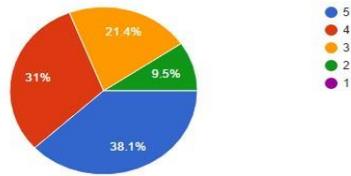


is time to time evaluation important?

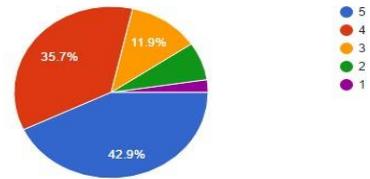
42 responses



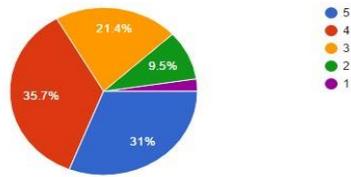
Is important to have an laboratory analysis near construction area?
42 responses



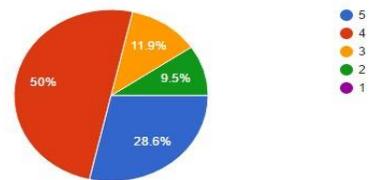
is land quality important?
42 responses



Is it important to locate a site to dump the construction waste?
42 responses



Is recreational parks is important near constructions?
42 responses



4. RESULTS AND DISCUSSIONS

The questionnaire which was prepared on the Land resources responses had been taken from the different level of employees in different construction companies was taken. Out of 73 responses I requested I got 42 responses from the respondents. Only respondents with minimum qualification as diploma were approached for answering the questionnaire survey. This was done to have quality of the opinion gathered in the survey. The result of Land resources with respect to cost, time and quality as below:

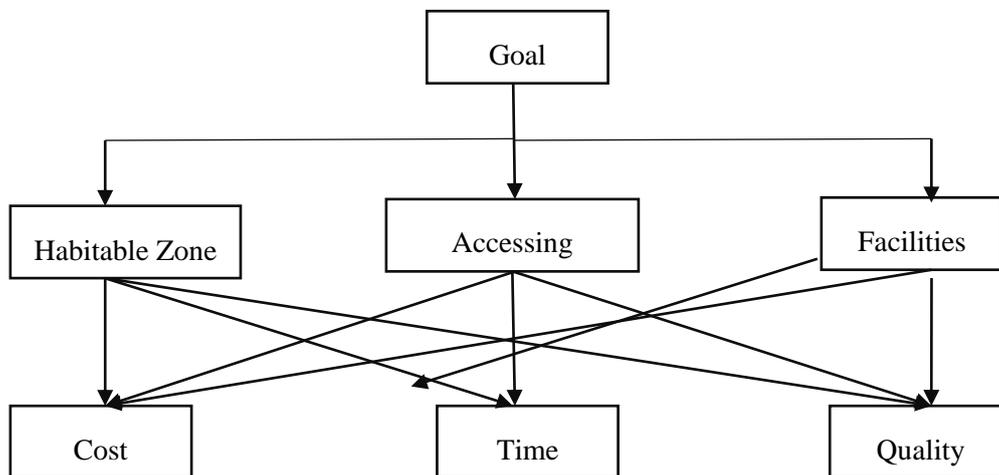


Figure 1 Hierarchy Tree

	Habitable Zone	Accessing	Facilities
Habitable Zone	1	2	4
Accessing	1/2	1	3
Facilities	1/4	1/3	1

Ranking of priorities

To find the ranking of priorities, namely the Eigen vector X:

An Analytical Approach for Evaluation of Land Resources Management in Construction Industry
 – A Model Study

- Normalize the column entries by dividing each entry by the sum of the column.
- Take the overall row averages.

$$A = \begin{pmatrix} 1 & 2 & 4 \\ 0.5 & 1 & 3 \\ 0.25 & 0.33 & 1 \end{pmatrix}$$

Sum 1.75 3.33 8

Normalized column sums

$$\begin{pmatrix} 0.57 & 0.60 & 0.50 \\ 0.28 & 0.30 & 0.37 \\ 0.15 & 0.10 & 0.13 \end{pmatrix}$$

Row Averages

$$X = \begin{pmatrix} 0.55 \\ 0.32 \\ 0.13 \end{pmatrix} \quad (\text{Priority Vector})$$

Criteria weights

Habitable Zone = 0.55

Accessing = 0.32

Facilities = 0.13

Calculation of Consistency Ratio:

To calculate λ_{\max} so as to lead to the consistency index and the Consistency Ratio.

$$\begin{pmatrix} 1 & 2 & 4 \\ 0.5 & 1 & 3 \\ 0.25 & 0.33 & 1 \end{pmatrix} \begin{pmatrix} 0.55 \\ 0.32 \\ 0.13 \end{pmatrix} = \begin{pmatrix} 1.71 \\ 0.98 \\ 0.36 \end{pmatrix} = \lambda_{\max} \begin{pmatrix} 0.55 \\ 0.32 \\ 0.13 \end{pmatrix}$$

$\lambda_{\max} = 3.04$, By averaging of Ax and X

CI= (3.04-3)/(3-1) = 0.02, n=3, R.I. = 0.52 (from Table)

C.R. = 0.02/0.52 = 0.04

C.R. \leq 0.1 it indicates consistency for decision.

Hence we can move further to do AHP Analysis.

Ranking Alternatives

Habitable zone	Cost	Time	Quality	Priority Vector
Cost	1	1/3	2	0.24
Time	3	1	4	0.62
Quality	1/2	1/4	1	0.14

The priority vector is obtained by doing Normalization as done above.

Accessing	Cost	Time	Quality	Priority Vector
Cost	1	3	4	0.63
Time	1/3	1	2	0.23
Quality	1/4	1/2	1	0.14

The priority vector is obtained by doing Normalization as done above.

Facilities	Cost	Time	Quality	Priority Vector
Cost	1	3	2	0.51
Time	1/3	1	4	0.33
Quality	1/2	1/4	1	0.16

The priority vector is obtained by doing Normalization as done above.

Ranking of Alternatives

Criteria	Habitable zone	Accessing	Facilities				
Cost	0.24	0.63	0.51		0.55		0.40
Time	0.62	0.23	0.33	X	0.32	=	0.46
Quality	0.14	0.14	0.16		0.13		0.14

As the analysis is done based on the questionnaire survey, the respondents concentrated on the Time that it can help to access to all areas where the construction is located linking to the Habitable zone, Facilities with respected to the projects of the company. The next priority they are giving to the cost of the land considered and transportation distance that costs more to transfer materials in the construction projects and the least preference is given to the quality of land for the construction company as it is important in construction projects to gain profits. Suitable construction with accessible areas, facilities is important in construction projects as people want to have pleasant life in their resident. From this analysis the recommendations are quality of Land like good drainage facilities, habitable zone area is need to be considered as main factor in constructions. As it is taken lightly it is recommended that to consider quality with respect to other factors.

5. RECOMMENDATIONS

Respondents had the awareness about the resources management in construction projects. It concluded that the resources are utilizing based on cost of the items that leads to the profits of the companies. These resembles that if cost of the items is less, they are preferring to buy and utilize resources in construction projects. If the cost of the items are less then the quality of the items or work doing by employees will be relatively low. Due to the low quality many of the structures not performing well and resembles to loss of property and life.

- It is recommended that while buying land and utilizing resources they have to have quality check list prepared by the Government to the respected country.
- Following the guidelines provided by the PMBOK.
- Avoiding the land for construction in habitable zone, no drainage facilities, no accessible to facilities will lead to problems for construction projects.
- Facilities such as water, drainage, waste dumping facilities must be checked while selecting a site.

An Analytical Approach for Evaluation of Land Resources Management in Construction Industry
– A Model Study

- It is observed that no proper vegetation is planted in the construction area as it is important.
- Planting trees in construction area will leads to comfortable living in the resident.

There are many improvements required in many aspects need to be considered in order to ensure the effectiveness. The respondents opinions will helps in ranking the most common issues pertaining resources management specifically Land resources in the construction projects. This rank can help in future construction project expected issues that might be faced during construction work. They can avoid these issues and look for alternatives. Given that feedbacks of the survey came from the construction employees all members are aware of issues and still they give importance to the cost of the project as they are not considering quality as a important factor due to the present competitive situation in the construction industry.

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