

A Strategic Planning for Highway Infrastructure and Construction

Amit Kumar

Assistant Professor

Department of Civil Engineering

UIET, MDU, Rohtak (HR)

Abstract: *The Construction projects especially the highway construction projects uses huge amount of resources on and off the field in various forms of resources viz., materials, plants, equipments and human resources along with money, time and space. The uniqueness of the projects makes the resource planning a tedious job as the efficiency of each resource depends upon a huge number of working condition factors. A detailed study of resource planning and productivity can, thus help in good resource planning, better monitoring and overall controlling of the project. In highway projects, the same resource is often used for different activities and the productivity of that resource being different for different activities, it becomes inevitable to know the correct norms for correct estimation, planning and monitoring. The main objective of this paper work was to planning the main resources (i.e. the equipments, plants and manpower) deployed at a highway project by using Microsoft Soft Project Software.*

Keywords: Highway Safety, Resource Planning, Transportation, Construction Materials.

Introduction:

Observing the trend in construction technology presents a very mix and ambiguous picture. On the one hand many of techniques and materials used for construction are essentially unchanged since the introduction of mechanization in the early part of twentieth century. For example at the time of highway construction at the beginning of the nineteenth century most of the highway project report stated that the work could not have been done any faster or more efficiently in our days, despite all technological and mechanical advances in the time, since the reason being that no present system could possibly carry the spoil material away any faster or more efficiently than the system employed. No motor trucks were in the digging of soil everything ran on the rails for cutting and filling of soil at different chainage to reduce the wastage of human resources and achieve maximum productivity. And because of quantity of soil and rain, no other methods have work so well to achieve the desired output. In contrast to this view

of one large project, it may also point to the continuous change an Improvement occurring in traditional material and technique. This continuous improvement in techniques help to plan and distribute the resources as per the requirement and efficient distribution of all these resources helps in close monitoring and actual progress of the work which includes resources like man, material, machinery and money with respect to their productivity.

Methodology:

1. First forecasting input and output is done in which the data wise requirement of project manpower, costly equipment, production costs, sales or earned value of work done and expected income.
2. Then the planning the construction work force by determining the size of project work force, its structuring into functional groups and workers team and scheduling manpower recruitment to match task requirement.
3. After this plan the construction materials which involves identifying the materials required, estimating quantities, defining specifications, forecasting requirements, locating sources material sample approved, material inventory.
4. Then planning construction equipment which aims at identifying the construction tasks to be undertaken by mechanical equipment, assessing the equipment required, exploring the equipment procurement and finally selecting the equipment. Planning the construction standard cost, the cost plan uses standard cost work packages, work items or activities. Then finally plan construction budget which involves structuring of project functional organization into production, services and administration responsibility center, allocating resources with budgeted cost and finally compiling the project financial plan in the form of project master budget.

Resource Planning:

Planning Construction Work Force: In this paper we will discuss about man power planning primarily focuses on determining the size of project work force, it's structuring into functional groups and workers teams, and scheduling the manpower recruitment to match the task requirement. This process chiefly involves identifying the trades or the skills required, establishing productivity standards to determine the number of worker needed to perform a given job in the specified time, data wise forecasting of workers requirements for accomplishing the project work and finally organizing the planned work force into operating work-teams having assigned programmed tasks.

Planning Construction Materials: Efficient material management in project environments calls for an integrated approach covering numerous functions such as materials planning and

programming, materials purchasing, inventory control, store-keeping and ware housing, materials transportation and handling at site, materials codification and standardization and the disposal of surpluses. The material planning and programming, which is the key function on materials management is closely linked with the project planning and control set-up. Both these work together to develop a plan to procurement and stocking of construction materials so as to provide at site, materials of right quantity, at right prices from right source and at the right time. The construction material planning involves identifying the materials required, estimating quantities, defining specifications, forecasting requirements, locating resources for procurement, getting material samples approved, designing material inventory and developing procurement plan to ensure a smooth flow of materials till the connected construction work are completed at the project site.

Planning Construction Equipment: Production task needing equipment include excavating, handling, transporting, filling, compacting, grading, hoisting, concreting, pre-casting, plastering, finishing, trenching, and laying of pipes and cables. The supporting equipment at project site consists of generators, transmission lines, pumping sets, other utility services equipment. Construction equipment is indispensable in execution of modern high-cost, time-bound massive construction projects. It produces output with an accelerated speed in a limited time. It saves manpower, which is becoming ever more costly and demanding. It improves productivity, quality and safety and also adds a sense of urgency. Acquisition of equipment mass involves initial heavy investment but, on the whole, its ads to profitability by reducing the overall costs, provided it is properly planned, economically procured and effectively managed.

Highway planning involves the estimation of current and future traffic volumes on a highway network. Highway engineers strive to predict and analyze all possible civil impacts of highway systems. Some considerations are the adverse effects on the environment, such as noise pollution, air pollution, water pollution, and other ecological impacts.

Financing:

Developed countries are constantly faced with high maintenance cost of aging transportation highways. The growth of the motor vehicle industry and accompanying economic growth has generated a demand for safer, better performing, less congested highways. The growth of commerce, educational institutions, housing, and defense have largely drawn from government budgets in the past, making the financing of public highways a challenge. The multipurpose characteristics of highways, economic environment, and the advances in highway pricing technology are constantly changing. Therefore, the approaches to highway financing, management, and maintenance are constantly changing as well.

Environmental Impact Assessment:

The economic growth of a community is dependent upon highway development to enhance mobility. However, improperly planned, designed, constructed, and maintained highways can disrupt the social and economic characteristics of any size community. Common adverse impacts to highway development include damage of habitat and bio-diversity, creation of air and water pollution, noise/vibration generation, damage of natural landscape, and the destruction of a community's social and cultural structure. Highway infrastructure must be constructed and maintained to high qualities and standards. There are three key steps for integrating environmental considerations into the planning, scheduling, construction, and maintenance of highways. This process is known as an Environmental Impact Assessment, or EIA, as it systematically deals with the following elements.

1. Identification of the full range of possible impacts on the natural and socio-economic environment.
2. Evaluation and quantification of these impacts.
3. Formulation of measures to avoid, mitigate, and compensate for the anticipated impacts.

Highway Safety:

Highway systems generate the highest price in human injury and death, as nearly 50 million persons are injured in traffic accidents every year, not including the 1.2 million deaths. Highway traffic injury is the single leading cause of unintentional death in the first five decades of human life. Management of safety is a systematic process that strives to reduce the occurrence and severity of traffic accidents. The man/machine interaction with highway traffic systems is unstable and poses a challenge to highway safety management. The key for increasing the safety of highway systems is to design, build, and maintain them to be far more tolerant of the average range of this man/machine interaction with highways. Technological advancements in highway engineering have improved the design, construction, and maintenance methods used over the years. These advancements have allowed for newer highway safety innovations. By ensuring that all situations and opportunities are identified, considered, and implemented as appropriate, they can be evaluated in every phase of highway planning, design, construction, maintenance, and operation to increase the safety of our highway systems.

Design:

The most appropriate location, alignment, and shape of a highway are selected during the design stage. Highway design involves the consideration of three major factors (human, vehicular, and highway) and how these factors interact to provide a safe highway. Human factors include reaction time for braking and steering, visual acuity for traffic signs and

signals, and car following behavior. Vehicle considerations include vehicle size and dynamics that are essential for determining lane width and maximum slopes, and for the selection of design vehicles. Highway engineers design highway geometry to ensure stability of vehicles when negotiating curves and grades and to provide adequate sight distances for undertaking passing maneuvers along curves on two-lane, two-way highways.

Project Management:

Project management could play a very important role in the construction industry. By using these management tools it will be very helpful to execute the project in a very economical way as well with the limited duration with usage of optimum resources. This also enables to store the information and manage the project in a central location. The project management consist of balancing the needs which could be identifiable or unidentified expectation of the stake holders by giving the quality, scope, and time of the project. The project management uses the information and turns it in a manner for execution in a skilled way with lot of strategies to satisfy the requirement of the construction projects. Every project has main goals to achieve that are the goal of project planning is to create a work chart with the activities which should be done on after another with a proper date of start and completion. By scheduling we could know the activities which are in a crucial position where it should be started and completed within the duration so that it will not affect the project completion duration. The allocation of the resources required for the project activities will cut down the wastage of materials which could affect the funds that are allocated for the resources in a project.

Conclusion:

The visit to highway project site and study of available database in the project site reveals that the construction companies in India have neither yet realize the necessity of detail study of their own resources nor have develop their accounting system for research and development purpose has evident from the lack of useful and relevant data from the site. The present construction practices in India is still adopt the methodology of as and when required,, resource management. Lack of professionalism leading to lack of detailed and meticulous planning and irrational decision making as per site management is concerned leading to under utilization of resources to a great extent. till now project resource planning is only limited to __planning and scheduling with time,, but resource __mobilization and usage,, planning according to their capacity and availability, ahead of time-in the planning stage, is still nobody,,s concern. In the present globalize business scenario, Indian construction

companies have also started facing stiff competition from foreign competitors. In this tightrope situation even the big companies from India have to access their own strength and weakness according to situation. In order to assess their capabilities for utilization of resources and track their productivity status, the first step should be to keep and maintain their real time record and build a data base from the ongoing projects. Next step is to analyze the data and find out the productivity of resources, and compared them with expected/ budgeted norms and improvement initiative as applicable. The companies should not only concentrate on activity oriented planning, but also at the same time should plan mobilization and usage of resources well before execution work started. Manpower Planning is the process by which an organization ensures that it has the right number and right kind of people, at the right place, at the right time, capable of effectively and efficiently completing those tasks that will help the organization achieve its overall objectives. In any project, most of the activities are done team wise and productivity of individual labourers cannot be determined. Also teams productivity is depend on driving equipment such as grader, roller, paver etc Planning of BRTS Highway Project by using Microsoft Project 2007 for 013 KMS and Existing Carriage indicate poor planning of resources. It will help to complete project on time with specified duration as per contract.

References:

1. Peurifoy, R.L., Construction Planning, Equipment and Methods, 2nd edition McGraw-Hill, NewYork,1970
2. LANGE, J.E., and D.Q. MILLS, The Construction Industry, Lexington Books, D.C. Health and Co., Lexington, MA, 1979.
3. Julian E. and Daniel Quinn Mills, “The Construction Industry”, Lexington Book, 1979.
4. WILLIAM BROTHER Bourdon, C.C., and R.W. Levitt, Union and Open Shop Construction, Lexington Books, D.C. Health and Co., Lexington, MA,1980.
5. TERSINE, R.J: Tersine, R.J., Principles of Inventory and Materials Management, North Holland, New York,1982.
6. PAULSON, B.C(1985)., Principles of Inventory and Materials Management, North Holland, New York,1985.
7. A.E.Kerridge and C.H.Vervalin, Houston, 1986; A.E.Kerridge and C.H.Vervalin (eds.), Engineering and construction Project Management, Gulf Publishing Company, Houston, 1986.

8. S.W. Nunnally, Construction Methods and Management, second edition, Prentice-Hall, 1986.
9. CORDELL, R.H. Caterpillar Performance Handbook, 18th Edition, Caterpillar, Inc., Peoria, IL, 1987.
10. GOSAIN RAJAT, 1999 “Equipment Planning and Procurement For highway Project, 1997-1999.
11. PEURIFOY ROBERT L, SCHEXNAYDER C.J (2003).
12. CHITKARA, K K, 2004 “Construction Project Management”, Tata McGraw Hill, New Delhi, 2004.

