Implementation of Project Scope Management For Residential Building

Tanmay S. Malvadkar [1], Milind M.Darade [2]
Department of Civil Engineering
[1] ME Scholar, Dr. D.Y.Patil School Of Engineering And Technology , Lohegaon, Pune, India.
[2] Professor, Dr. D.Y.Patil School Of Engineering And Technology , Lohegaon, Pune, India.

Abstract- *When a construction site is being built, the constructor raises a fence on the site defining the boundaries of the construction. This process of building a fence is called scoping. Scope management is the process of defining what work is required and then making sure all of that work – and only that work – is done. Scope management plan should include the detailed process of scope determination, its management, and its control. This needs to be planned in advance. The project manager must seek formal approval on a well-defined and clearly articulated scope. To identify scope, requirements must be gathered from all stakeholders. Gathering requirements from only a few stakeholders or only the sponsor might lead to the incorrect definition of scope. The project scope is the work the project will do to deliver the product of the project.*

The work of scope management includes the planning, coordination, and management activities (such as meetings and reports) that ensure the product scope is achieved. These efforts are a part of the project management plan and are further a part of the scope management plan. In this project using Microsoft project (MSP) we are going to schedule a followings projects and study the project scope management regarding the case studies. At the end of the project or the phase, the completed work is compared against the scope baseline in the project management plan to determine if the scope has been successfully completed.

Keywords- Project scope, management, Microsoft project (MSP) etc

I. INTRODUCTION

Planning has long been a subject of discussion in the building industry. Many guides have been developed and much knowledge resides with experienced practitioners (Griffin 1972; Pena 1987; Billings 1993; Preiser 1993; Haviland 1996; Cherry 1999; ASCE 2000). However, early planning in many cases is not performed well in the building industry. Consequently, the building sector suffers from poor or incomplete scope definition, frequently experiencing considerable changes that result in significant cost and schedule overruns (Gibson et al. 1997; Cho et al. 1999; Cho 2000). Because of these problems, there existed a need for a better method of assisting in defining project scope. The building industry is different from the industrial sector in various ways, such as the approach of planning, design, and construction of facilities; the owner's perspective; the architectural focus; and so on. Nonetheless, there are many similarities. Like the industrial sector, the building industry suffers from poor or incomplete preproject planning. As in the industrial sector, planning in the building industry is a process that needs to have input from a wide variety of individuals and must have significant owner involvement. However, at the time of this study, a quantitative understanding of scope definition issues for buildings had not been well-studied and no tool existed to help with scope definition. As developed, the PDRI for Building Projects is a user friendly checklist that identifies and precisely describes each critical element in a project scope definition package to assist project managers in understanding the scope of work. It provides a means for an individual or team to evaluate the status of a building project during preproject planning with a score corresponding to project's overall level of definition. The PDRI helps stakeholders of a project quickly analyse the scope definition package and predict factors that may impact project risk specifically in regard to buildings. (CII 1999; Cho 2000) As illustrated in Fig. 1, the PDRI for building projects is designed for use at varying times during the project's lifecycle prior to detailed design and development of construction documents.

Preproject planning is the project phase encompassing all the tasks between project initiations to detailed design. Over the past nine years, the Construction Industry Institute (CII) has funded several research projects focused on Preproject planning. Findings from these investigations have dramatically changed the awareness of project management professionals within CII toward the importance of the process and the benefits of early project planning. Research results have shown that greater Preproject planning efforts lead to improved performance on industrial projects in the areas of cost, schedule, and operational characteristics (Gibson and Hamilton 1994; CII 1995; Griffith and Gibson 1995; Griffith et al. 1998). Synthesizing these efforts was the development of the Project Definition Rating Index (PDRI) for industrial projects, a scope definition tool

that is widely used by planners in the industrial projects sector. One of the major sub processes of the Preproject planning process is the development of the project scope definition package. Project scope definition is the process by which projects are defined and prepared for execution. It is at this crucial stage where risks associated with the project are analyzed and the specific project execution approach is defined. Success during the detailed design, construction, and start-up phases of a project is highly dependent on the level of effort expended during this scope definition phase (Gibson and Hamilton 1994).

A more recent CII research study focused on developing a useful tool for measuring the level of project definition at the time the project is authorized for final funding. This new tool, the PDRI for Industrial Projects, is a project management tool that assists in calculating a total score representing the level of project definition. Developed specifically for industrial projects such as refineries, chemical plants, power plants, and heavy manufacturing, the PDRI provides project team members with a structured approach for developing a good scope definition package. The PDRI for Industrial Projects consists of 70 scope definition elements in a weighted checklist format. The 70 elements are divided into three main sections and 15 categories (Gibson and Dumont 1996; Dumont et al. 1997). The project team assessing the level of definition of each of the 70 elements and a score is calculated; the lower the score, the more well defined the project. A score of 200 points or below using this tool was shown to statistically increase the predictability of project outcome. A sample of 40 projects using the industrial version of the PDRI indicated that those projects scoring below 200 versus those scoring above 200 had:

- Average cost savings of 19% versus estimated for design and construction.
- Schedule reduction by 13% versus estimated for design and construction.
- Fewer project changes.
- Increased predictability of operational performance.

With the success of the PDRI for industrial projects, many building industry planners wanted a similar tool to address scope development of buildings. CII constituted a team and funded a research effort to facilitate this development effort. The rest of this paper will introduce the PDRI for building projects. The primary structure and format of the PDRI and its development will be explained. This will be followed by a brief synopsis of its validation on 33 completed building projects and its use on 20 ongoing projects. The paper will conclude by describing the potential uses of the PDRI and summarizing its benefits to building construction practitioners.

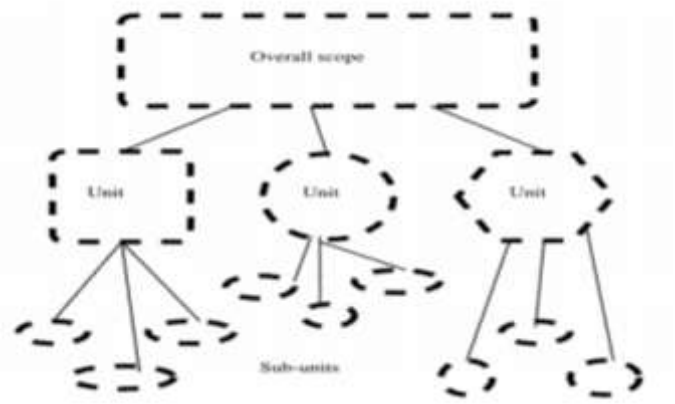

Fig 1.Scope Definition

1.1 Scope Changes

Any change, at any stage, in the functionality of the project or facility is termed a scope change. All other changes which result from design errors and omissions, acts of god, or changed conditions are classified as refinements or alterations. Overruns resulting from alterations, refinements and cost escalations are independent of scope changes. The change in functionality can be of three types and can be in the horizontal or vertical direction as described in section

1) Change in the capacity of functionality.
2) Change in the quality of functionality.
3) Complete change in the functionality.

1.2 Increasing Size Of Change

Sometimes if the the capacity or size of a item, activity or portion of a project is changed the functionality of that item, activity or portion does not change. But if the size is increased to such an extent that a change in functionality occurs, then it can result in scope modification. To understand this, consider for example, that a tunnel is being constructed which also has utility lines passing through it. If it so happens that there is a change in the design sizes of the utility lines. Up to a certain extent we might be able to adjust them in the same dimensions of the tunnel, but if the change is large enough the dimensions of the tunnel might have to be changed. Such a change might itself be a scope change or cause a change in scope for example, the ventilation system might need relocation and redesign, and the new design might be functionally different from the previous one. Figure 1-2 depicts such increasing size of change, the dotted line is the

critical point where the change becomes a change in functionality and hence a change in scope. In some cases the reverse of this might also be true, that is with a decrease in size the functionality might change. The importance of this discussion is that this type of change in functionality can happen unintentionally with incremental approval of increase in the size of an item, with the assumption that it would not cause a scope change. Such a scope change might be due to the activity itself or due to its disruptive or radiating effect on other dependent or related activities. So it is important to watch out for this kind of changes that do not appear to be a scope change in the beginning, but can become a cause of one. It is important to keep track of the border line point, whence the change becomes effectively a change in the functionality and consequently a change in the scope. It should also be noted that the border line point is different for different items and also unique for different cases.

1.3 Development Of PDRI For Building Projects

Initial development work on the PDRI for building projects began in June 1997 at the University of Texas using the PDRI for Industrial Projects as a basis. This effort included input and review from approximately 30 industry experts, as well as extensive use of literature sources for terminology and key scope element refinement (O'Reilly 1997). The 12 member, CII PDRI for Buildings Research Team, constituted in February 1998, refined and streamlined the list of PDRI elements and their descriptions, starting with the draft of 71 elements to the final draft in December 1998. A complete list of the PDRI's three sections, 11 categories, and 64 elements is given in Fig. 2. The 64 elements in the PDRI for Building Projects are arranged in a score sheet format and supported by 38 pages of detailed descriptions and checklists. The score sheet is given in Appendix I and will be described in more detail later in this paper. A representative example description for element G1, Equipment List, is given in Fig. 3. Due to limitations of space, the entire list of detailed element descriptions are not included in this document.

1.4 Objectives Of Study

- To Identify the scope of residential building by refereeing PMBOK
- To Study factors affecting the project scope management.
- To Implement WBS for satisfying the project scope.
- To Develop WBS programme using tool MSP.
- To Check effectiveness of MSP programme for satisfying the project scope using questionnaires survey.

II. LITERATURE REVIEW

Shweta Kasnale et al. The owner and contractor companies however share the delusion that it is not economically viable to spend the time or money, required to sufficiently define the scope of work early in a project's life cycle. Sometimes, project participants are unaware about the necessities of a sufficiently defined scope of work. A tool called Project Definition Rating Index (PDRI) was created to address these problems. The PDRI is an easy-touse, checklist of 68 scope definition elements, letting the users to measure and manage the level of scope definition as project planning progresses. It has been found that poor scope definition is one of the principal causes of project failure in the construction industry.

Maja-Marija Nahod et al Projects need to be performed and delivered under certain constraints. Traditionally, these constraints are scope, time and cost. The Scope Control process influences the factors that lead to project scope changes and control the impact of those changes, which a key issue for project success. It ensures that all requested changes and recommended corrective actions are processed and that changes are reduced or eliminated if they result in negative impact on projects. The scope control is considered from the investor's point of view, as achieving the project goals is of primary importance for the investor. The theoretical basis for the research is Dynamic Planning and Control Methodology Findings include reasons for and consequences of changes from the point of view of various stakeholders in the project, as well as recommended procedures for objective and practical management of the changes

Robert T. Hans et al. Software project scope verification is a very important process in project scope management and it needs to be performed properly and thoroughly so as to avoid project rework and scope creep. Moreover, software scope verification is crucial in the process of delivering exactly what the customer requested and minimizing project scope changes. Well defined software scope eases the process of scope verification and contributes to project success. Furthermore, a deliverable-oriented WBS provides a road map to a well defined software scope of work.

A.O. Ogunberu et al Data collected were analyzed using both descriptive and inferential statistics. Findings revealed that Competitive Advantage, Organizational Process Assets, Expert Judgment, Complex Activity List, Complex Project Scope Statement, Limited Resources, Fast Tracking, Project Delays, Client Demand, Technical Skills Required, Dynamism of Technology and Return on Investment were

adopted factors influencing the choice of project scope management practices among construction organizations. Data were obtained through the use of questionnaire and interview to a total of three hundred and seventy five (375) respondents which include one hundred and twenty five (125) project sponsors, one hundred and twenty five (125) project managers/coordinators and one hundred and twenty five project team members on ICT projects.

Timo Käkölä et al., December Most software project estimation and measurement (PEM) processes have been designed for providers. Customers need to leverage PEM to better direct software sourcing. A design theory for software project-scoping has been developed that supports the PEM processes of both customers and providers. A software provider used a preliminary version of the theory in dozens of software development projects annually, systematically (1) achieving higher customer satisfaction through better estimation accuracy and (2) improving productivity. Two government organizations used the theory to speed up their software sourcing and reduce their sourcing costs to a half without giving up any functional or quality requirements. Similar results have not been obtained before. Future research is needed to generalize the findings.

Chung-Suk Choand G. et al Methodology adopted for the same is as discussed further. Key project scope definition elements are identified. The project team evaluates the level of definition of each of the 70 elements and a score is calculated; the lower the score, the more well defined the project. The method chosen to quickly develop reasonable and dependable weights for the PDRI elements was to rely on the expertise of a wide range of construction industry practitioners gathered together in workshops. The PDRI validation procedures, involving over 50 projects, are discussed. A description of the uses of the PDRI and a gist of its benefits to the building construction industry are defined. The primary structure and format of the PDRI and its development are explained. A brief summary of its validation on 33 completed building projects and its use on 20 ongoing projects is given.

III. METHODOLOGY

Table No 1. Flow Chart

2.1 Project Scope Management

Project Scope Management refers to the set of processes that ensure a project's scope is accurately defined and mapped. Scope Management techniques enable project managers and supervisors to allocate just the right amount of work necessary to successfully complete a project—concerned primarily with controlling what is and what is not part of the project's scope.

2.2 What Is Project Scope

Scope refers to the detailed set of deliverables or features of a project. These deliverables are derived from a project's requirements. PMBOK defines Project Scope as the "The work that needs to be accomplished to deliver a product, service, or result with the specified features and functions." There are three processes of Project Scope Management-planning, controlling, and closing.

2.3 Steps Involved In Project Scope Management

As a project manager, you'll need to define project scope no matter what methodology you choose to use. Here's one example of a systematic process to capture, define, and monitor scope.

Step 1—Define Project Needs.

Step 2—Understand The Project Objectives.

Steps for Defining the Scope Of A Project

To define the scope of the project, to identify the:- Project objectives-Goals-Subphases-Tasks-Resources-Budget-Schedule.

Once these parameters are established, the limitations of the project need to be clarified and the aspects that are not to be included in the project identified. By doing this, the project scope will make clear to stakeholders, senior management, and team members what will and will not be included in the final product or service. Additionally, the scope of the project must have a tangible objective for the organization that is undertaking the project. This is integral for the scope of the project, since it will play a vital role in how project methodologies are applied to complete it.

2.4 Project Scope Management Processes

Fig 2. Scope Management Process

2.5 Plan Scope Management

This is the first process in the Project Scope management process. The PMBOK® Guide, Fifth Edition, added several processes to separate the initial planning activities from other activities. This process creates the scope management plan. The scope management plan describes the project scope and documents how it will be further defined, validated, and controlled. The table below shows the Inputs, Tools and Techniques, and Outputs of the Plan Scope Management Process.

The Scope management plan covers how the scope will be defined, validated, and controlled. It also includes information on preventing or dealing with scope creep, handling change requests, the escalation path for any disagreement on the scope elements between stakeholders, the process for the creation of the scope statement, the WBS, and how the deliverables will be accepted.

Fig 3. Scope Management Plan

2.6 Project Scope Management Tips

Often, when performing Scope Management, project managers bump into issues along the way. The problems that may arise when defining and documenting Project Scope are some common issues with performing scope management can lead to problems once the project has begun. We recommend reviewing all scope management documentation with an eye toward-

- Ambiguity: Ambiguity in scope often leads to unnecessary work and confusion. To avoid this, the scope needs to be clearly defined and to the point.

- Incomplete definition: Incomplete scopes lead to schedule slips which lead to cost overruns. To avoid this, the scope needs to be complete and accurate.

- Transience: Transient scopes lead to scope creeps—the primary cause of late deliveries and "never-ending" projects. To avoid this, the scope document needs to be finalized and remain unaltered for the duration of the project.

Uncollaborative scope: A scope that is not collaboratively prepared causes misinterpretations in requirements and design. To avoid this, the scope document should be shared with all stakeholders at every step of the scope definition process.

IV. RESULTS AND ANALYSIS

Fig 4. Tabular Scheduling Of Cool Homes

Fig 5. Graphical Scheduling Of Cool Homes

V. CONCLUSIONS

- The study investigated project scope management practices among organizations in the construction sector in Cool homes and examined the determinant factors for the choice of project scope management practices employed in the organizations
- The study revealed that major project scope management practices employed by construction firms were define project scope, create work breakdown structure, verify scope, and control scope.
- The factors shown to significantly influence the choice of project scope management practices were competitive advantage, organizational process assets, complex activity list, complex project scope statement, limited resources, fast tracking, and expert judgment.
- The studies further revealed that the key significant impact of project scope management practices on project success were customer expectation, customer satisfaction, resource allocation and project duration.
- The adoption of project scope management practices by construction organizations in both case studies are majorly affected by 'Competitive advantage', 'Complex project scope statement', 'Client demand' and 'Return on investment'. This will eventually ensure profitability, better return on investment and continued market share.
- "Cool homes" is located in highly humid area(Bhusaval), therefore scope of project was to design a home which is comparatively cooler then outer side temp. Thats why in that project, the windows, doors, cavity walls and elevation is design accordingly (Flat rate is 1300 Rs./Sqft).
- While in "18 Lattitude", it is located in Pune but its scope is commercial and accordingly to that scope it is constructed as a post tension flat slab system (Flat rate is 2300 Rs./Sqft).

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