

Management Principles and Application for Construction and the Building Environment Sector

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ABSTRACT

In order to answer the following four issues, the study first examines the logic of innovation in the construction industry. How is it carried out? Who is concerned? And why do businesses innovate or not? In order to examine data from a study of innovation in the Norwegian and Swedish construction sectors, the research combines an industrial network approach and the exploration-exploitation dichotomy. The results demonstrate that construction organizations are methodically transforming project-level ideas into corporate knowledge. This suggests a logic of innovation that is focused on utilizing novel combinations through the internal network. Corporations are also more and more concerned with forging stronger ties with users and consumers, which have historically been tenuous. At least on the client side, this has resulted in a focus on exploitation through the external network. As a result, the industry as a whole can experience a rebirth and more creative behavior. However, it necessitates that not just the connections with customers evolve, but also those with the suppliers. Companies in the construction sector should be aware of their innovation logic, specifically whether it is skewed towards exploitation or exploration, or towards the internal or external network, when determining their innovation behavior. There must be equilibrium.

Date of Submission: 25-05-2023

Date of acceptance: 06-06-2023

I. INTRODUCTION

1.1 GENERAL

The construction industry plays an essential role in a country's economy. This is fundamental to the country's development too. There are several challenging engineering and management problems that occur on construction sites which head to the high quantity of rework, defects, delays, disagreements, and cost overruns on construction projects. Therefore it is important to have a process of management for construction project. A construction site's success is based on project time, quality and cost. Completing a project within time, quality and cost is an important task and management helps to achieve those. A construction project has three stages; design stage, production stage and operation stage. In each task there are several personals and teams.

A proper management will help to communicate and coordinate with each other and it is one of key component to project success. It also includes the major topic of sustainability which is spoken in modern construction. It also explains how it effect to the construction cost, quality and time. It also explains how it effect to management.

To achieve all above task there should be a proper planning and monitoring which can help reduce or stop quantity of rework, defects, delays, disagreements and cost overruns on construction projects.

As it can see a management is important key component to achieve a project without problems. Therefore I try to explain several topics in management briefly below

II. OBJECTIVES

2.1 Established Definitions for Management Fryer

States that 'management is the process of steering an organization towards the achievement of its objectives, by means of technical skills for planning and controlling operations, and social skills for directing and coordinating the efforts of employees.

According to the above statement, it defines management is a combination process of technical skills and social skills for an organization that helps the organization lead to success.

Management is a multipurpose organ that manages a business and manages managers and manages workers and works (Drucker, 2006).

According to Fayol (1984) 'management is to forecast, to plan, to organize, command, coordinate, and control activities of others.

III. LITERATURE REVIEW

Alfredo Federico et.al., (2014): One of the major roles undertaken by a project manager is the management of the risk of a project. However, this duty is particularly complex and inefficient if good risk management has not been done from the beginning of the project. An effective and efficient risk management approach requires a proper and systematic methodology and, more importantly, knowledge and experience.

This paper addresses the problems of risk management in construction projects using a knowledge-based approach and proposes a methodology based on a three-fold arrangement that includes the modeling of the risk management function, its evaluation, and the availability of the best practices model. A major conclusion of this research is the fact that risk management in construction projects is still ineffective due to a lack of knowledge.

Amita Pawar et.al., (2017): Gaps and inconsistencies in the knowledge and treatment of construction and project risk are identified. The paper describes, on the basis of a questionnaire survey of general contractors and project management practices in Pune, the construction industry's perception of risk associated with its activities and the extent to which the industry uses risk analysis and management techniques. It concludes that risk management is essential to construction activities in minimizing losses and enhancing profitability. Construction risk is generally perceived as events that influence project objectives of cost, time, and quality. Risk analysis and management in construction depend mainly on intuition, judgment, and experience. Formal risk analysis and management techniques are rarely used due to a lack of knowledge and to doubts about the suitability of these techniques for construction industry activities.

C. Borysowich (2008): Most organizations are aware that risks do not appear on a linear basis and for this reason risk cannot be identified and measured in this way. Assessing and understanding the interrelation of risks and their associated correlated impact is the real challenge. These complex relationships require a different set of tools. Through the use of tools to simulate multiple risk scenarios and correlating risk interdependencies, the organization can begin to build an effective map of its risk landscape. The goal of the study was to understand the cumulative impact of risks on performance and value in order to select the appropriate mix between risk retention and risk treatments.

Franck Taillandier et.al., (2014): Efficient risk management is mandatory to project success. However, implementing such management is complex because of the diversity and the dynamic nature of the risk. Moreover, each of the project stakeholders has his/her own risks; his/her own vision, and his/her own action on the project and risks. In this paper, we propose an agent-based model called MSMACC to assess the impact of risks on the project. This model allows testing different risk mitigation strategies to measure their impact on the project.

Irem Dikmen et.al., (2013): Risk management paradigms exist as methodologies rather than systems that can fully support the risk management process. The existing risk management support tools are usually based on quantitative risk analysis whereas the other phases are carried out external to the software. Risk registers and risk assessment tools are proposed as decision support systems that can only be used at specific stages of a construction project for specific purposes such as time/cost estimation at the bidding stage, country risk assessment during international market selection, etc. Moreover, the proposed risk management support tools usually do not foster the integration of risk management activities between the parties involved in the construction supply chain, do not consider the impact of risks on all of the project success criteria, and cannot handle subjectivity. The major objective of this paper is to make a critical review of existing risk management support tools and propose the development of a risk management corporate memory coupled with a decision support tool for successful management of risk.

Josef Oehmen et.al., (2015):

Risk management is receiving much attention, as it is seen as a method to improve the cost, schedule, and technical performance of new product development programs. However, there is a lack of empirical research that investigates the effective integration of specific risk management practices proposed by various standards with new product development programs and their association with various dimensions of risk management success. Based on a survey of 291 new product development programs, this paper investigates the association of risk management practices with five categories of product development program performance: A. Quality DecisionMaking, B. High program stability; C. Open, problem-solving organization; D. Overall NPD project success and E. Overall product success. The results show that six categories of risk management practices are most effective: 1. Develop risk management skills and resources; 2. Tailor risk management and integrate it with new product development; 3. Quantify the impacts of risks on your main objectives; 4. Support all critical decisions with risk management results; 5. Monitor and review your risks, risk mitigation actions, and risk management process; and 6. Create transparency regarding new product

development risks. The data shows that risk management practices are directly associated with outcome measures in the first three categories (improved decision-making, program stability, and problem-solving). There is also evidence that the risk management practices indirectly associate with the remaining two categories of outcome measures (project and product success)

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IV. NATURE AND SCOPE OF STUDY

4.1 Management Process

There are six general areas that Fayol developed that has become known as the process of management, which we still use and refer to today. Communication is included recently in this process.

- Forecasting
- Planning
- Organising
- Motivating
- Controlling
- Co-ordinating
- Communicating

4.1.1 Forecasting

Forecasting defines as using past data to determine the future plan and predictions for a working situation and a budget ‘Principles of Management’ (Anon., 2008) and according to Madubashini, 2014. Forecasting provides information about possible future events and their significance for an organization.

According to Madubashini, 2014. There are three features of forecasting for a construction project. Financial Forecast – It simply defines a predicted budget for the project and it’s an estimation of future financial efforts.

Workload Forecasting – It is a process of forecasting how system workloads will differ in the future and it is a predicting the process of managing all the work, time, and cost during the project.

It is also a Margin for Tenders too. Resources Forecasting – It is forecast which type of roles, materials, and plants are needed on a future project. Forecasting in a construction

The main aim of forecasting is to predict possible outcomes, reduce project risk, and increase the chances of project success. This means that you can learn how likely it is that a project will be successful, evaluate the risks involved, and identify areas for improvement. As a result, project managers are armed with sufficient knowledge to anticipate project duration, cost overruns, project budgeting and forecasting, and resource needs.

Note that an adequate amount of data is necessary during project forecasting. Ideally, you begin forecasting when the project is at least 20% complete. There are different methods of demand forecasting in project management. However, there’s no silver bullet when it comes to applying each technique.

Some forecasting techniques in project management include trend analysis, historical data analysis, survey method, and regression analysis. Before choosing a particular forecasting technique, it is important to examine some factors such as the availability of project historical data, expected outcome of forecasting, and the degree of accuracy needed. This ensures that the right technique is applied relative to the scope and versatility of the project.

Project cost estimate: When implementing cost forecasting in project management, an applicable technique is trend analysis. In this case, project managers can evaluate past and present project spending patterns and extrapolate the spending data until the project is completed. This provides a forecast of the expected project cost.

project duration: The main point to consider when forecasting project duration is to understand the risks and uncertainties of the activities involved in the project development. A project with inadequate funding or resource availability will hinder the progress of the project cycle.

There are different analytical project budgeting and forecasting tools that are designed to provide insights into the past, present, and future project performance.

4.1.2 Planning

'Principles of Management' (Anon., 2008) illustrate that planning is the preparation of an operation of action considered to achieve a project's specific objectives, which will have been planned during the forecasting and it determines the board lines of operations.

In actual planning there are systemic approaches to planning which can do by following the steps

Construction planning is the specific process a construction manager uses to lay out how they will manage and execute a construction project, from building design to completion. It lists the activities and schedule for each part of the construction process.

A construction plan defines the scope of work, sets timelines, allocates resources, and establishes communication protocols. In short, it's the master plan that ensures a construction project runs smoothly and meets all its deadlines, budget constraints, and quality standards.

Step #1: Initiate the project

Every construction project, no matter how big or small, needs to start with a business case that lays out the feasibility of the project and what it's going to take to get the job done.

Start by creating a project initiation document (PID), which describes the following in general, not technical, terms (the technical part comes later):

- **People:** Number of workers needed, including contractors and subcontractors such as plumbers and electricians.
- **Resources:** Materials needed for the design and building plans.
- **Budget:** Total cost estimate of the project, including labor, materials, equipment, fees, and permits.

The purpose of this document is to outline, both for your stakeholders and your crew, the resources need to complete the project. Download our free project initiation document template to start planning your construction project. Our master template also has a construction budget calculator, construction estimator, and bid tabulation template to make the estimation and contracting process easier.

Use document management software to organize and store all project-related documentation in a central repository. Also, ensure everyone on the project team knows where to find and how to use the system to avoid disruptions in information flow.

Step #2: Create the project plan

Now comes the part where turn the PID into a more concrete construction plan by setting goals that are S.M.A.R.T. and C.L.E.A.R. take the specific resources you've listed in the previous step and use that to inform a broader strategy that will guide how you actually execute the project.

start with the definition of S.M.A.R.T. goals:

- **Specific:** Set specific goals for your project, such as deadlines for key milestones.
- **Measurable:** Agree on how you will measure success for goals. For example, is it good enough that you have started laying concrete by the deadline you set, or should it be completely set by that date?
- **Attainable:** You need to have a plan in place for how you're going to achieve these goals. For example, does your project depend on a specific material that might not be available in the quantity you need when you need it? If so, you need to adjustments.
- **Realistic:** Your goals need to be within your abilities as a construction manager. For example, if your project includes plans to get the electrical work done within three months when never done it in less than six months for a project of this size, setting yourself up for failure.
- **Timely:** Lay out a specific time frame within which you can realistically expect the project to achieve these goals.

Next, C.L.E.A.R. goals, which are a slight variation on this strategy:

- **Collaborative:** Get everyone on board. Before the project begins, hold a meeting with the entire team to lay out what's expected and have them help you identify any possible obstacles.
- **Limited:** Limit these goals both in terms of scope and time frame to not get overwhelmed.

- **Emotional:** Ensure your goals will get your employees fired up and on board.
- **Appreciable:** Break up big goals into achievable tasks so you overwhelm your workers.
- **Refinable:** Be flexible because you can never predict what will happen on a construction site.

Step #3: Execute the plan

It's time to execute your plan. Begin by creating a high-level project timeline, including major milestones and key deliverables, to keep everything on track. Once you have a timeline in place, start mapping out the details of each project stage.

Next, call a team meeting to go over the project plan and construction schedule. Talk to each person on your crew individually, if possible, to discuss expectations and allow them to ask questions about anything confused about. You might also need to assign a project manager(s) to oversee your teams. If a very small business, you may be the only project manager, but you need to have a schedule drawn up of what you'll be checking

Step 4: Track project progress

It's essential that you accurately track the performance of your construction project team and ensure they're meeting the parameters you've set. In the event of an unsuccessful project, this process ensures you have data that you can dive into to figure out why you failed so it doesn't happen again.

Successful construction managers typically use key performance indicators (KPIs) to monitor the performance of their projects. Some typical KPIs you can track include:

- **Project objectives:** Are you on schedule and budget?
- **Project performance:** Is the project proceeding smoothly, or are you running into some obstacles you weren't expecting?
- **Quality:** Sure, the crew is hitting their milestones, but is the work up to the quality that you want at this stage?

To stay on top of your construction project schedule, maintain accurate records to analyze progress and decide course corrections. Keep our documentation tracker template handy to track all project documentation and deliverables.

Step #5: Close out and evaluate the project

Just because the building is constructed doesn't mean you're done with the planning process. The lessons learned and data gathered from this project will help inform how you approach your next project, so it's important to perform the close-out tasks. This work can also serve as some of the pre-construction planning for your next project.

Thanks to the fact that you had a clearly-defined construction project plan and a way to track performance and obstacles, you're well-equipped to conduct an even more successful construction planning process the next time around. You'll know where the obstacles are and what mistakes were made, which will then inform how you can tweak the next construction plan to maximize success.

But this should be a process that takes place just in your head. Call a final meeting with your crew to discuss how you performed. Conduct a brainstorming session to get ideas on what you could have done better, and take extensive notes. Your team is your eyes and ears, so don't lose the opportunity to collect their valuable insight.

To formally close the project, create the actual project budget and contrast it with the original budget and then draft the final project report to share with key stakeholders.

4.1.3 Organising

Shakthivel Murugan (2004, pp. 133) shows Louis Allen statement organizing defines the process of identifying and grouping the work to be performed and defining and allocating responsibilities and duties towards various personnel in an organization.

Process of organizing Shakthivel Murugan (2004, pp. 133–135) states that the function of organizing is performed by Managers and it is a continuous process.

Organizing as a process is a dynamic concept and the following steps are involved in the organizing process.

- Determining Activities
- Grouping Activities
- Assigning Duties
- Delegating Authority
- Coordinating Activities

The management of construction projects requires knowledge of modern management as well as an understanding of the design and construction process. Construction projects have a specific set of objectives and constraints such as a required time frame for completion. While the relevant technology, institutional arrangements or processes

will differ, the management of such projects has much in common with the management of similar types of projects in other specialty or technology domains such as aerospace, pharmaceutical and energy developments. Generally, project management is distinguished from the general management of corporations by the mission-oriented nature of a project. A project organization will generally be terminated when the mission is accomplished. According to the Project Management Institute, the discipline of project management can be defined as follows: [1]

Project management is the art of directing and coordinating human and material resources throughout the life of a project by using modern management techniques to achieve predetermined objectives of scope, cost, time, quality and participation satisfaction.

By contrast, the general management of business and industrial corporations assumes a broader outlook with greater continuity of operations. Nevertheless, there are sufficient similarities as well as differences between the two so that modern management techniques developed for general management may be adapted for project management.

The basic ingredients for a project management framework [2] may be represented schematically in Figure 2-1. A working knowledge of general management and familiarity with the special knowledge domain related to the project are indispensable. Supporting disciplines such as computer science and decision science may also play an important role. In fact, modern management practices and various special knowledge domains have absorbed various techniques or tools which were once identified only with the supporting disciplines. For example, computer-based information systems and decision support systems are now common-place tools for general management. Similarly, many operations research techniques such as linear programming and network analysis are now widely used in many knowledge or application domains. Hence, the representation in Figure 2-1 reflects only the sources from which the project management framework evolves.

The uncertainty in undertaking a construction project comes from many sources and often involves many participants in the project. Since each participant tries to minimize its own risk, the conflicts among various participants can be detrimental to the project. Only the owner has the power to moderate such conflicts as it alone holds the key to risk assignment through proper contractual relations with other participants. Failure to recognize this responsibility by the owner often leads to undesirable results. In recent years, the concept of "risk sharing/risk assignment" contracts has gained acceptance by the federal government. [4] Since this type of contract acknowledges the responsibilities of the owners, the contract prices are expected to be lower than those in which all risks are assigned to contractors.

In approaching the problem of uncertainty, it is important to recognize that incentives must be provided if any of the participants is expected to take a greater risk. The willingness of a participant to accept risks often reflects the professional competence of that participant as well as its propensity to risk. However, society's perception of the potential liabilities of the participant can affect the attitude of risk-taking for all participants. When a claim is made against one of the participants, it is difficult for the public to know whether a fraud has been committed, or simply that an accident has occurred.

Risks in construction projects may be classified in a number of ways. [5] One form of classification is as follows:

1. Socioeconomic factors
 - Environmental protection
 - Public safety regulation
 - Economic instability
 - Exchange rate fluctuation
2. Organizational relationships
 - Contractual relations
 - Attitudes of participants
 - Communication
3. Technological problems
 - Design assumptions
 - Site conditions
 - Construction procedures
 - Construction occupational safety

The environmental protection movement has contributed to the uncertainty for construction because of the inability to know what will be required and how long it will take to obtain approval from the regulatory agencies. The requirements of continued re-evaluation of problems and the lack of definitive criteria which are practical have also resulted in added costs. Public safety regulations have similar effects, which have been most noticeable in the energy field involving nuclear power plants and coal mining. The situation has created constantly shifting guidelines for engineers, constructors and owners as projects move through the stages of planning to construction. These moving targets add a significant new dimension of uncertainty which can make it virtually impossible to schedule and complete work at budgeted cost. Economic conditions of the past decade have further reinforced the

climate of uncertainty with high inflation and interest rates. The deregulation of financial institutions has also generated unanticipated problems related to the financing of construction.

Uncertainty stemming from regulatory agencies, environmental issues and financial aspects of construction should be at least mitigated or ideally eliminated. Owners are keenly interested in achieving some form of breakthrough that will lower the costs of projects and mitigate or eliminate lengthy delays. Such breakthroughs are seldom planned. Generally, they happen when the right conditions exist, such as when innovation is permitted or when a basis for incentive or reward exists. However, there is a long way to go before a true partnership of all parties involved can be forged.

During periods of economic expansion, major capital expenditures are made by industries and bid up the cost of construction. In order to control costs, some owners attempt to use fixed price contracts so that the risks of unforeseen contingencies related to an overheated economy are passed on to contractors. However, contractors will raise their prices to compensate for the additional risks.

The risks related to organizational relationships may appear to be unnecessary but are quite real. Strained relationships may develop between various organizations involved in the design/construct process. When problems occur, discussions often center on responsibilities rather than project needs at a time when the focus should be on solving the problems. Cooperation and communication between the parties are discouraged for fear of the effects of impending litigation. This barrier to communication results from the ill-conceived notion that uncertainties resulting from technological problems can be eliminated by appropriate contract terms. The net result has been an increase in the costs of constructed facilities.

The risks related to technological problems are familiar to the design/construct professions which have some degree of control over this category. However, because of rapid advances in new technologies which present new problems to designers and constructors, technological risk has become greater in many instances. Certain design assumptions which have served the professions well in the past may become obsolete in dealing with new types of facilities which may have greater complexity or scale or both. Site conditions, particularly subsurface conditions which always present some degree of uncertainty, can create an even greater degree of uncertainty for facilities with heretofore unknown characteristics during operation. Because construction procedures may not have been fully anticipated, the design may have to be modified after construction has begun. An example of facilities which have encountered such uncertainty is the nuclear power plant, and many owners, designers and contractors have suffered for undertaking such projects.

If each of the problems cited above can cause uncertainty, the combination of such problems is often regarded by all parties as being out of control and inherently risky. Thus, the issue of liability has taken on major proportions and has influenced the practices of engineers and constructors, who in turn have influenced the actions of the owners.

Many owners have begun to understand the problems of risks and are seeking to address some of these problems. For example, some owners are turning to those organizations that offer complete capabilities in planning, design, and construction, and tend to avoid breaking the project into major components to be undertaken individually by specialty participants. Proper coordination throughout the project duration and good organizational communication can avoid delays and costs resulting from fragmentation of services, even though the components from various services are eventually integrated.

Attitudes of cooperation can be readily applied to the private sector, but only in special circumstances can they be applied to the public sector. The ability to deal with complex issues is often precluded in the competitive bidding which is usually required in the public sector. The situation becomes more difficult with the proliferation of regulatory requirements and resulting delays in design and construction while awaiting approvals from government officials who do not participate in the risks of the project.

The top management of the owner sets the overall policy and selects the appropriate organization to take charge of a proposed project. Its policy will dictate how the project life cycle is divided among organizations and which professionals should be engaged. Decisions by the top management of the owner will also influence the organization to be adopted for project management. In general, there are many ways to decompose a project into stages. The most typical ways are:

- Sequential processing whereby the project is divided into separate stages and each stage is carried out successively in sequence.
- Parallel processing whereby the project is divided into independent parts such that all stages are carried out simultaneously.
- Staggered processing whereby the stages may be overlapping, such as the use of phased design-construct procedures for fast track operation.

It should be pointed out that some decompositions may work out better than others, depending on the circumstances. In any case, the prevalence of decomposition makes the subsequent integration particularly important. The critical issues involved in organization for project management are:

- How many organizations are involved?

- What are the relationships among the organizations?
- When are the various organizations brought into the project?

There are two basic approaches to organize for project implementation, even though many variations may exist as a result of different contractual relationships adopted by the owner and builder. These basic approaches are divided along the following lines:

1. **Separation of organizations.** Numerous organizations serve as consultants or contractors to the owner, with different organizations handling design and construction functions. Typical examples which involve different degrees of separation are:

- Traditional sequence of design and construction
- Professional construction management

2. **Integration of organizations.** A single or joint venture consisting of a number of organizations with a single command undertakes both design and construction functions. Two extremes may be cited as examples:

- Owner-builder operation in which all work will be handled in house by force account.
- Turnkey operation in which all work is contracted to a vendor which is responsible for delivering the completed project

Since construction projects may be managed by a spectrum of participants in a variety of combinations, the organization for the management of such projects may vary from case to case. On one extreme, each project may be staffed by existing personnel in the functional divisions of the organization on an ad-hoc basis as shown in Figure 2-4 until the project is completed. This arrangement is referred to as the matrix organization as each project manager must negotiate all resources for the project from the existing organizational framework. On the other hand, the organization may consist of a small central functional staff for the exclusive purpose of supporting various projects, each of which has its functional divisions as shown in Figure 2-5. This decentralized set-up is referred to as the project oriented organization as each project manager has autonomy in managing the project. There are many variations of management style between these two extremes, depending on the objectives of the organization and the nature of the construction project. For example, a large chemical company with in-house staff for planning, design and construction of facilities for new product lines will naturally adopt the matrix organization. On the other hand, a construction company whose existence depends entirely on the management of certain types of construction projects may find the project-oriented organization particularly attractive. While organizations may differ, the same basic principles of management structure are applicable to most situations.

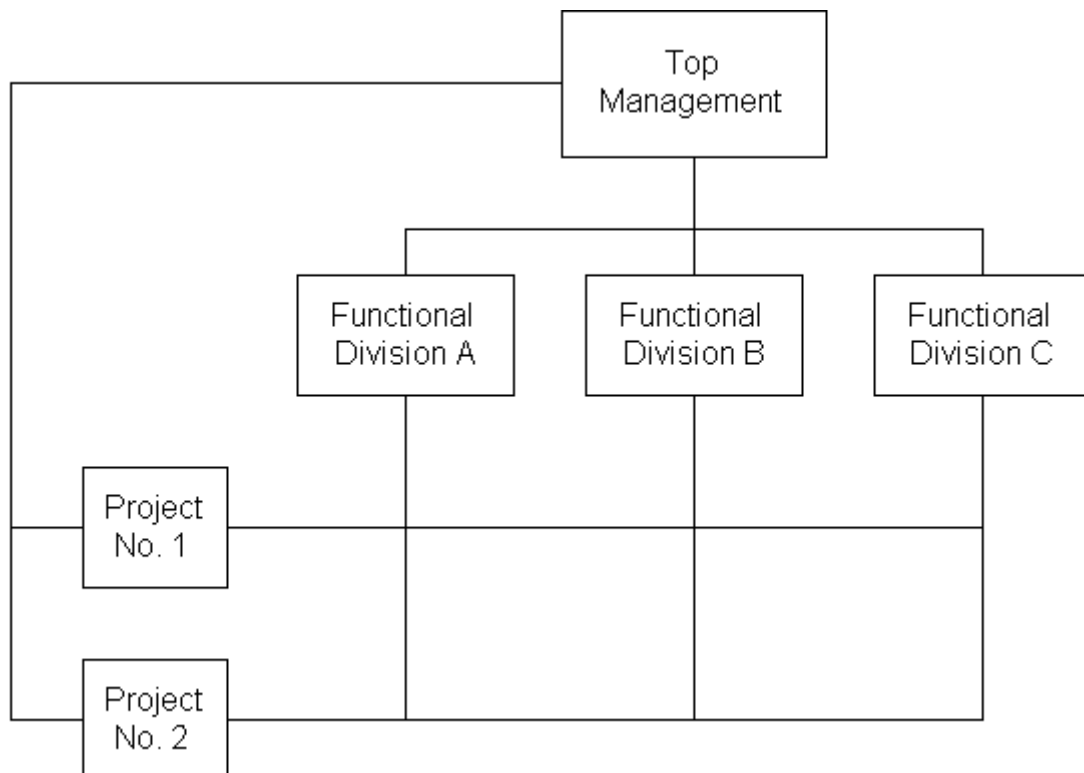
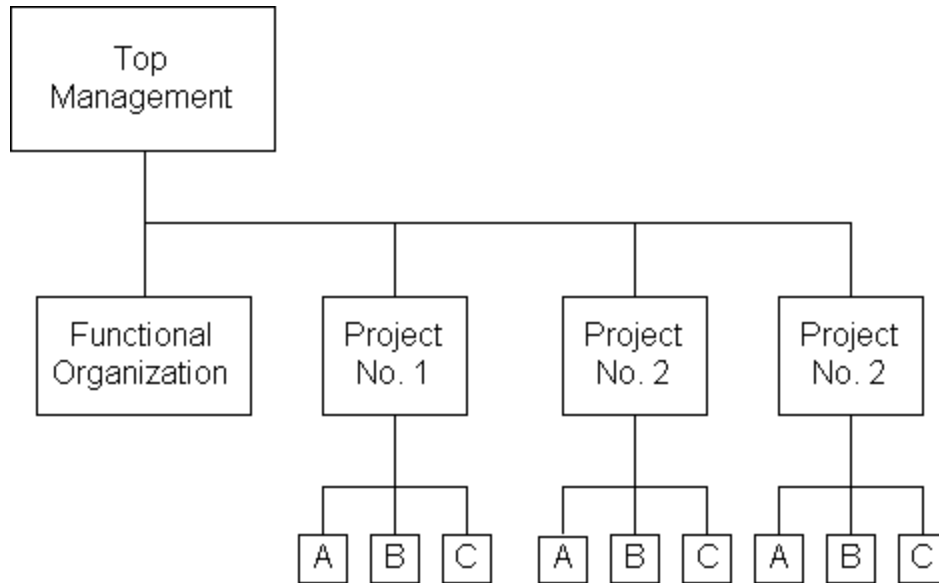


Figure 2-4: A Matrix Organization



4.1.4 Controlling

Controlling checks whether the above-mentioned plans are being recognized, in the event of deviations or shortfalls, managers can involve is corrective action. ‘Principles of Management (Anon., 2008)

Controlling Process

Controlling has the main process which is the establishment of standards. It defines the plans or the targets which have to be achieved. According to there are two main standards in controlling process;

Measurable or Tangible – Cost, output, expenditure, time, and profit Non measurable or Intangible - Performance of a Manager, deviation of workers, and planned targets

Impact of Project Control

Project Control has a direct correlation to project progress and stake-holder's expectations. Projects rarely fail because of just one issue. Rather, failure is usually a collection of minor issues that individually have negative impact in a specific project area; however, when looked at over the entirety of a project, these minor items can cause significant impacts to cost, schedule, risk, and can manifest themselves as deviations from the original Project Plan. Controlling process and functions

Controlling is essentially tracking and managing the core project management elements of scope, quality, time and cost. The Project Management Body of Knowledge (*PMBOK® Guide*) identifies the core controlling processes as:

- Integration change control
- Scope change control and scope verification
- Risk monitoring and control
- Quality control • Cost control and
- Project progression and performance reporting.

Project Control Techniques The following techniques can be implemented and used to manage and control a project's design and construction from initiation to successful completion.

- Small work chunks or small tasks— It is always advisable to break a big project into smaller chunks of tasks to verify the progress. From a control perspective, if your work packages are scheduled to complete within one reporting periods, it is much easier to detect a delayed or troubled task. With earlier notice, you are more likely to resolve the variance and protect the project's critical success factors.

- Baselines— A fundamental control principle is to first, establish a baseline. This is generally applied to the critical success factors of schedule and budget, but can be applied equally as well to product-oriented aspects of the project, especially requirements. Then, measure and report performance against the baseline and maintain it.

- Status meetings— Consistent and regular status meetings help to keep everyone honest, accountable, and on their toes—especially if work assignments are small and have clear completion criteria. In addition, status meetings are powerful tools for improving project communications and managing expectations.

- **Completion criteria**— This starts during project definition with defining the acceptance criteria for the project, and it continues for each deliverable and work assignment. Understanding the completion criteria up front increases productivity and avoids many of the issues associated with status reporting on work tasks.
- **Reviews**— Reviews are a key technique for ensuring quality and managing expectations on project deliverables, and they can take many forms. The principle here is to plan for the review-feedback-correction cycle on most, if not all, of your key deliverables. Common examples of reviews are process reviews, design reviews, audits, walkthroughs and testing.
- **Milestones and checkpoints**— A key feature of most proven project methodologies is the use of pre-defined milestones and checkpoints. These markers are important points to stop, report progress, review key issues, confirm that everyone is still on-board, and verify that the project should proceed with its mission. Besides being a powerful expectations management tool, these pre-defined points allow project sponsors and senior management to evaluate their project investments along the way, and if warranted, redirect valuable resources from a troubled project to more promising pursuits.
- **Track requirements**— A technique to help control both scope and expectations is the use of a requirements traceability matrix. The traceability matrix provides a documented link between the original set of approved requirements, any interim deliverable, and the final work product. This technique helps maintain the visibility of each original requirement and provides a natural barrier for introducing any new feature along the way.
- **Formal sign-offs**— Formal sign-offs are a key aspect of change control management. The formal record of review and acceptance of a given deliverable helps to keep expectations aligned and minimize potential disputes. Most importantly, the use of a formal signoff acts as an extra incentive to make sure the appropriate stakeholders are actively engaged in the work of the project and thereby satisfied.
- **Independent QA Audit**— The use of an independent & dedicated quality assurance audit is another specific example of the review technique mentioned earlier, and is often a component of project quality assurance plans.
- **V method**— The "V method" is a term used for a common validation and verification approach that ensures that there is validation and verification step for every deliverable and interim deliverable created. The left side of "V" notes each targeted deliverable and the right side of the "V" lists the verification method to be used for each deliverable directly across.

With all these techniques and more if necessary, it is very important to put the correct amount of emphasis on project control, it can be the difference between success and failure of any project.

4.1.5 Co-ordination

Coordination is the unification of efforts between the company personnel to ensure that all functions are working harmoniously towards the organization's aims and common objectives.

Having a regular meetings is very important to have proper coordination.

Importance of Co-ordination

- Encourages team spirit
- Gives proper direction
- Improves relationships in the organization
- Directs personnel contact and continuous operation

Coordination is an important function in the building process. Recent research has shown that poor or inadequate coordination is the best that is achieved on construction sites. Nevertheless, many authors of textbooks on construction project management have not discussed this vital topic. A literature review carried out in this present study revealed that there is a lack of formal understanding on how day- to-day coordination is actually achieved on a construction project. This research was directed at identifying what activities are performed to achieve coordination and, which among those are the most important and more time-consuming for a construction coordinator. In the absence of previous research, texts on the duties and responsibilities of project managers, clerks of works, construction engineers, etc., were reviewed from the contractor's project manager's perspective during the building phase of a construction project, and an array of issues relevant to achieving coordination were identified. Initially, the array included 64 coordination issues; a questionnaire was developed for construction project managers to indicate the relative importance and time consumed on a 3 point scale (i.e., high, mid or low). Thirty-three responses received from practitioners in the Hong Kong and Singapore construction industries

indicate that identifying strategic activities and potential delays and ensuring the timeliness of all work are the most important activities. Conducting regular meetings and project reviews and analyzing the project performance, detecting variances and dealing with their effects (16th and 17th, respectively in order of importance) appear to be the most time-consuming activities.

As a comparison to study that had been carried out by Neeraj Jha and Misra [19], this factor scored as the second ranking in the planning group of Indian construction projects. On the other hand, the factor was the fifth order in coordination activities in the Hong Kong and Singapore construction industries, which had been identified by Saram and Ahmed [46]. Quality assurance plan (Prepare for the project in line with contract specification) was ranked as the second important factors ($M = 4.81$).

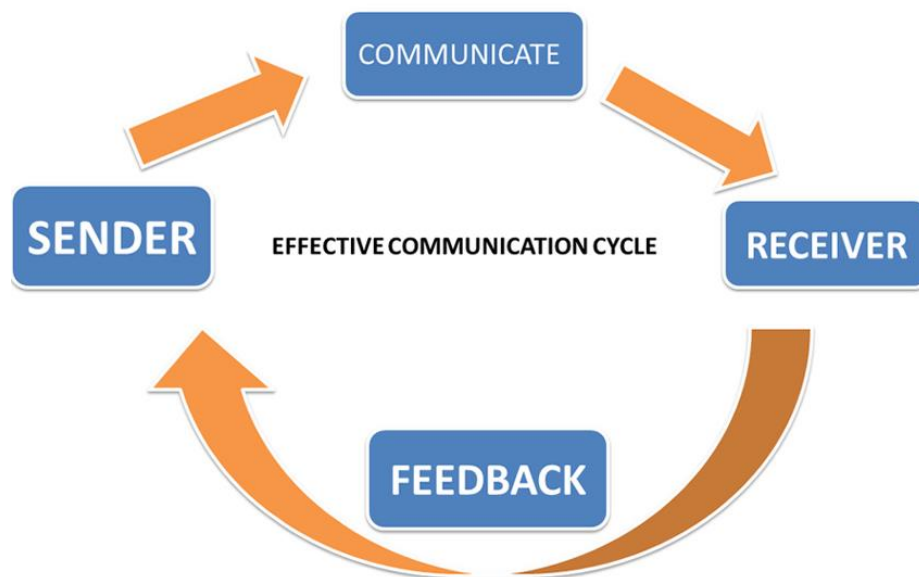
In contrast with Neeraj Jha and Misra's [19] results, this factor is not presented in the top 20 factors. In Saram and Ahmed's [46] study it was in the 12 order. The fourth order was occupied by Plans (use or write briefing of project execution approaches, such plans cover those delivered by the owner/contractor/consultant) with $M = 4.96$.

The fourth order was occupied by Plans (use or write briefing of project execution approaches, such plans cover those delivered by the owner/contractor/consultant) with $M = 4.96$. However, planning had the same rank in Neeraj Jha and Misra's [19] study and the eighth ranking in Saram and Ahmed's [46] study. The fifth ranked order was also occupied by Meetings (to exchange ideas, deal with conflicts and facilitate work, such as regular/irregular meetings) with $M = 4.64$.

4.2 Communication

This task is involved in all stages of the construction project. It is one of the important functions of a manager. It is an activity in order to get connect with others and do things through others.

4.2.1 Stages of Communication



Communication is one of the main predictors of success in projects. Ensure good communication to avoid delays, rework, and costly misunderstandings.

Communication within the confines of a construction project can prove to be decisive on whether the project is successful or not. Construction consists of many different elements. These include different roles, tasks and collaborations throughout the course of the project. To make sure that this all comes together smoothly, clear and effective communication is key.

Poor communication can cause a snowball effect. A simple misunderstanding could cause many more as the project progresses. Ultimately, this will lead to mistakes and rework, which can waste many valuable resources. This is why clear, well defined communication paths and workflows are so important.

Let's take a look into how you can maximise and enhance the communication strategy throughout the construction process.

The Importance of Communication in Construction

Construction projects follow a chain of communication from one person to the next, from one party to another party. For example, between the architect providing drawings to the contractor and the type of approval that is required in selecting and applying the final coat of paint to a building, there is a very long chain of processes and tasks that need to be clear and precise in order to make these types of decisions quick and accurate. Different people in various roles carry out these types of processes, hence the importance of good communication.

If there are any miscommunications or incorrect briefings in the chains of communication between the contractor to subcontractors, architect to the builders, etc. then projects, tasks and activities stand the chance of being completed incorrectly.

If this occurs, it would require some expensive rework to fix things. This will involve replanning and rebuilding – something that consumes more time and money. As a result, the entire construction project will be thrown off track, with resources being unnecessarily used to mitigate and correct the mistakes that have been made. With profit margins being tight within the construction industry, the cost of rework can quickly whittle these away.

To avoid going over budget and over schedule, it's crucial to put clear communication and collaboration systems in place right from the outset of a project. Teams need to be able to communicate seamlessly from the very first planning stages right through to the end. This will not only enhance the construction management process, but it will keep the entire project on track and importantly, indirectly, improve productivity and mitigate possible delay claims.

Why You Need Clear Communication in Construction Projects

Maintaining a strong chain of communication in construction will enhance each stage of the construction lifecycle. Below are some of the core reasons why you should focus on a solid communication strategy.

Strengthness of Relationships

Communication helps to strengthen and build relationships in construction projects. Good relationships are key for any successful business operation. This helps to build stronger trust and transparency between all the stakeholders involved.

Better Team Management

Team management becomes much stronger with good communication. A good project manager should be able to clearly communicate the desired daily and weekly activities to the team. This helps to form a clear roadmap for reaching the desired goal.

Strong communication skills from the site team to management will mean that there is a better understanding of the state of the project and the direction it needs to take. It will allow management to implement proactive and protective measures in-lieu of corrective measures if anything should happen on site. This is crucial as it leads to more accurate and efficient projects.

The better the communication is, the more confident the team becomes. Having a more open and transparent system in place allows the team to understand exactly what they need to do.

When challenges arise, open communication allows for the sharing of solutions. This means that teams can solve problems quicker. Ultimately, this leads to a team that is better equipped for the job and happier to take on the workload.

Improved Collaboration & Feedback

With good communication channels, you also enhance collaboration and creative innovation. Team members can share ideas and experiences for others to learn from. This helps to inspire stronger ideas and better collaboration on finding the best solutions for projects.

Communication leads to feedback. Feedback loops allow you to track performance and understand where there is success and where there are issues and concerns. Being able to communicate the strengths and downfalls of a project is one of the best ways to learn. By doing so, you can improve your strategies and tactics for future projects. Ultimately, transparency and strong communication results in a better outcome. Results are best achieved through good communication systems. They keep everyone involved on the same page, updated, and aware of deadlines and goals.

Communication Starts in the Planning Phase

When putting your communication system in place, it's important to implement it right from the start of a project. The construction planning and estimation phase is where it all begins, and it forms the basis for the rest of the project. The ability to be transparent during the estimation phase, sharing how unit rates have been produced and getting feedback of these rates from the project team allows for more accurate estimation for future and upcoming projects. Having strong systems in place, like using the right technology, will help to open up communication and transparency. This can add infinite value to the project ahead.

4.2.2 Importance of Communication

- Helps is a smooth and efficient working of an organization
- Facilitates co-ordination
- Increases managerial efficiency

V. TEAM WORK

5.1 Teamwork

Teamwork is a process of a group of people working together in order to achieve a goal. (Anon, 2014)
Teamwork is an essential part of an industry which is helping personalities work together at their best in any condition. It also helps to avoid conflicts inside the industry and conflicts between individuals.
This definition admits that teamwork brings together different ideas from different people, with different skill sets for the success of a set target or goal. (Anon, 2014)

5.1.1 Advantages of Teamwork

Better efficiency, the ability to focus different ideas on the same problem, and mutual support are some of the advantages of teamwork.

Many organizations trust teams. There are several advantages to teamwork. Some of these include:

- **Better Outcomes:** A team can bring more benefits to stand against a challenge and there is more important to reduce the risk of poor individual contributions, as a result, it can lead to better business outcomes because.
- **Efficiency:** A team can able to complete more work than individuals do alone. This helps the company save money.
- **Better Ideas:** A good team is admitted with different members. These members can use their ideas and skills to the same problem, which can give an effective solution to the problem.

Good construction businesses are built through teamwork. These teams understand the importance of sharing information as a team and building trust. When individual workers make the commitment to be team players and feel that they are part of a team, everyone wins. Not only will productivity and quality improve the project, but the overall safety will increase, as well. Here are a few of the other ways teamwork changes the scope of a construction project.

Teamwork puts the safety of the team first. Through years of experience, our team understands that our team must know we care about their safety. Developing a safety culture driven by strong leadership, planning, communication, and hazard elimination is all a part of building a team.

Wollam Construction believes that all injuries and occupational illnesses, as well as safety and environmental incidents, are preventable, and is committed to a goal of zero for all of them. Through our teamwork, we can implement our message of safety to all levels of our organization and its craft workforce. We're committed to providing a safe, injury-free work site.

Along with safety, teamwork also enables us to have clear and open lines of communication. Good communication means that everyone can voice their opinion. If every member of your team feels empowered to voice their opinion, that means a better, more trustworthy workforce. Building trust ensures that workers are comfortable sharing their suggestions and concerns. This open communication will also translate into more successful projects, as well.

Since construction jobs involve a myriad of tasks and trades, teamwork also clearly identifies who does what and how the project goes. As construction projects began and collaboration used, workers will clearly understand the importance of their tasks. From the bottom to the top, everyone will encourage each other and praise the work of their co-workers as projects continue. This builds trust and ensures that the entire project flows together as one. If teamwork is not included, many workers would feel confused, under-valued, and unappreciated in the workplace. Not only will the negatively contribute to the employee's day-to-day lifestyle but the entire longevity of the projects they work on.

Complicated construction projects are simplified when teams work together. As the team at Wollam Construction begins each project, we clearly outline each task, day, milestone, and purpose of the project. By doing this, we explain to each manager the details of their work and how vital it is to the project. These upper-level employees can then relay to their workers what is expected of them. Not only can these clear lines of communication boost the efficiency of the team as a unit but also increases our chances of success as no section of the team changes-up the process as we move forward. If we expect our employees to stick together as a team, we must communicate the importance of the process and the role they play in it.

As people work together on construction sites and in any workplace environment, conflict is unavoidable. It often stems from different points of view, misunderstandings, and interpersonal problems. With the high-stress environment of a heavy civil construction job site, managers and supervisors need to set an example as team players. Such skills as active listening, communication, negotiation, problem-solving, and decision-making can

genuinely make all the difference. When our leaders effectively resolve potential conflict, it fosters team growth. As a result, everyone is positively impacted. Together, as a team, you can work through problems and come out the other side, all the better for it.

At Wollam Construction, we work together as a team to accomplish all of the work on our plate. We have found that this helps in the success of our projects and improves the lives of each of our employees. To learn more about our team's success and how our efforts can change the scope of your project.

Teamwork puts the safety of the team first. Through years of experience, our team understands that our team must know we care about their safety. Developing a safety culture driven by strong leadership, planning, communication, and hazard elimination is all a part of building a team.

Wollam Construction believes that all injuries and occupational illnesses, as well as safety and environmental incidents, are preventable, and is committed to a goal of zero for all of them. Through our teamwork, we can implement our message of safety to all levels of our organization and its craft workforce.

5.2 Leadership

A Leader is someone who leads others. He/ She is a person who has a vision, and skills to make it happen. (Reh, 2014). It is critical to teamwork. The team leader is the person responsible for ensuring the members' work efficiency and working together to achieve their goal or objective the leader should be the role model for the team and he/ she should have the ability to solve problems. (Effective Teamwork, 2004)

A leader...

- Create a supportive climate of honesty, trust, and mutual respect and it helps to encourage loyalty and cooperation and provides a 'blame-free' culture
- Assist the team to forge a clearly articulated vision with clear objectives and goals
- Identify individual members' own goals which are compatible with team goals and objectives
- Develop a work plan which is allocated clearly defined tasks that are meaningful and challenging for each member
- Increase commitment from team members to complete the task on time, and inspire them "to go the extra mile"
- Ensure that all members feel their input is visible to the team as a whole
- Ensure for regular, clear and accurate feedback to the team on its performance over time
- Be willing to share credit with the entire team for the team's successes

The importance of leadership in construction makes it one of the most important industries to have a leader. A leader can be anyone who is in charge and making decisions that the workers will follow.

Leadership is important in all fields of human endeavor. Features of the construction process and construction projects render leadership even more essential. Construction projects are expensive and technically demanding and the project teams are large and diverse. The process is long and involves a large number of discrete and interrelated tasks.

Because constructed products influence long-term socio-economic development in developing countries, poor performance on projects can have severe implications for the nation and its citizens. Thus, the need for effective leadership in construction is even more important. It may be argued that 'effective leadership is one of the primary answers to the problems of the construction industry. To this end, greater attention should be given to leadership skills. In construction, leadership is even more essential. Many studies indicated that the success or failure of project management is highly dependent on the project leader.

It is found that effective leadership of many stakeholders in a construction project can aid in harmonizing their goals and preventing conflict.

Despite this recognition that leadership is important at all levels of the construction industry, emphasis is placed on the technical aspects, as well as management and leadership receive inadequate attention.

In developing countries, the importance of effective management for stakeholders in construction projects is most evident in international projects, which are commonly large and complex projects. On such projects, the teams are invariably multi-cultural, which underscores the need for leadership skills. Because the constructed product is critical to long-term national socio-economic development in developing countries, poor performance on construction projects has even more adverse implications.

The clients, end purchasers, and other stakeholders of construction in developing countries are unaware of aspects of construction. This finding implies a need for professionalism among the construction project participants and a dedication to meet the objectives and aspirations of the stakeholders in the most innovative, imaginative, and value-adding manner for the benefit of the client and all concerned. Thus, leadership should be a key feature in construction, as exemplified by its projects.

There are many levels where the construction industry clearly needs leadership. First, at the industry level, there is a need for strategic leadership and championing continuous industry

5.3 Leadership Styles

There can be as many ways to lead people as a leader. Many businesspeople and psychologists have developed useful frameworks that define the main ways to lead people.

- Autocratic leaders
- Democratic leaders
- Laissez-faire

Democratic Leaders Facilitate Success

The top leadership tier of your construction firm—the executive level—relies on democratic leaders for success. Those using this leadership style take other people's thoughts and opinions into account before making big decisions. Democratic leaders gather information from trusted sources before reaching any final conclusions, especially when their choices could impact the entire organization. Democracy is crucial at the executive level because leaders at the very top are focused on bigger picture issues. They depend on those in the middle to communicate concerns that could negatively affect those on the ground. Democratic leaders look to the next level of leaders and foremen who work directly on the frontlines to provide the information they need to make the best possible choices for the company as a whole. For example, an executive leader may decide to shift the firm's focus from residential to primarily commercial contracts. But if that leader doesn't consult the next level of leadership (such as heads of operations, finance and human resources) before making that commitment, they won't know if it's the correct choice to make.

Instead, a democratic leader consults the leaders below them to determine the viability of each important decision under consideration. In the example above, for instance, HR leaders could advise their executive colleagues regarding staffing and training for commercial versus residential contracts.

While leaders at the very top are expected to be assertive and ambitious, it's critical that they are also democratic and cautious. As your firm develops the next generation of top leaders and conducts your next executive search, add democratic leadership to your list of priorities. Incorporate elements of democratic leadership into your company's succession planning and training for future leaders at the executive level.

Executives must always be prepared to make tough decisions. But before those decisions can be made, they need to know how to gather the information necessary to make the right choice for your firm.

Servant Leaders Remove Obstacles

Servant leaders are vital to your company's success. This is not the exception: it is the expectation in today's world. The construction industry as a whole has moved forward, and servant leadership plays a crucial role at the C-suite level to drive productivity & profitability. Servant leaders "serve" the needs of the business by providing for the people who do the work. This is most important at the departmental and team leadership levels. Department leaders — such as chief operating, financial and human resource officers — and team leads must be able to listen and value the opinions of those who report to them. Only then can they truly serve their team members' needs and support them in their daily tasks and projects. CHROs, for example, are valuable members of a servant leadership team. Their role is to identify what the business needs in terms of talent. Much of that comes from listening to foremen, identifying skill gaps or learning opportunities, and then providing those experiences to set employees up for success.

Servant leadership is less about wielding power and more about empowering the potential of others. By doing so, servant leaders put the needs of their people before their own. Prioritizing the people at the lowest levels of your construction firm can exponentially increase company productivity and workforce engagement. In a field where power dynamics tend to be strong and aggressive, employees on the frontlines appreciate leaders who meet their needs so they can do better work.

Coaching Leaders Develop the Workforce

Upskilling and development are imperative for the construction industry, especially given the skills shortage facing the sector today. Coaching leaders take the lead on developing in-house training for their firms. Coaching leaders are natural teachers who are good at communicating what they know and helping others learn how they learn best. This is crucial to designing employee training that sticks. Offering training in-house can expand your construction firm's talent pool. Addressing any skill gaps with internal training and development frees your company to hire talent with potential, even if they don't yet have the necessary experiences and certifications. This can go a long way towards solving one of the most significant drags on the construction industry's employment rate.

Coaching leaders can also improve safety training to minimize accidents and injuries on site. Effective training can minimize accidents and injuries. The better trained your workforce is, the more cautious and self-aware they're likely to be, mitigating the occurrence of dangerous incidents. Because coaching leaders are naturally attuned to noticing other people's strengths, weaknesses, and opportunities for growth, they can develop

training and development programs that cut across individual learning styles. Continually improving your training and development programs is imperative for expanding employee abilities and growing your market share.

Pacesetting Leaders Set an Example

Jobs onsite often have to be fast-paced to meet deadlines. Although a rapid pace of work is unsustainable for the long term, pacesetting leaders can successfully lead their teams through short sprints. These sprints are crucial for accomplishing specific projects on time and on budget. Pacesetting leadership at the right points in the company exerts a positive influence at the project level.

Pacesetting leaders such as foremen lead their teams efficiently in sprints of activity. Foremen who are pacesetting leaders are capable of keeping projects on track. They're good at organizing their resources—including time—to make the most efficient use of what they have.

Pacesetting leaders are quick to recognize the value of each team member's contributions. They can identify the best workers for a specific project, trimming any wasted time or resources. Because they're laser-focused on getting the job done, pacesetting leaders can make the right decisions to keep projects moving ahead, even if those aren't easy or popular choices to make.

Autocratic Leaders Take Charge

Onsite jobs can be extremely hazardous. That's why your company needs leaders who can take charge when things go wrong. An autocratic leader makes difficult decisions with knowledge and authority, typically without explaining why. In the construction industry, there often isn't time on the job site for lengthy explanations. The job site is fast-paced and dangerous, and often not the right place for learning. To protect employee safety, autocratic leaders need to take action with authority.

But autocratic leaders can't simply bark orders. There must be authentic substance behind their autocracy. To command the authority needed on the job site, autocratic leaders need to be hard workers themselves. Their employees need to see this type of leader willing to work alongside them. Without that willingness, workers will question their leadership, potentially resulting in an accident.

Because of the specific cocktail of characteristics needed to foster effective autocratic leadership, the best autocratic leaders are raised in-house. They need to be people that your workers know because they've worked alongside each other and proven themselves in practice. Identify candidates for leadership among workers with the highest work ethic. Autocratic leaders must command respect, so ideal candidates will already have a positive influence on their colleagues.

Autocratic leaders are necessary on the jobsite. But keep in mind this style of leadership is most effective when workers trust that the leader calling the shots is making the right decisions to protect everyone's safety and interests.

The Right Leadership Styles in the Construction Industry Carry Your Firm Forward

The right leadership is essential for taking your firm to the next level. The challenge is that no one type fits all leadership styles. You need to identify the leadership styles that work the best at each level of your company culture. Without nuance, you risk putting good leaders at the wrong points in the company where their talents and leadership styles can fall flat.

As you develop your plan to tackle the challenges facing the construction industry, give extra thought to the leadership styles that can have the greatest impact at each level of the company. Taking a thoughtful approach to leadership development now can spell success for your construction firm's future

VI. MARKETING

6.1 MARKETING

"Marketing is the social process by which individuals and groups obtain what they need and want through creating and exchanging products and value with others." Philip Kotler. "Marketing is the management process that identifies, anticipates, and satisfies customer requirements profitably."

The construction industry in most countries worldwide is characterized by extreme competitiveness, high risk, and usually low profit margin in comparison with many other industries. The major reason for this intensive competitiveness is the relative ease of entry into the construction industry compared to other industries, even for people or companies with little capital investment. Furthermore, to find a new project, construction firms have to participate in a competitive bidding process, as it is not generally possible for them to induce demand for their services. These conditions lead to a significantly higher rate of business failure in the construction industry than that in many other businesses in the recent decades.

In such severe circumstances, construction firms look for ways to win the projects and be involved in areas of construction that may generate more profits. In this context, marketing can create a sustainable competitive advantage for construction companies and help them differentiate themselves from their competitors.

There are many definitions of marketing. The American Marketing Association defines marketing as “the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large”.

According to Arditi and Davis, marketing in construction comprises activities such as seeking new clients, new types of construction, and new markets, satisfying clients and keeping them loyal, market research and analysis, offering additional services, project cost estimation and pricing, submitting a modified proposal, negotiating and contracting, and promotional activities including advertising, publicity, brochures, and corporate identity programs.

Marketing management plays a crucial role in the success of a business and directly influences profitability and customer satisfaction. Similarly, construction companies can achieve several benefits from effective marketing, including an increase in profits, sales, and client satisfaction, developing a brand identity, creating and entering into new markets, and improving customer loyalty, reputation, and overall quality. However, marketing has been either misunderstood or completely neglected in many construction companies.

One of the main reasons behind this situation is the difficulty and problems associated with applying conventional marketing theory and techniques, in the construction industry owing to the special characteristics and the marketing nature of the industry. Besides, the number of studies conducted in the field of construction marketing is significantly lower than those in other fields of construction management. The majority of these few studies, especially in the past decade, have endeavored to recommend and investigate the practical applications of traditional marketing theories, with only minor modifications for the construction industry. The works by Arditi et al, Polat and Donmez, and Dikmen et al. about marketing practices and orientation of American and Turkish contractors and research works by Polat and Polat and Donmez on marketing resource allocation are examples of such studies. However, like many other management fields of construction in which there is inadequate theory-building/modification according to the nature of the industry, the marketing field suffers from this problem too. Despite the acknowledged importance, there is no literature specific to the theory and characteristics of marketing in the construction industry, and there are only implicit suggestions in a few studies, notably the researches by Smyth and Winter and Preece .

Smyth proposes that, in order to develop a marketing theory for construction, one can employ a combination of existing marketing theories and contributions from other industries that are similar in one or more characteristics to the construction industry. In agreement with this idea, Winter and Preece suggest a combination of service and industrial marketing theories and strategies for construction.

These suggestions, on the one hand, are not derived on the basis of a systematic marketing approach; therefore, there is no consensus on them. On the other hand, they are not so comprehensive that they result in a framework for developing a marketing theory for the construction industry. Consequently, comprehensive and methodical research is required in this context.

The aim of this study is to develop a foundation for construction marketing, and two main issues in this regard were addressed: (1) investigation of the marketing nature of the construction industry through a systematic approach based on the principles of marketing science and (2) development of a reference framework for construction marketing.

This article is organized as follows: First, the appropriate method to investigate the nature of marketing is identified and the nature of construction marketing is examined according to this approach. Next, a conceptual framework for construction marketing is proposed and its elements and the current knowledge gaps in each part are investigated. Finally, managerial implications are discussed.

2. Nature of Marketing in the Construction Industry

The marketing attributes of the product are the characteristics that discriminate it from other products. An obvious relationship exists between the characteristics of a product and the appropriate marketing strategy adopted for that product. A consistent and comprehensive marketing strategy should be based on the attributes of a product. In this context, marketers classify products into categories according to some of their intrinsic characteristics, each of which calls for different marketing strategies. Therefore, the product classification system approach is used to identify the specifications and the nature of marketing in the construction industry and establish a roadmap for construction marketing.

2.1. Benefits of Product Classification

The classification system is the principal tool used by both academic and business researchers to arrange elements into groups in order to systematically study phenomena and develop theories. Product classification supports the sharing of best practices, common problems, and solutions by highlighting differences and

similarities between products of in a specific context. Furthermore, different industries with similar attributes can exploit the studies carried out in other similar industries .

Classification in the marketing field can assist the manager in acquiring much valuable knowledge from similar business sectors, including the needs and behavior of customers and clients, efficient methods to create and deliver value to the client, and strategies and techniques for customer acquisition, retention, and satisfaction .

2.2. Product Classifications in Marketing

Marketing practitioners and academics have long been aware of the advantages of developing special strategies for different product categories, and they have suggested various product classification schemes. Most of these suggestions are limited to specific types of products such as the studies by Copeland , Aspinwall, and Bucklin in the context of goods, Silvestro et al, Bowen, and Liu et al. in services, and Havalдар and Boyt and Harvey in industrial products. Others attempt to cover all products, for example, Winzar and Murphy and Enis . Each of these classifications evaluates products from a different point of view. Besides these categorizations, Kotler—known as “the father of modern marketing”—suggests a classification system based on the inherent characteristics of products to help develop strategies and a marketing mix as the main practical paradigm in marketing. According to the comprehensiveness and applicability of this classification from the marketing perspective, Kotler’s approach to classification has been chosen in this paper to examine the marketing nature of the construction market.

Kotler and Armstrong state that products can be classified on the basis of durability, tangibility, and users (Figure 1), each type possessing its own appropriate marketing mix and strategies. In terms of durability and tangibility, the products are categorized as nondurable goods, durable goods, and services. The first category includes products purchased frequently and consumed after one or few more uses. Durable goods are products like machinery that can be used repeatedly. The third class comprises services which are intangible, such as consulting. In terms of the user of the products, there will be two categories—industrial users and consumers.

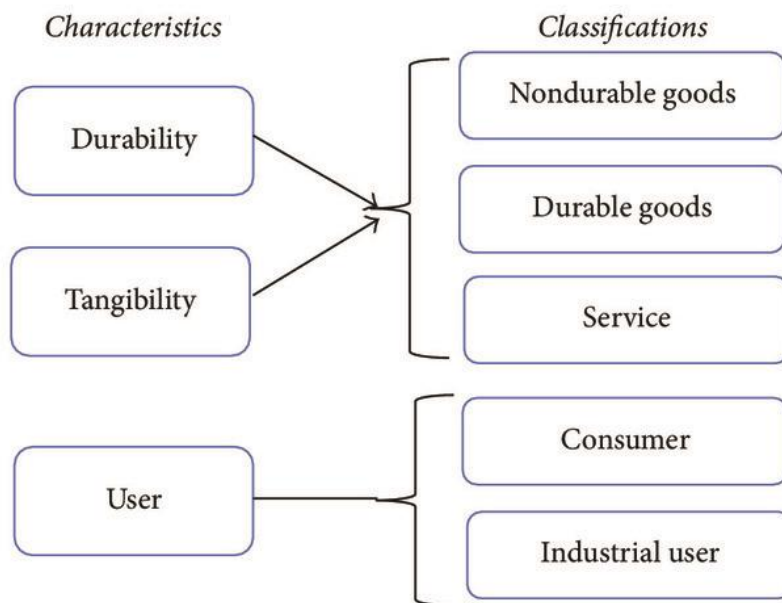


Figure 1_

Kotler’s product classification system. Based on [18].

The following sections examine in which of the above-mentioned categories the construction product falls.

6.1.1 MARKET

A market can be defined as a place where any type of trade takes place. Markets are dependent on two major participants (Anon,2014)

- Buyers
- Sellers It is also considered some more facts which are important to marketing for the above parties
- Each party has something that might be of value to the other party
- Each party is capable of communication and delivery
- Each party is free to reject the exchange offer

- Each party believes it is appropriate or desirable to deal with the other party

According to a recent analysis of the construction market published by AMA Research (2017), the UK has experienced good demand since 2013, with construction output increasing by 11% between 2014 and 2016. Not only is construction one of the largest sectors of the UK economy, construction also has a much wider significance to the economy, creating and maintaining the economic infrastructure, the homes, schools and hospitals which serve the society (Department for Business Innovation & Skills, 2013).

A modern, competitive and efficient construction industry is essential to the UK's economic prosperity. The extent of control over prices is determined by a number of factors which will be researched in further detail below. The main factor is the amount of competition in a market, which is, in turn, determined by the number of firms and type of construction project.

This research paper aims to discuss the market structure of the construction industry and assess the impact on competition, prices, and costs, while examining the competitive strategies available to large contractors in the UK.

Construction Market Structure Overview

Different industries have different market structures. The market structure reflects the state of competition in a market: how firms of different sizes are distributed and how firms are diversified into different submarkets in which the firms compete with each other.

Before a firm can compete in a market, it has to be able to enter it. Many markets have at least some impediments that make it more difficult for a firm to enter a market (Caves et al., 1977). An entry barrier has the effect of reducing or limiting competition.

There are currently few significant barriers to entry to the building industry for small firms, and such barriers will continue to be low while the industry maintains current practices based on a large number of small, specialised subcontractors.

Because there are only a limited number of contractors capable of managing large projects, the barriers to entry at this level tend to be significant and contractors are chosen based on track record, financial capacity and technical capability. This is due to the risks associated with running a complex project (De Valence, 2017)

6.1.2 MARKETED

Marketing people have involved in marketing 10 types of entities: (Anon, 2014)

- Goods
- Services
- Experiences
- Events
- Persons
- Places
- Properties
- Organization
- Information
- Idea

6.1.3 Types of markets

There are four main major markets include;

- Customer markets
- Ownership markets
- Supply markets
- Labour markets

VII. STAGES OF CONSTRUCTION

A building has three (03) stages including

- design team
- production team
- operation team

Each and every stage has different professionals. They are doing different duties in the construction industry

7.1 DESIGN TEAM

This team was also known as consultants. The consultants are professionals typically appointed by the client to perform expert tasks on a project include,

- Providing advice on setting up and defining the project.
- Developing and coordinating the design.
- Preparing production information and tender documentation.
- Administration of construction contracts.
- Inspecting the work of contractors (Anon, 2014)

The members of our consultant team are mostly:

- Architect
- Clerk of Work
- Structural Engineer
- Civil Engineer
- Service Engineer
- Quantity Surveyor (Cost Consultant)

The design team for construction projects consists of an architect and engineers. Often, the team itself may consist of an architectural firm and an engineering firm which themselves employ several architects or engineers. On smaller projects, you may simply have one architect or engineer who is tasked with your project. Each of these groups can have individuals that specialize in specific areas of design or engineering.

Architects

The architect or architectural team is responsible for the design stage of the project. The architect will take an idea the owner has and if that idea is feasible, create a design around it. Different types of architects may specialize in different types of projects. Some architects specialize in specific types of buildings, while others specialize in a subset of the project itself. For example, on a single project, you may have an architect who is designing the physical structure for the project and a second landscape architect that is responsible for designing the exterior portion of the project.

Architecture is both an art and a science. Modern professional architects seek to produce buildings that are both aesthetically pleasing and functional. Increasingly, architects are focusing on incorporating sustainability into their designs, and charting out new ways to add value to the client through design processes.

Engineers

Your design team will almost certainly consist of one or more engineers in addition to the architect(s). Broadly speaking, engineers are responsible for ensuring that the finished product of the construction project is safely and appropriately constructed. But this isn't all engineers do on construction projects. Engineers make sure that the project is as efficient as possible, reducing costs while maintaining necessary safety features. Engineers will also conduct an initial survey of the building site to assess feasibility for the project and get a sense of any special accommodations that may need to be made.

An important aspect of what civil engineers are responsible for is ensuring that all local and state legal requirements are met for your project. Early on, this means closely tracking changes to the design to ensure that plans and specifications include any necessary requirements. As the construction project progresses to the physical construction stage, the engineer will regularly review construction to verify that everything is being built according to requirements. Effective engineering firms also specialize in optimizing the building process by finding ways to build more efficiently, reducing both costs and time associated with the project.

The Design Process

Each design team will approach their own creative process differently. That being said, the design phase itself generally occurs very soon after the start of the project. During the first phase of a project, the owner approaches a construction project manager to explain their idea and determine the feasibility of the project. If the construction project manager determines that the project is feasible, they will bring a design team on board within a short period of time.

Bringing the design team onto the project early is both necessary and advantageous. It is necessary because the design must come before the construction phase can begin. You will also need a design before you are able to secure the necessary permitting and entitlements for the project. Getting an early start on the design process also allows the client's team to quickly gain a sense of whether the structural design is possible, what constraints there are, and whether any entitlements will be necessary.

As the client, you will also want to get the design teams in place and started on the project as soon as possible because the entire process can take a great deal of time. Every construction project is unique. Some projects may also require multiple revisions, each of which will take extra time.

The first draft and subsequent revisions represent a collaborative effort on behalf of both the architects and engineers. When the architect comes up with a design for the project, the engineer will explore a variety of things, including what materials will be required, what support systems will need to be in place, and possibly what design aspects will need to be adjusted. If any adjustments need to be made, the design will be sent back to the architect. Once that draft is done and has been approved by the client and architect, the engineer will need to go over it again to ensure that all safety, legal, and regulatory requirements are met.

Challenges During the Design Process

The biggest challenge facing the design process is the breakdown of communication between the various entities involved. It is difficult to understand how important communication is during this time period. Both the architectural and engineering teams require information from one another. Without the information they need, they cannot move forward with their portion of the project.

Often, communication difficulties stem from a basic misunderstanding about what the other party needs. One team member may not understand that the other requires certain information and may, in fact, feel like they are waiting for information themselves. This isn't just a risk between members of the design team, but also between the design team and the owner's team, and the design team and the contractor. Each party involved in a construction project can run into challenges getting the information they need when they need it.

The solution to this problem lies with the project manager. Project managers that are integrated into the process will work to ensure that team members have the information they need to finish their part of the task. By facilitating the flow of information, project managers can ensure costly delays resulting from stagnant communication don't occur.

A second factor that can affect the success of the design process is a project manager who isn't familiar with basic design principles. Whereas in the past the product of the design process was a paper schematic, today's design process revolves around Building Information Modeling (BIM). BIM is 3d modeling and design software that integrates the design, engineering, and project management roles through the creation of a shareable model depicting design, infrastructure, engineering, and operational information. If project managers aren't familiar with how BIM functions and how to coordinate the creation of BIM models, the entire design process can become less efficient.

The Role of Construction Project Management in the Design Process

One of the roles of the project manager during the design process is to facilitate the flow of information between other entities involved in the process. This includes the client, architects, and engineers. At a certain point, this may also include bringing a general contractor on board and incorporating them into design discussions. Like other parts of construction projects, in order to be effective, project management teams must be familiar with the design process as a whole. They must understand where problems might arise and work to mitigate those problems as efficiently as possible. The project manager is also responsible for ensuring that each team member has a clear understanding of the project budget and schedule. This will help ensure that the design will progress within the project budget and time constraints.

Project managers are typically engaged throughout the design process. The design phase occupies a significant portion of the preconstruction phase. Design considerations can impact the project timeline and budget and may require the project manager to revise the project's strategic plan.

Navigating the Selection Process

As the client, you'll want to work closely with your project manager during the selection process for your design team. The selection of your design team can have a large impact on the success of your project. Designers differ in the types of construction projects they specialize in and in their design philosophy. One designer may specialize in utilitarian industrial design, while another may specialize in creating commercial structures that are aesthetically pleasing and emphasize sustainability. If certain features of design like sustainability or accessibility are important to you, you'll want to work with a design team that incorporates those features into their design philosophy.

Your project manager will be able to steer you towards designers that have worked on projects that are similar to your own. This is usually a good place to start. From there you'll want to find the design team whose design philosophy aligns closely with the project outcome you desire. Even after construction

has been completed, your project manager and architect will perform a final walkthrough to ensure the physical construction matched the project requirements. In this way, working with the design team is a long-term commitment. As such, you'll want to be as discerning as possible during the selection process to find a design team that you will be able to work well with.

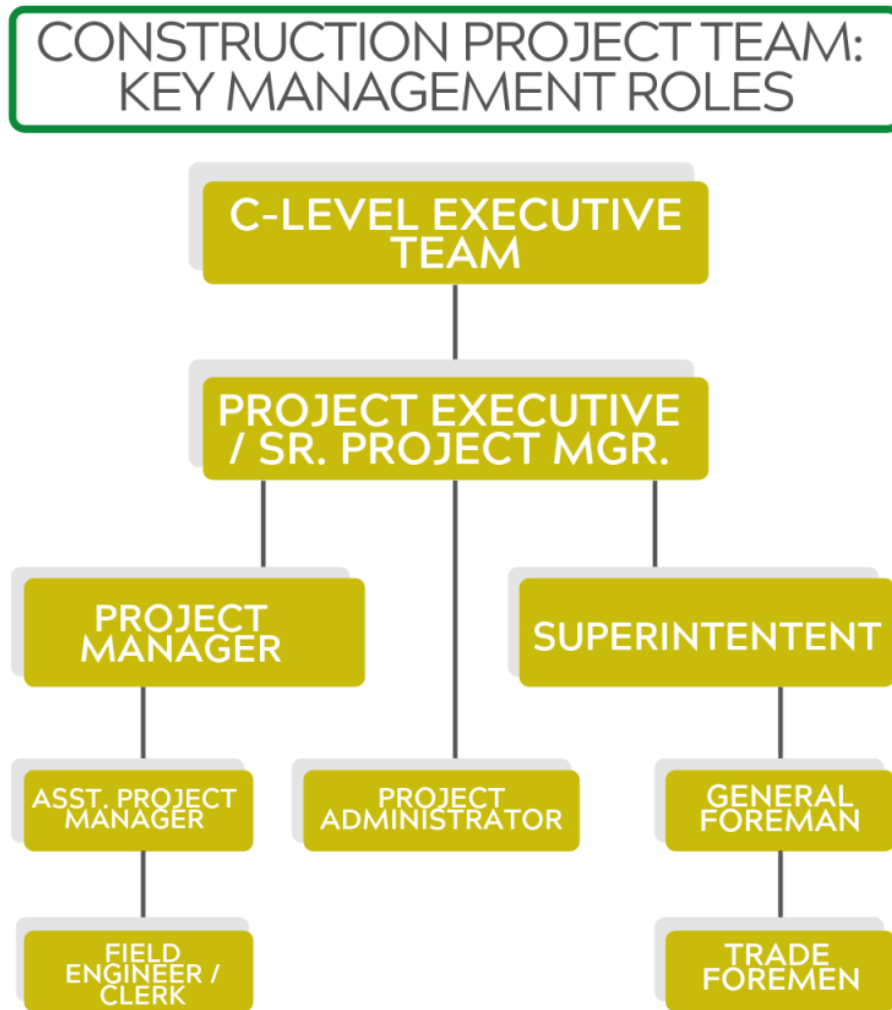
Closing Thoughts

The design team in the construction industry has an important role. Design team members are engaged with the project through its entire life cycle. Design teams can add value to projects in a variety of ways, from an emphasis on value engineering to implementing sustainable building practices.

7.2 Production Team (Contractor's Team)

A construction team is a group of people who are working on the design in real. Construction team members are:

- Contractor
- Project Manager
- Site Engineer
- Quantity Surveyor
- Safety Manager
- Supervisor
- Store Keeper
- MEP Engineers
- Labours
- Specialist Sub-contractors
- Specialist self-employees



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C-level positions are in charge of the big picture at a contracting company. They consider questions like:

- How much work does our company have this year (in dollars)? How about next year?
- How can we lower our operating costs to increase profit and be more competitive?
- What mistakes have we been making as a company that we need to fix?
- Should we hire more people? Move offices? Purchase equipment? Take on new types of projects?

The typical C-level executives you'll find at a construction company include:

- CEO – Chief Executive Officer
- CFO – Chief Financial Officer
- COO – Chief Operating Officer
- CMO – Chief Marketing Officer

These C-level managers are involved in construction projects during the most critical moments. This includes bidding on work, big-picture budgeting and executing favorable contract. C-level positions usually have a minimum of 20 years of experience, but of course there are always exceptions.

They also receive regular updates on a project's key metrics:

- Budget & Profitability
- Schedule
- Quality / Deliverables

However, managers in these positions rarely spend more than a day or two in any given month on a particular project. They're overseeing all projects that a contracting company has – ongoing, upcoming and potential projects. These metrics are often reviewed on a monthly or quarterly review basis.

2. Project Executive / Senior Project Manager Responsibilities

The Project Executive, also known as a Senior Project Manager, is usually the highest non C-level position on a project. This is a person who has worked as a Project Manager for many years, and thus has the experience to monitor all parts of a construction project – including the big picture.

A Project Executive's years of experience vary – it's more about how many projects they've overseen from start to finish. A Project Executive or Senior Project Manager has overseen *5-10 projects before they're seen as "senior"*. As such, Project Executives or Senior Project Managers typically have 15-20 years of experience working in the P.M. capacity before getting that "Senior" added in there.

Project Executives usually oversee 2-3 projects at any one time. They rely on the Project Managers to manage the day to day, and instead focusing on making sure the higher-level stuff comes together, including a healthy client relationship.

Here are a few things Project Executives are responsible for on a project:

- Establishing protocols, collaborations, meetings and methodology between all parties to help the project reach its' goals.
- Ensuring high-cost items are contracted or planned out to stay within the budget.
- Watching the schedule and making sure major milestones are hit.
- Compliance with specifications, testing, inspections and quality.

Project Executives typically spend only 1-2 days per week on any particular project, so they maintain a big-picture perspective. They work with Project Managers to make sure plans are being carried out accordingly.

3. Construction Project Manager

The Project Manager is in charge of making sure the day-to-day needs are carried out. This spans quite a few areas of the project.

Project Managers collaborate with senior management to plan the short- and medium-terms goals of the project. Other than those check-ins, Project Managers are co-captains of carrying out these plans.

Here are just a few of the areas a Project Manager oversees on a regular basis, mostly in the office:

- Meeting the schedule and organizing the resources needed to do so.
- Monitoring the project budget and billing the client for work completed.
- Developing working sets of drawings and designs.
- Monitoring the scope of work and any changes or additions to it. In turn, managing change orders.
- Working with the Client and Owner's Representatives to exchange information, get approvals and meet project requirements.
- Co-develop a job site safety plan and policy.
- Purchasing materials, equipment and hiring consultants.
- Oversee document control.

Construction Project Managers typically have 7-10 years of experience in the industry as an Assistant P.M. or similar. They've worked on every phase of a project at least once and have worked for a Project Manager to learn the trade.

Related Articles:

- [Can An Engineer Become A Project Manager? 5 Realities To Consider](#)
- [Is Construction Management Stressful? 7 Causes Of Stress](#)

- Common Issues Project Managers Face & How To Solve Them | TOP 10 LIST

4. Construction Superintendent

The Superintendent is like the dance partner of the Project Manager – it takes two to tango. This is because The Project Manager and Superintendent share the same role in a deliverable sense: *manage and oversee the day-to-day operation of a construction project, and ensure compliance with schedule, budget and quality requirements.*

While Project Managers carry out their role from an office, administrative and document-oriented positions, Superintendents perform their duties on the job site.

Superintendents help develop a schedule, oversee performance/execution, attend meetings and manage the flow of information – both to the field from the office, as well as from the office to the field, just like Project Managers.

Where the P.M.'s responsibilities end is where the Superintendent's role begins. Here are a few responsibilities specific to the construction Superintendent:

- Ensuring job site is safe and all work is being performed correctly.
- Monitoring job site quality requirements.
- Tracking daily activities against the project schedule.
- Documenting unknowns or unexpected delays.
- Making sure design details are built properly.
- Determining means, methods and constructability.
- Overseeing field workers and onsite subcontractors.
- Hiring and firing field crews as needed.

There are additional requirements and qualifications for being a site Super, such as the following:

- High-level OSHA training (40+ hours)
- Knowledge of Building Codes
- Certified To Oversee Hazardous Activity Such As Rigging & Hoisting

Superintendents need at least 7 to 10 years of experience, like a Project Manager. Many Superintendents have a lot more experience than this, though, because they're worked as a tradesperson and foreman already. In turn, they understand the details of construction and have seen many projects play out. This experience is vital for a Superintendent.

7.3 Maintenance Team (Installation Team)

- Mechanical Engineers
- Electrical Engineers
- Plumbing Engineer
- Trunk Drivers
- Crane Operators
- HVAC installers
- Heavy equipment operators

Main Cycle of work activities

The cycle of work activity is the process of work that is being done by the construction company. In the cycle, there are different stages with different people involved in these stages. The following are the stages:

- Preconstruction
- Construction
- Post construction

VIII. CHAPTER 8

The Influence of scale and Size of a Project Can Affect the Way a Construction Business is Organized and Managed

Every construction has a scale and size which is important to organize and manage a project.

This is influenced by a project because a construction project is depending on the amount of work that needs to be done. The scale and time of a project generally impact several factors;

- Project Time
- Project Cost
- Project Quality
- Project Resources

- Construction techniques

A general contractor is needed to manage and organize the project around these factors. He also should consider these impacts to move the project toward success and profit.

When a principal contractor is selected the client should consider whether the contractor has enough capability to achieve the project without failure. It is his responsibility to find out whether the size and scale of the project can be managed by the principal contractor because as it explained earlier if he doesn't have capable of managing and organizing the project it will lead to failure and loss.

Therefore a scale and size of a project directly influence project management and organization.

IX. Estimated Cost and Actual Cost

9.1 Estimated Cost and Actual Cost

Estimates costs are the expressions of opinion (cost) based upon past experiences. Though the standard costs are based upon the standard rate that is very carefully developed and set as scientifically as possible. However, both estimated costs and standard costs are related to a future period of time but there are some significant differences between them. (Anon, 2010)

9.2 Cost Planning

Cost planning ensures value for money and responsible management of public monies of a capital project's finances, including the requirements set out in the code of practice for the building and construction industry. There are very many different names given to cost planning documents. Cost plans are generally prepared by quantity surveyors.

Considerations of Cost plan preparation

- Go forward through the life of the project
- Developing in detail and accuracy as more information becomes available about the nature of the design
- Then actual prices are provided by specialist contractors, contractors, and suppliers. They range from very early initial cost appraisals through to tender pricing documents and the final account. As a result, there are a great number of names that can be used for keycost-planning information. It has standardized these as follows:
 - Initial cost appraisals (studies of options prepared during the feasibility study stage).

9.3 Cost Control

The cost controls start with the businesses identifying what their costs are and evaluating whether those costs are reasonable and affordable. Then it can look for ways to cut costs through methods. To have a profit for companies they must not only earn revenues. It also must controls costs. If costs are too high, profit margins will be too low. It is making it difficult for a company to succeed against its competitors. In the case of a public company, if costs are too high, the company may find that its share price is depressed and that it is difficult to attract investors.

Main Advantages of Cost Control

- Lower Expenses
- Less Abuse
- Better Records
- Atmosphere of Thrift

9.4 Cash Flow

An income or expense changes a cash account over a given period. Cash inflows usually arise from one of three activities

- Financing
- Operations
- Investing

Although this is also occurs as a result of donations or gifts in the case of personal finance. Cash outflows result from expenses or investments. This holds true for both business and personal finance. (Anon, 2013) In construction as in personal finance cash flows are essential to creditworthiness. They can be offered as a record of something that has happened in the past or forecasted into the future or a person expects to take in and to spend. Cash flow is critical to an entity's survival.

Having plenty cash on hand will ensure that creditors, employees and others can be paid on time. If a business or person does not have enough cash to support its operations, it is said to be insolvent, and a likely candidate for bankruptcy should the insolvency continue. (Anon, 2013)

X. WORK PLAN

10.1 Work Plan

Problems will arise in every Construction Project. These problems and their alternative solutions establish some elements of change around which the organization must adapt. Projects are generally established to carry out these changes and someone is always responsible for each project's successful completion.

A work plan is an outline of a set of goals and processes by which a team or person can accomplish those goals, offering the reader a better understanding of the scope of the project. Work plans, whether used in professional or academic life, help to stay organized while working on projects.

Through work plans, you break down a process into small, achievable tasks and identify the things you want to accomplish.

A work plan is being followed several steps to write it:

- Identify the purpose for your work plan
- Write the introduction and background
- Determine your goal(s) and objectives
- Consider ordering your work plan by "SMART" objectives
 - S -Specific
 - M -Measurable
 - A -Achievable
 - R -Relevant
 - T -Time-bound
- List project resources
- Identify any constraints
- Who is accountable

XI. CONCLUSION

CONCLUSION:

Different aspects presented by various authors on project risk and risk management in construction are identified and analyzed. Risk management is a challenging task in the construction industry and is complex in its structure. It affects a large number of participants who work together on the project. The project manager plays a major role in the management of the project risk and relies on their experience to identify project risks, which are influenced by individual perceptions and attitudes.

According to studies, it is found that financial issues of projects, accidents on construction sites, improper management of construction projects, and defective design are some of the major risks that affect construction projects.

Risk identification and risk assessment along with risk response and risk documentation constitute efficient risk management. A major conclusion of this paper is that risk management in construction projects is still ineffective due to various reasons. Therefore, there is an urgent need for further research for improving risk management in the construction sector which should employ sophisticated techniques to yield better results

ACKNOWLEDGEMENT

First and foremost, we would like to place our devotional thanks to the with Blessing of Deivathiru Founder “**Lion. Dr. K.S. RANGASAMY, M.J.F**” and our Chairman **Mr. R. SRINIVASAN, B.B.M., MISTE** for providing all enraptures to complete this project successfully.

We are highly indebted to and record our deep sense of gratitude to our beloved Principal **Dr. P. SENTHILKUMAR, M.E., Ph.D., K.S.R** College of Engineering Tiruchengode, for his benevolence in having offered and provided all facilities and provisions to bring our his project successfully.

The project works good offices **Dr. V. REVATHI, M.Tech., Ph.D.**, Professor and Head of the Department, Department of Civil Engineering, K.S.R .College of Engineering, Tiruchengode to whom we extend our sincere thanks and whose advice was precious during the course of our project.

It is great pleasure to express our deep sense of gratitude to our Project Guide **Mr. K. SELVA KUMAR, M.E.**, Professor, Department of Civil Engineering and other Faculty members for the guidance and suggestions, which helped us in the smooth traverse journey of the project work.

We extend our heartfelt self-thanks to our parents and our friends for helping in one way or other.

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