

Impact of Effective Project Management on Building Construction

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Abstract - This paper appraised the effects of project management on building production in the construction industry in Osun State. This paper identified and assessed the performance of project management methods in Osun State and later evaluated their effects on project performance aim and objectives of the study include the identification of the methods adopted for managing construction industries. The scope encompasses organizing the field forces and backup personnel in administrative and engineering positions necessary for supervising labour, purchasing materials, combining of managerial talents required presupposes training and experience both in field and office operation of construction jobs. Field survey and well structured questionnaire was used to collect data from the subjects of the study. The analysis of the data reveals amongst others, that construction firms practice a decentralized system of staff recruitment, permanent of head office management on permanent/contract/casual employment, provide work measurement techniques, planning techniques, organize and manage resources, prepare quality and quantity of job performance. Based on these findings, the study concluded that the methods adopted were limited in scope and that there was moderate level of professionalism within the industry. The study then recommends that construction firms should expand their sources of management techniques; use of qualified personnel and the involvement of competent professionals with good managerial skill.

Keywords- project management, building construction, management techniques. productivity

INTRODUCTION

The building construction industry just like the manufacturing industry required a number of resources for achieving set goals and organization objectives. The major function of management is the coordination and control of resources and this is the function of Project Management regarding other resources in project execution. Project Management refers to the discipline of organizing and managing resources in such a way that these resources deliver all the work required to complete a project within defined scope, time, and cost constraints. (Breach, 2003) Also, is the philosophy or practice of organized human activities while project managers are the people appointed by a client to plan and control a large complex project and co-ordinate the building team through all stages of design and construction as a professional service aimed at serving time and cost. (Terry 1998). A project as a finite Endeavour (having specific start and completion dates) undertaken to create a unique product which brings about beneficial change or added value.

The primary task of project management is to achieve all the project goals and objectives while adhering to a classic project constraint usually scope, time and budget. The secondary and more ambitious challenges are to optimize the allocation and

integration input necessary to meet pre-defined objectives. The field of management is usually divided into general and specialist branches, for each of which there have been developed particular techniques or "tools" and in each of which are broadly common to all industry, together with some of their appropriate tools which are of particular relevance to the building industry, which include General Management, Finance, Design, Development, Marketing, Production, Maintenance, Personnel, Office and purchasing (Calvert 1990).

The roles of project management in any project cannot be over emphasized. It plays a vital role in the set goals of construction works. Against this background this study attempts to study the performance of project management methods on Building project. It examine the source of management and there responsibility and there duties in Building Construction Industry. Project Management in the Building Construction industry play a vital role and if not managed properly may leads to several set back in profit making, accomplishing the set/pre-determined tasks and project handling. The beneficial of the project will experience maximum turn-over in area of Over Head profit and yielded maximum benefit. (Barry and Paulson, 1999)

Functions of Project Management

According to Sukenbruck (2005), among the functions of project management in construction industry are the following:

- a) Maximization of efficient resource utilization through procurement of labour, materials and equipment according to the prescribed schedule and plan.
- b) Specification of project objectives and plans including delineation of scope, budgeting, scheduling, setting performance requirements, and selecting project participants.
- c) Implementation of various operations through proper coordination and control of planning, design, estimating, contracting and construction in the entire process.
- d) Development of effective communications and mechanisms for resolving conflicts among the various.

Effect of Project Management through Construction Organisation Structure

The organization structure of construction industry are basically broken down into functions and further broken down into element of such functions.

Constructions organization structure sets out to establish division of duties, line of authority, line and staff relations and the span of control. It must be noted that managers and supervisors should be able to control and manage the available materials within the specified range. The organization structure of construction project is a function of its size and this can be divided into three: small, medium, and large within each individual structure varying accordingly as small firms, medium size firm and large size firms.

Tools and Techniques of Project Management

The tools of management are many depending on the management techniques make use by the managers, these includes:

a) **Management Information Systems:** This provides information necessary for decision-making. By information it mean data that have been processed, timely germane and set in proper prospective. This is necessary because the project manager will require information and not data. As such management information systems provide information that is collated, consistent, current and complete as well as concise. Nowadays, effective management information and processing is made

relatively available due to advance in computer technology and development in microprocessors.

b) **Operation Research and Related Developments** (management planning, control and decision-making): This offers management a collection of techniques, which can be of tremendous use in establishing decision-making framework. The essential characteristic of operation research is to assist management to present a comprehensive analysis of tangible elements of problem. The phases are:

- (i) Identification of problems.
- (ii) Construction of the model.
- (iii) Testing of the model.
- (iv) Solution of the model.
- (v) Implementation of results

c) **Network Organization and Analysis:** Capital projects can be effectively appraised through network analysis the key parameter, which is predominantly 'time' is now replaced with resources/finance. This procedure allows the review of cost-implications of any plan as provided by the schedule times. A procedure that revises the network after the project has commenced also provides management an up-to-date status of each of the activities in the project.

Scheduling and Expediting

Two common methods of scheduling construction projects are by means of the Gantt (bar) chart, and critical path method. Others are Line of balance and Network analysis

Bar Chart: The bar chart is preferred by many contractors because of its simplicity, ease in reading, and ease of revision. The bar chart can show a great deal of information besides expected field progress. It can also show actual field purchasing log lists every subcontract and purchase order after its submission to a subcontractor or vendor; dates for required delivery; fabrications and approvals; percent of completion, both planned and actual; and time relationships of the various trades. Copies of bar charts may be distributed to subcontractors, trade supervisors, and in many cases laypeople, with the expectation that it will be easily understood.

Critical Path Method (CPM): This is favored by some owners and government agencies because it provides information on the mutually dependent parts of a construction project. CPM also reveals the effect that each component has on the overall

completion of the project and scheduling of other components. It permits a more realistic analysis of the daily problems that tend to delay work than does the customary bar chart. Strict adherence to the principles of CPM will materially aid builders to reduce costs substantially and to enhance their competitive position in the industry. Execution of the method can be expedited with the aid of a computer and CPM program. Network for critical-path method of scheduling comprises arrows representing steps, or tasks, and numbered nodes representing start or completion of those tasks. Heavy line marks critical path, the sequence of steps taking longest to complete.

Briefly, CPM involves detailing, in normal sequence, the various steps to be taken by each trade, from commencement to conclusion. The procedure calls for the coordination of these steps with those of other trades with contiguous activities or allied or supplementary operations. The objective is to ensure completion of the tasks as scheduled, so as not to delay other work. Also, CPM searches out those trades that control the schedule. This knowledge enables the contractor to put pressure where it will do the most good to speed a project and to expedite the work at minimum cost.

Project Evaluation and Review Technique (PERT): This is the most common formal approach to incorporate uncertainty in the planning process is to apply the critical path scheduling process and then analyze the results from a probabilistic perspective. This process is usually referred to as the PERT method or evaluation method. As noted earlier, the duration of the critical path represents the minimum time required to complete the project. Using expected activity durations and critical path method; a critical path of activities can be identified. This critical path is then used to analyze the duration of the project incorporating the uncertainty of the activity durations along the critical path. The expected project duration is equal to the sum of the expected durations of the activities along the critical path. The mean and variance for each activity's durations are typically computed from estimate of "optimistic," "most likely", and "pessimistic" activity durations.

Line of Balance: The line of balance is a planning technique for repetitive work. The basis of which is to find the required resources for each stage or operation. A line of balance schedule can be prepared as follows: Prepare a logic diagram; estimate the

Man-hours-required to complete each operation; choose better times which guides against risk of interference between operations; calculate the required output target in order to meet a given project completion date; and then draw a schedule.

Discussion of Findings

Table 1: Nature of ownership of building construction firms

Response	Location	Number of respondent	Percentage of respondents
Indigenous	Osun	53	88.33
Foreign	Osun	3	5.00
Both	Osun	4	6.67
Total		60	100.00

Interpretation: From table1, it can be seen that about ninety-five percent (95%) of the construction firms are indigenous ones. This implies that a greater percentage of the construction firms in the building construction industry are of indigenous nature and origin. The inference made from this study will show the typical attitude of an indigenous construction firm towards effective project management.

Table 2: Years of existence of the construction firms

Year	X	F	FX
1 - 10	5.5	23	126.5
11 - 20	15.5	21	325.5
21 - 30	25.5	4	102
31 - 40	35.5	-	-
Total		48	554

Where:

X - Represent the median value of the age range

F - Represent the number of respondent

$$Mean, \bar{x} = \frac{\sum fx}{\sum f} = \frac{554}{48} = 11.5 \text{ years}$$

Interpretation: The table shows that most of the respondents have been engaged in construction works at a mean age of 11.5 years and this reveals that the respondents have adequate experience on Building construction upon which the project work will be based.

Table 3: The composition of the construction industry based on the nature of the firms

Nature	Number of response	Percentage
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Contracting	30	62.5
Consultancy	10	20.8
Manufacturing	6	12.5
Supplier	2	4.2
Total	48	100.0

Interpretation: Table 3 shows that about sixty two percent (62.5%) of the firms in the construction industry are contracting firms while a little less than twenty one percent (20.8%) are consultancy firms. About thirteen percent (12.5%) of the industry manufacture building related products while less than five percent (4.2%) are suppliers in the industry.

Table 4: The factors that contribute to the success of Building project management techniques used. (3 - very high; 2 - moderately high; 1 - high)

Techniques	Rank				Percentage	
	1	2	3	Total	Mean	Rank
Management Technique	10.0	6	32.0	48	2.46	3
Percentage	20.8	12.5	66.7	100		
Use of qualified personnel	4.0	26	18.0	48	2.29	4
Percentage	8.3	54.7	37.5	100		
High Technical know-how	4.0	15.0	29.0	48	2.52	2
Percentage	8.3	31.3	60.4	100		
Involvement of competent professionals	-	12.0	36	48	5.19	1
Percentage	-	25.0	75	100		
Involvement of competence contractor	6.0	14.0	28	48	2.46	3
Percentage	12.5	29.2	58.3	100		
Precise standard	4.0	30.0	14	48	2.21	5
Percentage	8.3	62.5	29.2	100		

Interpretation: From the table 4, a couple of inferences could be drawn. These are:

- a) **Management techniques:** The very high rank got a total of about 67% of the total response. This is a value well over average mark hence, the management techniques employed has a very great impact on the management of building project and so cannot be underestimated in any project management setup.
- b) **Use of qualified personnel:** The moderately high rank got a total of about 55% of the total

response. This is a value well over average mark hence, the management techniques employed has a moderate impact on the management of building project.

c) **High Technical know-how:** The very high rank got a total of about 61% of the total response. This is a value over average mark hence, it is necessary to ensure that the operatives used on the job have adequate technical skills.

d) **Involvement of competent professionals:** The very high rank got a total of about 75% of the total response. This is a value over average mark. This implies that it is paramount to involve competent professionals if the success of a project is desired.

e) **Involvement of competence contractor:** The very high rank got a total of about 58% of the total response. This is an encouraging value and it implies that it is of great advantage if the contractor on the job is a very competent one.

f) **Precise standard:** The moderately high rank got a total of about 63% of the total response. This is a value well over average mark. This implies that being precise with standards is necessary in the management of building project.

Table 5: Work measurement techniques:

Techniques	No of response	Percentage
Time study	12	25.0
Pre-determined system	6	12.5
Standard time data method	4	8.3
Work sampling	26	54.2
Total	48	100

Interpretation: The above data collected shows that most of the companies visited use Work Sampling as a technique for Work measurement, some use Time Study, few people use Pre-determine System and others use standard time data method.

Table 6: Planning Techniques used by firms

Techniques	No of response	Percentage
Gantt charts	14	29.2
Line of Balance	24	50.0
Space-Time diagrams	10	20.8
Total	48	100

Interpretation: The techniques used in adequate planning within the specified cost, time, resources availability, quality of finished work and safety.

Among the techniques, line of balance method was used mostly by the construction firms visited.

Table 7: Factors affecting Project Management

Effect	High	Medium	Low	Total	Percentage
Experienced operatives	20	14	4	38	79.2
Proper supervision of project during construction	18	16	12	46	95.8
Good management relationship with workers	24	14	5	43	89.58
Financial and non-financial incentive and motivations	16	16	4	36	75.0
Adequate plants and tools	12	10	14	36	75.0

Interpretation: The table shows the factors that affect project management in building production as well as the frequency of the factors.

Table 8: Challenges usually encountered in project management

Problems	No of response	Percentage
Human resource	14	29.2
Capital	20	41.7
Material resource	10	20.8
Time	4	8.3
Total	48	100

Interpretation: Most construction firms encounter capital constraint, Human resources and material constraint which with no doubt can be overcome if there is adequate planning and monitoring of line of work.

Table 9: The project monitoring techniques make use

Techniques	No of response	Percentage
Tracking progress	12	25.0
Analyzing impact	14	29.2
Company actual Outcome to predicted outcome	13	27.1
Making adjustment	9	18.75
Total	48	100

Interpretation: Most construction firms make use of project monitoring techniques and they are not waiting for making adjustment.

Table 10: Determinants used to define success of a project management.

Determinant factors	No of response	Percentage
Completion within allocated time	10	20.8
Completion within budgeted cost	6	12.5
Completion of the desired performance/technology level	14	29.5
Utilizing the assigned resources effectively and efficiently	16	33.3
Accepted by the customer/user/client	2	4.2
Total	48	100

Interpretation: Table 10 shows how the identified factors determine the level of success of a managed project. But in order for a continuous stream of successful projects to occur, there must be a strong corporate commitment to project management, and this commitment must be visible.

SUMMARY OF FINDINGS

From the responses and suggestions from the respondents, it had been revealed that:

a) Construction firms sampled practice a decentralized system of project execution, from the upper cadres to the lower cadres in project management.

b) The study further reveals that, the use planning techniques and monitoring techniques encourage effective project management.

c) The study also reveals that project managed by professional both skillful and trained are completed within the allocated time, budgeted cost, project specification, and delivered within the defined constraints.

CONCLUSION

This paper has been carried out to appraise impact of project management on selected Building Construction Companies in Osun State and from the findings the paper concludes that

a) The key quality required of a manager is that of leadership and effective managerial skills.

b) The success of project management depends solely on the personnel of the individual project manager as well as his management experience, are

important in decision making and leadership qualities.

c) Some construction industries in Osun State does not make use of planning and project monitoring techniques leading to poor handling of construction project.

d) The small size construction firms do not emphasis professional bodies registration in the recruitment of their staff. This shows that small size construction firms may not have qualified professionals in their employment.

e) A proper project management objectives are defines as having achieved success when the management utilizing the assigned resources effectively and efficiently within budgeted cost and allocated time.

f) Effective project management will enable the project management where and what kinds of action he should take to meet their project objectives. A comparison of actual progress, costs, manpower, and so on with the plan provides basic data for action.

RECOMMENDATION

Based on the above conclusion, the paper recommends as follows:

a) For effective project management in Building Industry in Osun State, a well seasoned and qualified professional Builder Registered with council or registered builders of Nigeria (CORBON) must be engaged to manage the production process of all building project and to provide efficient services to all the stakeholders involved in building projects.

b) A well-trained professional Builder and project managers must be involved in stage-by-stage construction process of building project.

c) A building inspectorate division in all local government authorities must be established urgently without prejudice to other professionals.

d) Effective communication network must be employed by the stakeholders to make known his predictions and inspire the necessary efforts, by executives to pass on their plans and instructions for action.

e) Project manager should establish a statement of work (SOW) preparation team consisting of personnel he deems appropriate from the project office who are experts in technical areas involved, and representative from procurement, financial management, logistics, operations, safety and quality assurance may be involved in building construction.

f) Project managers should prepare a detailed checklist showing the mandatory items and selected optional items as they apply to the main body or the appendixes of the statement of work

g) Project management must have standardized tools as manual in planning and design stage, execution stage, monitoring and controlling systems and completion stage.

h) Project manager should set clear objectives; allocated responsibilities for their attainment asses progress towards them and lead the work force towards realizing them and should manage result.

i) He should allow excellence guide his operations result so that the clients will be externally satisfied.

j) For improvement of the use of network method or modern technique and to do away with old system in construction industry in Nigeria, there is undoubtedly urgent need for the following:

- Top management should provide training on modern technique or network analysis for people participating in projects planning as well as laboratories.

- Prosper knowledge of network analysis should be imparted to students who engage in any aspects of construction.

- Government should provide all necessary equipments for training of network analysis to our campuses.

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