PDF - AN INVESTIGATION INTO DESIGN ERRORS AND IT IMPACT ON INITIAL COST OF A CONSTRUCTION PROJECT - researchcub.info ABSTRACT

This research project investigated the effects of design error on the final cost of a project in Nigeria. It is a key issue, because many projects in Nigeria have inadequacies in the plans and specifications which have been major causes of changes to the contract. Therehave been extreme examples of design errors such as numerous building collapsesin Nigeria projects that have wrought disaster after the construction arecompleted. One or two major errors that can be corrected with only initial costconsiderations and little effect on the schedule finally ends up causing majorimpacts on the final cost and schedule growth. These dilemmas place an increasing pressure on stakeholders in the construction industry to search forsolutions that will minimize error in designs so as to maintain estimatedconstruction cost and time while maximizing its quality. One hundred and twentyselected project clients, consultants and contractors in Imo state of Nigeriawere issued well structured questionnaires to elicit responses on theinvestigation of the effect of design error on the final cost of a project, and the analysis of data was done using pie chart. The research study revealed thatdesign error affects final cost of a construction project causing cost overrun on cost and time. Additionally, theresearch revealed that the issue of cost and time impacts on projectconstruction could be managed by using construction recognized and acceptedmethodologies which identifies and quantifies the overall impact to the project. The research concludes that unclear scope of work orchange in scope of work; time and inexperience of the designer and inaccuracyof the design documents are the major causes of design error on construction projects in Nigeria. In this regard the paper recommends that the consultants' experience, lack of design reviews, designmanagement experience, awareness of changes in standards, communications and availability of information, inconsistent decision making, and lack of coordination between disciplines, lack of planning and inspection of projectand unclear or ambiguous requirements for design specifications should beworked upon by the stakeholders concerned in order to prevent the occurrence ofdesign error in construction projects in Nigeria.

CHAPTER ONE INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Whenasked to define "design error," not all disciplines in theconstruction process agree on a common definition. Depending on which discipline you address, the owner, the designer or the contractor, there willbe a common understanding surrounded by varied conclusions, "amistake." From the basic definitions of "design" and "error" we conclude that a design error is a deviation from a drawingor specification, also including omissions and ambiguities. It is these is of this error that must be considered to determine its consequences on the

overall outcome of the project. One of the most important challengesfacing management today is controlling the ball too frequent final cost andschedule overruns that effect the construction industry (Diekmann and Thrush, 1986). One of the major issues to control growth in project final costs andtime is the reduction of design errors.

Theowner, designer and contractor all have different interests in, or uses for the design of a facility. But what they do share is the commitment to complete the project safely and within a given budget and completion time. There are many initiatives being conducted to control the growth of final cost and schedule within the construction industry.

Themajor issue is "accuracy of the drawings," or the number of designerrors, omissions and ambiguities within the plans and specifications thataffect the quality of the facility. Inadequacies in the plans and specifications are the major causes of changes to the contract So much emphasisis placed on the issue of time and final cost that quality takes a back seat. The quality of the project depends on the conformance of the objectives andrequirements from the owner. An informative quality management technique willprovide an agreement to procedures and definitions among the principle parties for the project. Since design errors have an impact on the outcome of theeffectiveness of the contractor's effort on the project it is essential that allparties determine what the definition of a design error should be.

1.2 STATEMENT OF THE PROBLEM

Designerrors indicate the total design in-effectiveness of a project. Major designquality problems occur during construction when errors, omissions and ambiguities plans and specifications become evident (Davis and Ledbetter, 1987). Thisstatement directs that the inadequacies in the plans and specifications are themajor causes of changes to the contract. There have been extreme examples ofdesign errors such as numerous building collapses in Nigeria - projects that have wrought disaster after the construction are completed. These are examples of design errors that escaped the close scrutiny of all parties. One or twomajor errors that can be corrected with only initial cost considerations andlittle effect on the schedule can impact projects. The projects that reallysuffer are those with many small errors (design, rework or change of scope)which when finally added up causes major impacts on the final cost and schedulegrowth. Through Davis and Ledbetters research it was

determined that"accuracy of the design documents" was the most critical of thecriteria used in the initial evaluation of design effectiveness. This accuracywas further described as the concern for the frequency and impact of errors in the specifications and drawings. This is due to the fact that the drawings and specifications are the most "readily identifiable outputs of the designprocess." It is even more important that the quality control of designs beaddressed during the planning phase and closely monitored during the construction phase.

Designerrors of a project have been an issue that has been misconstrued. The attitudetowards design errors in the country can now be best described as tardy andunsatisfactory.

1.3 AIM AND OBJECTIVES OF THE STUDY

1.3.1 AIM

Themain aim of the study is to investigate how design errors can affect the finalcost of a project.

1.3.2 OBJECTIVES

Thespecific objectives are:

- 1. To determine what constitutes a design error.
- 2. To examine the contributing factors to designerrors in Nigeria.
- 3. To examine how these factors can affect final costof a project.
- 4. To proffer solutions on how to minimise cost of construction projects in Nigeria.

1.4RESEARCH QUESTIONS

- 1. What are design errors in construction projects?
- 2. What makes or contributes to a design error?
- 3. What are the factors that lead to design errors?
- 4. What effect can design errors have on final costand growth of a project?
- 5. Who is responsible for design error?

1.5 HYPOTHESIS FORMULATION

1.H0: Design error affect final cost of a building construction project.

H1:Design error does not affect final cost of a building construction project.

2.H0: Design errors causescost overrun in a building construction project.

H1:Design errors does not causecost overrun in a building construction project.

3.H0: Additional work causes additional cost in a building construction projectdue to design errors.

H1:Additional work does not cause additional cost in a building constructionproject due to design errors.

1.6 SIGNIFICANCE OF THE STUDY

This study gives a clear insight into the variousways in which contractors in the construction companies in Nigeria can maximiseprofits and reduce final cost through effective and efficient contract planningand management. The study also gives a clear insight into the various effects of design errors on the final cost of a project. The findings and recommendations of the researcher will help in building a strong and betterproject management guideline for contractors in Nigeria.

Also, the study of the investigation of the effectof design errors on the final cost of a project will provide results that willoffer the following benefits:

1. Establish the scope and methodology of designfunctions performed by Architectural firms for the benefit of the entireconstruction industry including prospective building clients.

2. Assist designers in understanding the costimplication of design errors, so that they can make objective design decisions during the early phase of a project.

3. Avail the designer with a tool for eradicatingerrors that are directly related to the designer that delay and or add cost tothe project.

1.7 SCOPE OF STUDY

The study is on the investigation of the effect ofdesign errors on the final cost of a project. It is narrowed down to buildingconstruction projects in Imo state of Nigeria.

1.8 LIMITATION OF THE STUDY

The only limitation faced by the researcher in thecourse of carrying out this study was the delay in getting data from thevarious respondents. Most respondents were reluctant in filling questionnairesadministered to them due to their busy schedules and nature of their work. Theresearcher found it difficult to collect responses from the various respondents, and this almost hampered the success of this study.

1.9 DEFINITION OF TERMS

·Design: The basic definition of design, according toWebster, is "the making of drawings or

plans to plan and fashion the formand structure of an object to have intentions or purposes." The quality ofplanning and design is one of the primary factors of success in any projectendeavour (Chalabi, Beaudin and Salazar, 1987). The design includes everyaspect of the facility construction including operation and maintenance. The designincorporates a set of specifications to guide the contractor in developing hismeans and methods of construction.

•Error: An error is defined, according to Webster, as "a deviation fromaccuracy or correctness; a mistake, as in action or procedure; an inaccuracy, as in speaking or writing." There are basically three types of errors:imperfections, non-conformance and omissions. Imperfections are deviations indetails that have no affect on the assembly or facility (Davis and Ledbetter, 1987).

•Design Error: From the evaluation above a simple definition of design error is "a deviation from the plans and specifications." It is not the intention of this definition to include any final cost or schedulegrowth or insinuate its root causes or legal responsibility. It is theresponsibility of the owner, designer and contractor to establish the criteriain order to make a reasonable determination for responsibility. The surveyshows a common theme, that of a mistake or error in the design. The survey also indicates several reasons why design errors exist and who cause them. This provides evidence that there is not a concise definition within the construction industry.

•**Contract:** Erikson (2002) defined Contract as an agreement that creates anobligation binding upon the parties thereto. The essentials of a contract areas follows: (1) mutual assent; (2) a legal consideration, which in mostinstances need not be pecuniary; (3) parties who have legal capacity to make acontract; (4) absence of fraud or duress; and (5) a subject matter that is notillegal or against public policy.

•**Contract Planning:** According to Simmons (2007),Contract planning is the process of systematically and efficiently managing contract creation,execution and analysis for maximising operational and financial performance andminimising risk.

•Contractor: Generalcontractor, organization or individual that contracts with another organizationor individual (the owner) for the construction of a building, road or otherfacility.

·Profit: Tucy (2008) defined profit as the differencebetween the purchase price and the

initial costs of bringing to market.

•**Final Cost:** final costare not fixed, expenses incurred on thepurchase of land, buildings, construction, and equipment used in the production of goods or in the rendering of services. Put simply, it is the total final cost used to bring a project to acommercially operable status.

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