An Appraisal of the Duties and Responsibilities of Engineers in Organisational Success

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Abstract- ***Engineers are individuals who by virtue gotten education and training acquire scientific knowledge and methods in translating engineering designs to Concrete physical facilities. The engineer is an organizational builder who is involved at all the stages of any project from the time the idea of the project is conceived to its final commissioning and operation and maintenance. The work of engineers take into cognizance the various socio - political, economic and engineering factors involved in all the stages of the project and arrive at sound decisions which enables them to offer developing strategies to/make an organization successful in its operations.***

Indexed Terms- Contract supervision, Engineers, Project development, Protect execution Roles and responsibilities

I. INTRODUCTION

The field of engineering includes abroad range of activities from planning and supervising large construction projects to designing and producing aids for the physically handicapped but it is much more than that, it is a profession that puts scientific knowledge to practical use. It is also an art. It encompasses economy and prudent management of human and material resources. It must be stated here and now that there are very many branches of engineering.

The duties and responsibilities of engineers are indispensable to organizational success. An engineer is adexterous and adroitman, having been trained in the use of facilities at his disposal to provide services and products to enhance the life of man. The engineer therefore, manufactures a wide range of products, plants, machines and engines that in turn makes life easier, for example road equipment designed with engineering knowledge makes modern road construction a lot easier.

Engineers are the project planners, developers and implementer, executors which promotes the socio-economic life of the societal populace.

II. CONCEPTUAL DISCOURSE

In the course of good understanding of the thrust of this paper, we shall ponder on the following concepts.

- Conceptualizing Concept of Engineer

An engineer may be conceptualized as any person who by virtue of his or her engineering education and training acquires scientific knowledge and methods; he understands materials and manages human beings for development.

Another school of thought sees an Engineer as a dexterous and adroit man, having been trained in the use of facilities at his disposal to provide services and products to enhance the life of man. The engineer is an expert in the design and construction of Engines and other related services with the aid of tools. He is an artist, a scientist, an economists and adroit manager of materials and human resources. He has been trained to design engines, machines, applying the knowledge of properties of matters and natural laws to transform life for the better. He has the mental wherewithal to lighten the burden of man by

his designs and production. He produces the engine which is a combination of various simple machines coupled together to perform a predetermined function much more easily than the task would have been carried out without such a machine(s).

- A Technical Officer

A technical officer is an engineering personnel that works with the Engineer in translating engineering designs to concrete physical facilities. He might have acquired engineering education outside degree awarding institutions or might have risen to that rank of technical officer through rank and file with in-house training and long years of experience on engineering field.

The branches of engineering are civil, chemical, electrical, mechanical, agricultural, petroleum, aeronautical, industrial, production etc.

- Duties And Responsibilities Of Engineers

The engineer is involved at all stages of any project from the time the idea of the project is conceived to its final commissioning and operation and maintenance. The engineer should be able to take into consideration the various socio-political, economic and engineering factors involved in all the stages of the project and arrive at sound decisions which enables him or her to offer objective advice for the final decisions. Any developmental project will have the following phases or stages in which the engineer plays vital roles.

i. The conception and planning phase.

The conception and planning stage is a critical stage where the confidence of the Engineer comes into play. This is to say that the Engineers should be egocentric and able to discuss adequately with the policy makers.

Here the politicians or influential community leaders may tend to use socio-political consideration to overwhelm sound engineering principles in conceiving a project but the Engineer must listen and respect the views being expressed.

The Engineer may give the engineering considerations in simple possible language, if possible with facts and figures. The engineers should be ready to discuss socio- political considerations but should not allow them to override their judgment to compromise engineering ethnics

As an illustration, the politicians and community leaders may want installation of six new transformers in their area to enhance their political status as against three transformers recommended by an electrical engineer.

ii. Feasibility study phase: following the conception of a project, the engineer prepares the feasibility study, taken into consideration the size or the capacity of the project, the location of the project, the alternative forms or design available, the economical aspect of phasing out project and what are the phrases? More into consideration are the source of fund, the materials needed and their availability, the social environmental impacts of the projects, the operation and maintenance cost

iii. Preliminary design: From the feasibility study report, it will be known whether or not the project is feasible and the client decides to go ahead with it, the engineer is requested to come out with a preliminary design. In order to carry out the preliminary design, the engineer visits the site to obtain all the necessary pieces of information, the topographical survey, the social structure and physical features of the site must be obtained. This will enable the engineer to produce the site plan and the locational plan for various components of the project. The final shape and form of the project is put on paper without the detail drawings of every component.

iv. Detailed design phrase: Here the engineer prepares the size and types of all the aspects of the project and draw them to suitable scales. All features are shown in the plan, elevations and sections. All the catalogues of manufacturers of various components together with the relevant codes of practice used. Details are drawn to large scale for easy illustration of details. Location drawings are prepared to scale ranging from 1:50 to 1:2500, sufficient details must be provided together with the details for all positions to enable accurate bill of quantities to be prepared from the drawing. Also care must be taken to prepare the

drawings to enable equipment and components fit into space accurately.

This stage is the most important stage for the engineer, any mistake made at this stage can be dangerous and very expensive in material and may cause loss of life and valuable resources and property.

v. Tender documents preparation: The tender documents consist of the Following:

1. Condition of contracts.
2. Bill of qualities.
3. Specifications.
4. The drawings.

The condition of contract documents is normally of general nature, all contracts with minor sections unique for each particular contract .In many developing countries which were former British colonies, the condition of contracts drawn up by the institution of civil engineers is widely use. The bill of quantities is normally prepared from the drawings. The engineer is responsible for the preparation based on the specifications and the components manufacturers prices. The specifications will consist of two main part. A part containing general item like the type of cement and steel and that containing items which are unique for the project.

However, the engineer is responsible for producing all the documents and getting them ready for the tendering contractors to collect. On certain types of projects the quality surveyor is requested to prepare the Bills of quantities.

vi. Selection of contractors

After the period allowed for tendering has expired, the Engineers is responsible for the examination of the various tenders submitted by the contractors. The tender procedure may be either selective or open. In the case of selective tender, special contractors are invited to tender for the project. They are normally selected on the basis of their special attribute. They may be invited because of their good record of past performances. In the case of open tender, all contractors who qualify for the category of jobs involved are free to tender.

The engineer examines the submissions of each contractor and writes a report on each. Depending on the type of project the Architect and the Quality surveyor may also be involved in the examination of the tenders projects, which involves the structural buildings will, certainly involves, the Architects and the Quantity Surveyors.

Often it may be necessary to invite the contractors separately to meetings. During such meeting each contractor in interviewed on the tender documents, his staffing, his equipment and his previous performances.

Based on the facts collected from the various tenders and from the interviews the Engineer makes his recommendations to the tender's committees of the clients. The committee makes the final selection of the contractors. Normally, the selection should agree with the recommendation of the Engineer. However, certain extraneous considerations may make the clients to select contractors who have not been recommended by the Engineer.

The Engineer should let the client know in writing the application of their choice. The Engineer should be ready to work with the contractors with open mind.

vii. Construction Phase

During the construction stage of a project, engineers from the three vested interests may have to work together at the site. These are the engineers of the clients, the engineers of the consultants and the engineer of the contractors. If the consultants are in charge of supervision, they appoint the Resident Engineer. In this case, the Engineer of the clients will work with the Resident Engineer to ensure that the interest of the client is best served. Residents Engineer has the overall site responsibility.

All the Engineers ensure that the project is constructed according to the conditions of the contract and specifications. They ensure that all the materials are tested and that all construction follow the designs. They also ensure that modifications are made in the best interest of the project where necessary.

During construction, certification at different stages of progressive work for payment is endorsed by the Engineers.

viii. Operation and Maintenance Phase

After the completion of a project the Engineer is responsible for its operation and maintenance. The Engineer ensures that the project operates in accordance with the design manual. He supervises the various operation staff members and ensures that preventive maintenance is carried out. The Engineer ensures that spares are available for repairs.

ix. Scheduling Phase

Essentially in the act of detailed planning, scheduling is generally understood to mean the scheduling of work to be done. It is the Engineer's function of coordination of resources of their allocation and arrangement of their organization by time of place. The Engineer will schedule the phases of the project construction from the initiation/development to the completion stage as well as finally schedule the final payment for the constructed project.

x. Policy making

Engineers play also a sensitive role in the policy making of a government in most areas of government departmental project. For instance, an Engineer in the ministry of Environment, Ministry of Power and Energy, Ministry of Housing, knows that he has to prepare and present his proposals for developmental projects simultaneously with the cost estimates for a new fiscal year. This is in turn passed to ministry of finance for inculcation into the budget. However, before final acceptance of the proposals, the Engineer is called upon to defend his submissions. Such development projects may include installation of transformers, sewage treatment or construction of public buildings.

xi. Consultancy Services

After the architectural design, the client has the right to appoint an Engineer on consultancy. The Engineer takes charge of the preliminary design, detailed design and supervision role of a project construction work.

xii. Manufacturing and Production

Engineer may design and manufacture various articles which are consumed by the people varying from office pins to jumbo jet aircraft. They manufacture other goods for man's use.

xiii. Engineers in Marketing

After the goods have been produced, the Engineers together with marketing experts cooperate to ensure that the consumers have access to the goods. Such consumers may include governmental ministries or agencies. An illustration is the supply of hand water pumps to water board for use in rural areas.

xiv. Engineers in training and Research Institutions

Some governmental ministries or agencies want to train their professional manpower such as engineers in computer technology training. They employ the services of computer engineers, who discuss terms of payment relative to period before embarking on the training. Such training may include AUTOCAD training for engineers, Architects, Quantity surveyors etc.

In fact, Engineers worked in such materials research institutes and bring about Solution to problems existed in the society.

CONCLUSION AND RECOMMENDATION

The roles of engineers are so pronounced. It touches nearly every aspect of human endeavor on national prospects. In industries, manufacturing, production, construction etc. In transport-air, land and sea, in agriculture-food planting, food production etc. so engineering effects are enormous in even man's life. The researchers therefore recommended that engineers should without fear or favour, do their engineering works genuinely to affect man's life well at all times. The government too should create an enviable environment for engineers to do their normal works so as to affect both individual and national development.

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