International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 3, Issue 5, pp 22-30, May-2019

A Value Engineering Methodology for Low Income Housing Projects in Egypt

[1]M.Kotb, [2]Amin Saleh, [3]Khaled Muhammad Ali Muhammad

[1]Professor, Civil Engineering Dep., Structural Engineering Dept., Faculty of Engineering, Al-Azhar Univ., Cairo, Egypt
[2]Professor, Civil Engineering Dep., Structural Engineering Dept., Faculty of Engineering, Ain Shams Univ., Cairo, Egypt
[3]Ph.D. Student, Civil Engineering Dep., Structural Engineering Dept., Faculty of Engineering, Al-Azhar Univ., Cairo, Egypt

***Abstract* - The construction industry is concerned with satisfying its customers' needs through delivering projects that achieve their objectives and meet their expectations on time, within budget and as specified. Despite the several housing programmers constructed by government authorities, there is a real housing problem for the poor. This problem is attributed to a number of reasons. Amongst them, the inability of the low-incomers to cover the cost of supplied houses and the lack of the constructed projects to achieve users' satisfaction. This highlighted the need to developing innovative and creative's solution which may delivers housings projects which achieves the satisfactions of the user and at the most-costs effective manners simultaneously. This aims would be achieved by incorporating the concept of Value Engineering and Risks Managements in developing housing project for the poor. Towards these aims, the paper attempt to accomplish three main objectives. Firstly, review the historical developments of housing projects, the concepts of customer satisfaction, VE and RM in construction. Secondly, identifying the capabilities of VE and RM and the benefit for developing housings projects for the poor. Thirdly, presenting learn lesson extract from cases study of low-incomes housings project constructed by the governments of the Egypt. Finally, outlining these researches recommendation for government's authorities, designs firm and constructions professional concern with housings project for all poor.**

Keywords: Projects Management, Value Engineering, Risk management, Time cost quality relationship, constructions project in Egypt, Low cost housing.

I. INTRODUCTION

The Value Engineering were intensives, interdisciplinary problems solving activities that focus on improving the values of the function that were required for accomplishing the goals, or objectives of all products, processes, services, or organizations. Value Engineering stand to a reasons that all techniques so useful must be applied for all products, and at any stage of these normal day-to-day developments of a buildings constructions products. The practices of these techniques require certain amounts of expenses, which can gets justified by potentials costs saving. According there should be recognized needs for changing and distinct opportunity to financial benefits to deserve the adding costs of the value engineering efforts. Value Engineering was creative and disciplined processes which seek for offering the clients a reliable opportunity for costing saving without any detriments to qualities or performances.

II.RESEARCH METHODOLOGY

The infrastructure do not developed at same pace as poverty increase. Today over 100 million people lives in these cities' slum area, lack water, transportations and electricity These poor, worldwide, resort to all sorts Of mean to houses themselves in the faces of housing manufacturing and policies that fails to provide them by affordable options. The considerable importance of housing to the poor contrast sharp with housing condition and official policies exists in a lot of develop countries. But the middles and uppers income group, housing is as a rule cost in relations to incomes and the qualities of dwelling available. Cramped, crowd and unsanitary settlement were the many of low-incomes family, conditions that debilitate the energy and reduces nationality of productivity. Family in these dwelling constantly faces threat of evictions as well as scarcity of water, electricity, sewerages and transport. Housing was far away more living spaces and shelters. It was nature and value was determined with the services it offers. These services were varied, including neighborhoods amenities, access to educations and healthy facility, and security, in addition to shelters.

Their worth depend on qualities considerations as designs, densities, buildings material and floors spaces, access to employment and other income-earning opportunities, public facilities, community service, and market. Statistics of the World Bank show that publics.

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Expenditures on housings projects for all poor usually constitute the small fractions of total public's expenditures at the national levels. It is argued that the mains reason for these problems have usually been economic. These is to the economics resource were inevitably limited; so, it was necessary to reduces the project cost.

This resulted in scarifying these functions and qualities of these projects for these benefit of cost. In additions, the social and psychological factors of these users are not considered. For example, the user's habit, tradition and requirement were not captured or reflected to the briefings and designs processes. These produced facilities that do not meets users' need or achieves the objective as well as mismatches with their expectation As a result; user either rejected the facilities or forced to adapt them for accommodating the activities and meets their need. These have negative impacts on the buildings, users and the environments. These papers aim to incorporate the concept of VE and RM in the developments of lows costs housing project as an innovative approaches to constructs sustainable, cost–effective facilities that achieves the users' satisfactions. To achieve these aims, the researches methodology was designed to accomplish three objectives. Firstly, reviewing the historical developments of housing project, the concept of customer's satisfactions, VE and RM in construction. Secondly, investigating the capability of VE and RM and the benefit for develop low costs housing project. The objectives are achieved through literatures reviews. Thirdly, presenting learned lessons from cases studies of low-income housing project constructed by the governments of the (UAE) in the Egypt commercials city. Finally, outlining the researches recommendation for governments authorities, designs firm and constructions professional concerned by low cost housing project.

III. AN OVERVIEW OF THE HISTORICAL DEVELOPMENT OF HOUSING PROJECTS

Housing may be described as programs of organization of physical spaces - which implies a relevant uses of lands and the investments of considerable resource, usually public- with these principals' aims of providing lodging to socials group that was unable to obtain it on the open markets. Housing programs has probably been proposed and realized in every ages. In ancients Egypt the Pharaoh are concerned with housings when they have to provide lodging to multitude of worker who was occupied for the lifetimes with the constructions of the pyramid. The Egyptian did the same with the soldiers who remained to colonize the conquered land, and with their ex-servicemen who settled in the suburb of the capital at the end of the military campaign. Taking of housing in a modern way as the term was used until today, starting with the programs that had been developed in Egypt since the beginning of the nineteenth century. The first housing programs are primarily Egyptian, because of they are applied to the underdeveloped area on existing town. Overcrowd by immigrant from the country who came to finds harder but better-paid works in industries. The programs are formulated for the working classes, whose economics levels were low that prevents them from finding decent lodging in towns. Towards the middle of nineteenths century, the housing programs change to the modern concepts which was constructions of new set of living unit on free area usually located in the suburb or in proximity of town. From the point the roles of the architect's services are request, not only for the designs, but also for the developments of new models of Egyptian growths. The first Egyptian model are a contractions of these middle class houses which are built in towns. The developed housing unit was far more restricted the levels of comforts lower and the facilities and equipment's more poorer. It show that the ruling classes considers the working classes as disabled and had insignificants value to be accounts of. Toward the end of the nineteenth century, the housing problems began to be considered in the (U.S.A.) and other countries under colonial powers. The pattern in the (U.S.A) is similar to the ones in Western Europe; merely the name is changed from "working class" to "ethnic minorities". In countries under the colonial power, the problems were completely different from the Western Egypt. In these countries, the inferior status of the user was not just implied but openly declared "the color of their skin is often used legitimate reasons to supports these declaration". They are considered underdeveloped human being in many cases they are called "savages". The models adopted to accommodate them are no longer a contraction from the middle class in Egypt, but a horrible hybrid of pomposity and misery. In the twentieth centuries the ideas of housing is developed. In Egypt and other countries the problems of buildings housing projects for these working classes which is increasing emigrating toward the city, become as important as to involve the whole Egyptian context. In fact, the allotments of housing site become fundamentals tasks in making these master plans of cities.

IV. CUSTOMER SATISFACTION

Customers are defining as one who make used of or receive the products or services of the individuals or organization. In constructions, the customers are entity that uses the final products of the constructions industry. Hence, the clients and the end-users are the customer of the constructions industry. Customer's satisfactions were studied within markets researches. In the past, no more efforts were make for finding out which specific factor were important to customer's satisfaction and then takes actions for products

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improvement. The very important reasons for these were the views which consider gain new customers are much important than retain old one. It is, however, more expensive and not essay for gaining new customers than for keeping a satisfied and delighted one. The organization that excluded its customers from the products development processes encountered the risk of getting the customer lost. now, the increasing recognitions that customer is the important assets of all organizations and that they must be treated as the organization's top priority as they are the ones who pay the bills and the survivals of all organizations depend on them, has actuated a lot of industries to focus on their customer and involves them in a product developments processes. Understanding the customer's need and expectation are essential to win new project and keeping existing one. Every organization must give its customer the quality products or services that meets or exceeds their need, on time and at a reason able price. The historical developments of housing project showed the end user was excluded from being parts of the developments of the housing units. In as well as, the social and psychological need of the user, their requirement, habit and tradition are not captured or reflected in designs. These produced units that do not achieved the users' objective or meets the expectation. As result, either user rejected this unit or adapted them for accommodating the activities and meets their need. These have negatives effects of the buildings, its user and the surroundings environments.

V. VALUE ENGINEERING IN CONSTRUCTION

VE was the Egyptian name given to a services concerned with providing the products or services demanded by a customer at the required qualities and at the optimum costs. The philosophy are based on these works of Lawrence Miles who, in 1950s were a purchases engineering with the General Electric Companies. Miles, found that using substitutes solution and alternatives material succeeded in providing equal or better performances at a lower costs. Based on these observations and proposed a systems called Value Analysis which were defined as an organized approaches to the identifications and eliminations of unnecessary costs that provide neither use, nor life, nor quality, nor appearances, nor customers feature. Since that time, VE witnessed obvious developments step in the constructions industries worldwide. These took the form of setting out the rule, drawing the boundary of the disciplines, stating its objective, defining the relevant terminology, adoptions and implementations by governments authorities, modifying contract to includes value engineering services clauses, initiating professionals societies, benchmarking, academic researches and publications.

a) Value

Stated that values are a very subjective concept; it had different meaning for different peoples. A customer's will regards it as these "best buy", a manufacturers will consider it as "the lowest cost", and the designer will view it as the "highest functionality". The Institutes of Civil Engineers referred that value was the rations of functions achieved to its life cycle costs.

Value = (Function) / (Cost)

Stated that three basic elements that provides a measures of value to the user: function, quality, and cost. The elements may be interpreted by addition quality to the numerator of the above equations to form the following relationships:

Value = (Function + Quality) / (Cost)

Where:

Function = the specific purposes or works that a designs / items must performs.

Quality = The Client's or user's need, desire, and expectation.

Cost = the total life cycles costs of the products.

Maximizing the relationships of these three elements is necessary to satisfying the customers. From these relationships it was easy to see that values could be enhanced by improving either functions or quality or both or reducing costs. Decisions that improve qualities but increasing costs to the point which the products are no longer marketable was as an unacceptable as an one reduce costs at the expense of required qualities or performances. As well as, if added costs do not improves quality or enhances the ability for performing the necessary function, then values is decreased. Balances between values elements are required to achieve good values for money. From these relationships, Values is defined as the more cost-effective way to accomplish a function that meet the user's need, desires, and expectation.

b) The Value Process

Value Planning was applied during the concepts and briefs developments stage to be sure that values are planned into the whole projects from its inceptions. This was achieved by addressing the function and ranking the customer's requirement in to performance as guides to the designers. Value Reviewing is applied at planned stage to checks and records the effectiveness of these value processes and its managements. It analyses and compares a completed designs or projects against pre-determined expectation.

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Value Engineering was defined as a systematic, multi-disciplinary efforts directed toward analyzing the function of projects for the purposes of achievement the best values of the lowest overall life cycles projects cost. Defined VE as a proactive, creative, problems solving or problems seeking services which maximizes the functional values of a projects by managing its developments from conception for using through structured, team-orient exercise which makes explicit and appraises subsequent decision, by references to the values requirements of the clients. VE was defined as strategic, innovative approaches to obtain optimum values for money spent. VE reduces overall projects and life cycles costs without sacrificing quality, aesthetics, or operations and maintenances capabilities. VE investigate, analyses, compare, and select amongst the various option to produces the required functions and meeting or exceeding the customer expectation. VE produce a ranges of designs option for the whole projects or for defined part of it, which were tested against the client's values objectives and criteria for removing unnecessary costs without sacrificing function or quality.

c) The Value Engineering Procedures

1) Pre-Study Phase

The objective of these study phase were to make sure that all parties were well co- ordinate, the studying was properly target and there was sufficient data available to the study. The activities that occur during these phases include: orientations meeting, finalizing the teams structures, selecting the teams members, deciding on study duration, determining study locations and condition, gathering information, sites visits, costs estimates verification, preparations of model and efficiency data.

2) Study or Workshop Phase

During these phases the Multi-disciplinary teams are mobilized to conducts the VE studies following the procedures set down in the five-step job plans subsequently described. The team's structures are tailored to suit the particular projects types, but generally include a VE Team Coordinator "qualified value specialist or equivalent", relevant designs engineers, operations expert, quantity surveyor/cost engineering and customer's representatives. Where constructability issue is of concerns a constructions manager can participate. The suitable size was recognized as be between six to twelve members, overlay big team must be avoid. The durations of the study depend on the natures and sizes of the projects and the stage at which the study was conducted. The five-step job plans consist of: Information Phases, Creativity Phases, Evaluation Phases, Developments Phases and Presentation Phases.

i) Information Phase

This phase aim to establish a good understanding of the projects in term of: its functions, constituent element, designs, operations plans and area with the greatest potential for saving and ne1eded improvement. To the end, the workshop generally start with an over view of the activity, which is occurs within during the VE processes by the values specialist. These will be followed by designs presentations from the design teams. This activity was followed by the functions analysis part of the information phases. Function analysis was intended to assure that every VE teams members fully understands the project's entire functional requirement, not just her or his own areas of special first by examining total projects and then each of its components elements, for identify the basic and secondary function.

ii) Creativity Phase

This phases aim to generates innovative alternatives idea for achieving the same basic function at lower cost or for achieving necessary improvement The most often used method was the brainstorming techniques, which consist of VE teams generating and recording the large number of idea without evaluations, "idea evaluation was performed in the evaluation phases". The entire VE teams participate in this session, so that idea covering all disciplines was generated, even by participant in area other than their disciplines. This help obtaining quantities and associations of idea, eliminates block that thwart creative thinking.

iii) Evaluation Phase

Various evaluations method can be used during these phases to analyze and highlight the best idea generated during the creative phase. Since there were usually times constraint on the numbers of idea that may properly be developed, it was important the only the bests idea was selected. This idea was evaluated, both on economics and non-economic criteria such as aesthetic, environmental impacts, etc.

iv) Development Phase

The idea for alternative selected during the evaluations phases was now developed into fully detailed proposal, which generally comprises:

- Descriptions of both the originals and the proposed designs.
- A narrative on the advantage and disadvantage of each proposal.
- Initial and life cycles cost consequence of the proposal.

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- Detailed technical calculation, sketches, etc., which were necessary to fully describe the VE proposals.
- Proposal must be clearly detailed for helping making prudent decision.

v) Presentation Phase

Generally at the last day of the study, a presentations of the refined and developed proposal is be made to decisions maker and other interested parties. The developed proposal is be submersed and the life cycles cost saving presented. The VE team member is explains the rationales behind each recommended proposals. Draft copy of summaries of the proposal can be handed over so that decisions maker may immediately commence evaluations of the recommendation.

3) Post-study phase

Within six to ten working day a preliminary VE reports can be submitted which is contains all the detailed proposal and summaries, narrative on the processes and so on. Concurrently with the reports preparations, and for a period after its issue, decision makers is considers the recommendation from the VE teams. Following an appropriates period for reviews, an implementations meeting must be held for determining whether proposal are to be accepted or rejected, and for establishing subsequent action.

VI. RISK MANAGEMENT IN ONSTRUCTION

The constructions industries are considered to be subjects to much risk than other industry. These are because of the complexes and time-consuming processes of designs and constructions in addition to the great efforts required to co-ordinate a multitude of peoples, from different organizations, with different skill and interest. A variety of unexpected event can occur during the processes of buildings procurements, and more of them may cause loss to the clients or other interested part. Such event is called risk. At the macro level the event can be for examples, constructing a buildings for a forecasted costs, times, and qualities. The risks at these levels are be that the actual outcomes are deviates from those forecasted. At lower levels the events, constructing a buildings comprise thousands of interrelated event with variety of risks degrees that they are not turns out as planned. For examples prolonged bad weathers delaying concretes pour, failure of supplier to delivers material on times are delay the activity, which is use this material or the injury of work when they undertakes risk activity. All constructions project involves different kind of risks. The initials purposes of risks managements processes are for helping the clients decides if the potential benefit associated with investments in constructions were sufficient to warrant accepting the identified risk. The second purposes are to safeguards the client's interests when a courses of actions are selected. It was the important to identify the risk, establishes when the might occurs, what their effects may be and what the appropriates responses must be. The principle of RM were widely used in the constructions industries, applied at various stage during the procurements processes. It had been shown that proper applications of RM technique may significantly improve the investments performances of constructions project.

a) Types of Risks in Construction Projects

Risk in constructions project can be classified under more category.

- According to the event outcomes, risks either "a" upside risks when the outcomes are better than the originals forecasts or "b" downsides risks when the outcomes are worse than the originals forecasts.
- According to the possibility of occurrences, risks either "a" pure risks, normally arises from the possibility of accidents or technical failures or "b" speculative risks, possibility of losses and gains, which can be financials, or physicals.
- According to the possibility of reductions, risks either: "a" diversifiable risks, if it was possible for reducing risks through pooling or risks-sharing agreements or "b" non-diversifiable risks, if pooling agreements are ineffective in reducing risks for the participant in the poor.
- Classified constructions risk to: political, economics, technical, external relations, managements, designs, environmental, legal and operational.
- Classified risk in constructions project as: physical, constructions, designs, political, financial, legal-contractual, and environmental.

b) The Risk Management Process

The RM processes comprise identifications, analysis and response strategy to all significant projects risk with the aims of reducing the opportunity for and consequences of losses. The processes of RM may be broken down into three essential component, they were risks identifications, risks analysis, and risks responses.

1) Risk Identification

Risks identifications were the diagnostics processes in which all the potential risk that might affects a constructions projects were identified and investigated, thus enabling the client understand the potentials risks source at an early stages in the projects. Such understanding at the projects proposals

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stages is help client concentrates on strategies for the control and allocations of risk. Different method is used in risks identifications. They were brainstorming, historical information, checklists, tree diagrams, and influences diagrams.

2) Risk Analysis

Risks analysis are used to evaluate risks, and to ascertain the importance of each risk to the projects, based on an assessment of the probability of occurrence "Likelihood" and the possible consequence of its occurrence "Severity".

Risk = (Likelihood x Severity Loss)/ (Gain)

Risks analysis assesses both the effect of individual's risk, and the combined consequence of all risk on the projects objective. The major purposes of risks analysis is for providing a projects risks profiles that the clients may use to looks ahead to possible future event and see the probability of those events occurring. The clients may then decides whether or not to invests in the projects, or adopt specifics strategies for dealing with the major risk. Two techniques were used for risks analysis:

Quantitative Risk Analysis: It is risks analysis techniques, which require inputs of numerical data and carrying out of some calculation work. The quantitative risk analysis studies provide some numerical result, which is allowing more informed decision-making by the teams.

It is risks analysis techniques, which involve subjective assessments based on experience of the teams, which can be used for determining risks impacts. Lack of information, lack of demands for more detailed approaches and absences of numerical data related to identifying the risks were two mains reasons that forces the risks analyst to use the qualitative techniques. The do not means that the quantitative risks techniques were not used. Both techniques are used according to the importance of the projects and the availability of information.

3) Risk Responses

Since all projects are unique and risk is dynamics throughout the projects life cycles, it was necessary to formulate a risks responses strategy. The information gained from the identifications and analysis of the risk gives an understanding of their likely impacts on the projects. This in turn, enables an appropriates response to be chosen. Typically there were three mains types of response to risk: to avoid or reduces the risk, to transfer the risk or to retain the risk.

Risk Avoidance or Reduction: Once the risk had been identified and analyzed, it can be possible to formulate method of avoiding certain risk. During the earlier stage of projects the clients can take preventive actions to reduce, avoid or transfer risk. Rejecting a proposals are an obvious way of avoiding risk. However, if the clients decided to proceeds with a projects, then risk must be reduced wherever possible. These are be normally achieved through a man of action including detailed designs reviews, further geographical and geotechnical investigations, more detailed study of the projects environment, the used of alternatives contractual agreements, closer co-ordination with the projects teams or the applications of different technology or constructions methods.

Risk Transfer: Risks transfers involve transferring the risks from one part to another, without changing the total amount of risks in the projects. Risks transfers may occurs between these parties involved in the projects or between one party and an insurer. The decisions to transfers or allocate risks to another party are implemented through an insurances policy or the condition of contracts. It is usually up to the clients to initiates the transfers of risks, although there were several factors that needs to be considered before any risks transfers. First, the capability of the party whom the risks are being transferred to manages or controls the risks and accepting the consequence of risks transfers. The second consideration was whether or not the risks premiums that will have to be paid for the transfers of risks are greater than the costs of the consequence.

Risk Retention: In some situations the only options available was to retain a risks. The party that was holding risks could be the only one that may manage the risks or accepts the consequence. It was normal for the clients to be left with some risk and these were termed residuals risk.

VII. VALUE ENGINEERING AND RISK MANAGEMENT FOR DEVELOPING LOW COST HOUSING PROJECTS

The used of VE and RM for developing housings projects for the poor are promising and expected to delivers housing unit that meets the customers satisfactions at the most cost-effectives manner. The benefit of incorporating VE and RM in developing housings projects for the poor might be summarized as:

1. **Better Understanding of the Customer Needs and Requirements**
   VE and RM are total customers driven techniques directed towards understanding the customer objectives, establishing the value systems, identify, analyzing and respond to different risk which affecting and hinder the achievements of customers

ISSN (online): 2581-3048
Volume 3, Issue 5, pp 22-30, May-2019

objective and the projects brief may be improved by refining requirement, analyzing function and feeding backs for future project.

2. **Removing Unnecessary Cost**
   Applications of VE and RM help "a" achieving optimums values for money in satisfying a range of customer's requirement, "b" preventing unnecessary expenditure, "c" achieving balance between costs and functions, "d" using substitute's material, "e" reviewing designs at key point, "f" improving Life Costs Cycling, "g" avoiding over specifications and "h" conserving energy.
3. **Reducing Project Time**
   These might be achieved through "a" simplifying projects designs and constructions methods, "b" managing risk that can delay the projects completions and "c" using standards element.
4. **Improving Communication and Team Working**
   The diversity of workshops teams' member represents a cornerstone for successful result. Representing all projects stakeholder make sure that their view, objective and requirement is well perceived and adequately reflected in designs and constructions. As well as, their participations in the decisions making processes emphasize their commitments to implements the selected decisions. As well as, applications of VE and RM principle help escalating employees' enthusiasm and enhancing skill through team's participations and improving communications between stakeholders.
5. **Created, Challenged and Innovative Ideas**
   VE and RM were based on systematic step which make sure that the problems in hand was thoroughly studied, innovative alternative were generated and evaluated, best alternative were selected and implemented. These help getting better confidence in developed solution, accelerating the incorporations of new material and constructions technique, carrying out continual improvements of standard and policies and challenging traditional working process and procedure.
6. **Managing Change Orders Effectively**
   VE and RM have different opportunities to be applied throughout the projects life cycle for achieving good value for money and manage associated risks. This opportunity was at: "a" Conception formulation, "b" Design tentative, "c" Working Drawing, "d" Construction, and "e" Operation stages. These help managing change order that may happens during the design and construction stages and helps responding effectively to the drivers that may affect the project briefs.

VIII. CASE STUDY RESULTS FROM THE UNITED ARAB EMIRATES

A recent study carried out by Abdellatif and Othman (2007) to improve the sustainability of low incomes housings project in the cities of Mustafa, Abu Dhabi, United Arab Emirates showed that: 71.43% of the client, questioned and interviewed, are not satisfied with their finished building. They attributed their satisfactions to a numbers of reasons:

- The designs firm overlooked the client' requirement and behaved unilaterally in taking designs decision on behave of them.
- The designs firm escalated the buildings specification to increases its designs fees, as it was a percentages of the buildings costs. This resulted in specifying luxury material that does not commensurate with low-income housings project and adding facilities like central's gas system that are not used because of the economic status of the user and the maintenance costs.
- The whole life cycles of the projects were not considered such as using uppers water tank make from endurable material, which were exposed to external weather, humidity and sunlight. These resulted in getting them cracked and their connection rusted. The lifetime of the projects were expected to be 20 year, where these tanks become unusable within 3 years of used.
- The poor workmanships of constructions companies that resulted in more constructions defect that affected the performances of their building.

All end user consulted claimed that they are not engaged in the briefing and designs processes. Hence, their requirements are not captured and their need was not reflected in designs. For examples the increasing family sizes forced some user for using the services room as accommodations and used the public area as corridor and roof as a store. Architect mentioned that this might be attributed to the nature of the governments and housings project, where the end users are usually absents or unknowns during the briefing and designs processes.

IX. CONCLUSIONS AND RECOMMENDATION

Having reviewed the historical developments of housings project, the concept of customers satisfactions, VE and RM in constructions in addition to investigating the capability of VE and RM and their benefit for developing housings project to the poor and presenting learned lesson and feedbacks extracted from cases study of low-income housings project constructed by the governments of the Egypt, the researchers

ISSN (online): 2581-3048
Volume 3, Issue 5, pp 22-30, May-2019

can reaches the following conclusion: Governments authorities, designs firm and professional parties responsible of developing housings project to the poor were advised to focus on buildings sustainable, affordable housings project that achieves the user satisfactions through:

- Supporting and adopting the concepts of customer's satisfactions by involving the client and user in the briefings and designs processes.
- Playing actives roles such as customers advisor through capturing their requirement, understandings their habit and tradition, getting their feedbacks and comment to close the loop and avoids mistake and deficiencies in future project.
- Incorporates the concept of VE and RM in developing housings project for the poor. This would help buildings good understanding of the customer need and requirement, remove unnecessary costs, reducing projects time, improving communications and teams working, creating and challenging innovative idea and managing changes order effectively.
- Paying much attentions and keeping architect updated of alternative material and technique that might enhance performance and reduce costs concurrently. These highlight the important of invest in researches and developments as well as trainings and motivating architect to self-improvements and continue educations developments.

ACKNOWLEDGEMENT

All thanks and appreciation for the support of this research professor Amin Saleh and M.Kotb.

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AUTHOR'S BIOGRAPHIES

3rd Author

Khaled Muhammad Ali Muhammad
Ph.D. Student,
Structural Engineering Department,
Faculty of Engineering,
Al-Azhar University, Cairo, Egypt.
Born in Cairo, Egypt.
On 1/10/1986.
ID. No. 28610010129531

Citation of this article:

M.Kotb, Amin Saleh, Khaled Muhammad Ali Muhammad, "A Value Engineering Methodology for Low Income Housing Projects in Egypt" Published in *International Research Journal of Innovations in Engineering and Technology (IRJIET)*, Volume 3, Issue 5, pp 22-30, May 2019.

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