RANKING DELAY, COST, QUALITY FACTORS FOR PROJECT SUCCESS IN REAL ESTATE COMPANIES

Ajit Pal Singh (PhD Research Scholar)¹ & Rajwinder Singh²

Abstract—Real estate construction delays, cost escalation, and poor quality of construction can be defined as the late completion of projects compared to the planned schedule, cost spent within budget, and according to quality specification. Real estate construction delays, cost control, and poor quality of construction can be minimized only when their causes are identified. The aim of this research study was to identify and rank the most important factors and items causing of construction delays, cost escalation, and poor quality of construction related reasons in Addis Ababa (Ethiopia). A structured questionnaire five points Likert scale based was adopted in this study; 750 questionnaires were distributed to employees working in real estate companies in Addis Ababa city. The ordinal data were analyzed by the Pearson product-moment correlations coefficients, which was used to check the relationship among factors and relative important index method, which was used to rank the factors and items by using relative importance index. Pearson product-moment correlations coefficients research findings revealed that there is no positive strong relationships among three factors i.e., delay, cost increasing, and poor quality in real estate construction projects. Also relative importance index showed that cost increasing factor (0.680) was found to be most obstacles followed by delay in project completion factor (0.627). The findings of this research study would be valuable for all real estate construction professionals involved in the real estate companies.

Keywords—Project management, Delay, Cost, Quality, Real estate companies

1. INTRODUCTION

Construction plays a major role in the development of any nation and was considered one of the major indicators for measuring the economic growth of countries (Alzahrani & Emsley, 2013). The construction industry has unique characteristics, which include the construction process, project management knowledge areas and project management process group. According to Anbari (1985) projects and project management can trace their roots to major project such as the pyramids, the Great Wall of China, Roman roads and viaducts, and Greek architecture. Whereas, modern project management can be traced to the 1950s and the 1960s, with major project such as the Polaris project, space exploration, highways, nuclear power plants, and defense systems. Since then, project management has been growing rapidly and strengthened by new applications of project management in engineering, construction, information technology, pharmaceuticals, and government, as well as a better understanding of the effectiveness of project management for increasing resource productivity and producing successful project outputs and strategic outcomes (Anbari, 2010).

A. Project

Projects are playing major role in the economic development of a country. During planning of economy of the country large amount of money is to be invested in projects related to industry, construction, minerals, power, transportation, irrigation, education etc. with a view to improve the socio-economic conditions of the people. These projects are designed and implemented with the plan of well-organized management, earning adequate return to provide for future development with their own resources.

Professionals, expert, and practitioner have stated that project management is a vital strategic view. It provides entities with powerful set of tools that develop their ability to apply managerial functions to accomplish specific organizational goals. Project management is a results-oriented management style that places a quality on building collaborative relationships among diverse cast of characters. Exciting openings await people skilled in project management areas (Larson & Grey, 2011).

Different researchers give various definitions for a project. Their definition depends on their areas of research studies and the point of view that each researcher used. But to have comprehensive understanding of a project, it is better to refer different definitions of a project. According to Oxford Dictionaries (2016) in modern business and science, a project is an individual or joint enterprise, possibly involving research or design that is carefully planned, usually by a project team, to achieve a particular aim. A project is a set of interrelated tasks to be executed over a fixed time period and within certain cost and other limitations (BusinessDictionary.com). According to PMI (2013) project is a temporary endeavor undertaken to create a unique product, service, or result.

Larson and Grey (2011) stated: “Like most organizational effort, the major goal of a project is to satisfy a customer’s need. Beyond this fundamental similarity, the characteristics of a project help differentiate it from other endeavors of the organization”. This definition was given based on two key characteristics of project. All projects are temporary and undertaken

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to create a product, service, or result that is unique. These two simple concepts create a work environment that mandates different management approach from that used by an operations manager, whose work is oriented toward continuous improvement of existing processes over longer periods of time. Accordingly, Modesto and Tichapondwa (2009) define project as initiative to bring about change in order to achieve specific objectives, within a timescale, in a given context with normally allocated budget. Verzuh (2005) stated that: “we live in a world where change and the rate of change is constantly increasing. In order to survive and prosper, organizations need to continually modify their products and services. Projects are the means by which these innovations are affected. Greater change = more innovations = more projects.”

Many other researchers and books prefer to define and explain project by describing the common characteristics of projects instead of giving a direct definition so that anyone can define project by integrating these features of projects. Different scholars provide the unique features of projects. Nicholas and Steyn (2008) provide comprehensive characteristics of projects. The following section is the discussion on these characteristics.

B. Characteristics of a Project

Regardless of specific features of particular projects, below are some common characteristics forwarded by Nicholas and Steyn (2008) for all projects:

- A project involves a single, definable purpose and well-defined end-items, deliverables, or results, specified in terms of cost, schedule, and performance requirements. Larson and Grey (2011) stated that this singular purpose is often missing in daily organizational life where employees carry out repetitive operations daily.
- Every project is unique, a one-time activity, something different than was done previously and never to be exactly repeated again. Lock (2001) discussed that the principal identifying characteristic of any project is its novelty and stepping into the unknown, fraught with risk and uncertainty. No two projects are ever exactly identical, and even a repeated will differ from its predecessor, administrative or physical aspects. In a “routine” project such as home construction, variables such as terrain, access, zoning laws, labor market, public services, and local utilities make it unique.
- Projects are temporary activities consisting of an ad hoc organization of personnel, resources, and facilities assembled to accomplish a objective within a scheduled time frame; once the specified objective is achieved, the ad hoc activities are disbanded.
- Projects cut across organizational and functional lines because they need skills and multiple talents, professions, and organizations. Larson and Grey (2011) stated that instead of working in separate offices under separate managers, all project team members should work closely together under the guidance of a project manager to complete a project.
- Given that each project is unique involving unfamiliarity, risk and encompass new processes and for the organization undertaking it, possess significant elements of uncertainty and risk.
- The organization usually has something at risk while doing a project. The work calls for special analysis because failure would put in danger the organization objectives.
- A project is the process of working to achieve an objective; during the process, projects pass through project life cycle. The tasks, people, organizations, and other resources involved in the project change as the project moves from one phase to the next.

C. Classification of Projects

The scope, size, type, location, technology/processes, and speed are normally the factors which determine the effort needed in executing a project. Project can be classified under different heads, some of which are shown in Figure 1 (http://www.ddegjust.ac.in).

Projects can be classified under different headings such as based on type of works that projects involve, based on size (duration) of projects, and so on. Lock (2001) classified projects into four main headings based on type of works that projects involve as the following.

(1) Civil Engineering, Construction, Petrochemical, Mining and Quarrying Projects

These projects are characterized by on site activities, remote from the contractors’ head office which incur special risks, and involves massive capital investment. They deserve rigorous management of time, cost, and quality. If the projects are extra-large, they will involve several contractors working together as joint venture or in a form of other means, which makes the projects more complicated. Barrie and Paulson (1992) defined that the construction industry is divided into four categories: residential construction (i.e., single family homes, multi unit town houses, garden apartments, high-rise apartments and condominiums), building construction, heavy engineering construction and industrial construction.

(2) Manufacturing Projects

Upon establishment of factories for producing goods, projects are often conducted. Different additional projects will also be executed after the establishment of a factory for different purposes such as new product development. These post-establishment projects are called manufacturing projects.
Regardless of the size of a company, it will run at least few projects throughout its lifespan. These projects are required by a company in different situations such as on plant or service center relocation, on restructuring of a system and organization, in research and development, for feasibility studies, for executing special trainings, to plan and conduct celebrations, etc.

These projects are independent research projects which consume huge amount of funds and lasts for many years. They assume high level of risks so that it becomes difficult or impossible to define end results. These projects require effective time and cost management.

Real estate projects involve the construction of houses for selling purpose. They also require huge capital investment with longer time and quality demands. Accordingly, they come under the first category of projects.

D. Project Management

PMI (2013) defines project management as an application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Similarly, Chandra (2017) define project management as an organized venture for managing projects, involves scientific application of modern tools and techniques in planning, financing, implementing, monitoring, controlling and coordinating unique activities or task produce desirable outputs in accordance with the determined objectives within the constraints of time and cost. This Chandra’s definition of project management is used as operational meaning in this research study. Project management is accomplished through the appropriate application and integration of the different logically grouped project management processes, which are categorized into five process groups. According to PMI (2013), these five process groups are: initiating, planning, executing, monitoring and controlling, and closing. McNamara (2002) stated that project management is carefully planned and organized efforts to accomplish a specific one-time effort, for example, construct a building. Project management includes developing a project plan, which includes defining project goals and objectives, specifying tasks along with careful controls to ensure the plan is being managed according to plan, what resources are needed, and associating budgets and timelines for completion. Project management generally follows major phases, including feasibility study, project planning, implementation, evaluation and support. Heerkens (2012) stated: “The project management process calls for the creation of a small organizational structure, which is often a microcosm of the larger organization. Once the team has produced the desired outcome, the process then calls for the decommissioning of that small organizational structure.”

2. PROJECT SUCCESS - TIME, COST, AND QUALITY FACTORS

According to Muller and Jugdev (2012) there is no clear definition exists and stresses the need for measurable constructs of project success. According to Wit (1988) projects are a unique and temporary organization and vary in size, context and complexity. Accordingly, a criterion for measuring the success of a project varies (Mir & Pinnington, 2014) and a common
definition of project success and ways to measure it is therefore unlikely (Westerveld, 2003). Further Mir and Pinninting (2014) stated that the task is further obstructed by different interpretations and criteria of success from different stakeholders. Rockart (1982) coined the term-critical success factor and as those relatively small numbers of essentially important issues, which made the difference between success and failure. He explained that organizations should focus their attention and resources on these issues in order to achieve success. Cooke-Davies (2002), Sanvido, Grobler, Parfitt, Guvenis, and Coyle (1992), and Tiong (1992) agreed to a view whereby they defined critical success factors as those factors which are important for the project stakeholders to achieve their project goals.

Cheong and Mustaffa (2017) research study outlined the development trend of project success measurement globally and locally. Cheung, Suen, and Cheung (2004) identified project performance grouping such as people, cost, time, quality, safety and health, environment, client satisfaction, and communication. According to Freeman and Beale (1992) and Iyer (1996) schedule, cost, quality, safety’ and no-disputes are the important project evaluation criteria.

Pinto and Slevin (1987) described a process used to determine ten vital success factors that are felt to be foretelling of successful project management. The research study has provided the basis for developing a behavioral instrument to be used as a diagnostic for assessing the status of any project as determined by the model.

Project management success is measured mostly according to the traditional “iron-triangle” of time, cost, and quality (Shenhar & Dvir, 2007; Pinto & Slevin, 1988; Morris & Hough, 1987). All projects are controlled to a time outline during which they are to be completed. No projects are intended to continue forever. Thus, one of the basic requirements that control project management and determine its success is whether it is completed on as per stated schedule (Pinto, 2013).

Also all projects are constrained to a restricted budget, no organization has unlimited resources to spend on projects. Project also struggle for resources between each other. In order to use resources economically projects must stick to approved budget. Therefore, the second requirement that control project management is whether it is completed within budget guidelines or not (Pinto, 2013). Again all projects are produced to meet to some form of technical requirement determined at project initiation phase. Hence, measuring success equals determining to what extent the project fulfills the requirement (Pinto, 2013).

Niazi and Painting (2017) identified the significant factors that lead to construction cost overruns in Afghanistan. Results revealed that the key critical causes result in construction cost overruns in Afghanistan are corruption, delay in progress payment by owner, difficulties in financing project by contractors, security, change the order by the owner during construction and market inflation. Al-Hazim, Salem, and Ahmad (2017) study investigated the factors that may cause overrun of the planned cost, allocated resources and scheduled time of infrastructure engineering projects. The results revealed that the top factors terrain and weather conditions are causing completion delay and cost overrun in infrastructure projects in Jordan.

Senouci, Ismail, and Eldin (2016) investigated cost overruns and delays in Qatari public construction projects. Wanjari and Dobariya (2016) identified top three factors affecting cost overruns such as price escalation of raw material, delay in planned activity and lack of co-ordination between construction parties which could be significantly responsible for cost overrun of construction project in India.

Mukula, Aigbavboa, and Thwala (2015) assessed the effects of construction projects schedule overruns in the construction industry. The results revealed that the major effects of construction projects schedule overruns are due to addition of time, cost overruns, loss of profit, disputes, poor quality of work, stress to the client, hastening losses, bad reputation with contraction team, claims and delay in getting profit by the client were in Gauteng, South Africa.

Chai and Yusof (2015) defined and reclassify delay in housing delivery system and it is found that institutional delay is the major contributor to housing delay in Malaysia. Rahman, Memon, and Karim (2013) focused on investigated the effect of various factors on budget overrun in construction projects undertaken using management procurement method in Malaysia. Desai and Desale (2013) presented list of construction delays causes retrieved from literature. Sweis, Sweis, Rumman, Hussein, and Dahiya (2013) identified the factors i.e., governmental delay, severe weather conditions and design changes that have major roles in affecting the projects’ cost and these factors can be alleviated in the future. Ismail, Rahman, and Memon (2013) studied the factors affecting time and cost overruns throughout life cycle of construction projects. However, all the research studies shall not be produced but the contributions of many researchers to identify factors affecting project management strategies in terms of project success, time, cost, and quality are shown in Appendix-A.

3. RESEARCH METHODOLOGY

Primary data collection is done by a structured designed questionnaire based on five point ordinal measures Likert scale representing strongly agreed = 5 and strongly disagree = 1 was adopted in this research study to investigate the reasons related to delay in project completion, project cost increasing, and poor quality of construction in real estate construction projects in the Addis Ababa city (Ethiopia). The questionnaires survey was used due most speedy, cheaper and economical methods for collecting a large amount of data in a short period.

Questionnaire was randomly distributed to 750 employees working in real estate companies in Addis Ababa city (Ethiopia). A total of 737 questionnaires were received, yielding 87.24% response rate. 641 correctly filled questionnaires were adequate for analysis and reporting the findings of this research study (Miller, 1991). Questionnaire are coded and analyzed further for correlation analysis and relative importance index methods by using SPSS-20 version. A total of three factors consisting of 44 items were identified by previous studies as shown in Appendix-A.
A pilot study was also conducted by distributing the 50 questionnaires to experts, managers in real estate companies, and advisor to identify ambiguous questions/items and to test the techniques used to collect data. Pilot questionnaire study results were reviewed and minor adjustments were made accordingly a final questionnaire is produced.

Pearson product-moment correlation coefficient (r) is generally used method for measuring the degree of relationship between two variables. It is assumed that there is linear relationship between the two variables and the two variables are casually related which means that one of the variables is independent and the other one is dependent. Moreover, a large number of independent causes are operating in both variables to produce a normal distribution (Kothari & Garg, 2014). The present research study applied Pearson product-moment correlations coefficients (r) to determine the relationship between project management knowledge areas and real estate project success.

The Pearson product-moment correlations coefficients (r) were reviewed and minor adjustments were made accordingly a final questionnaire is produced. The relative importance index was computed based on the following question (1).

\[ RII = \frac{\sum_{i=1}^{5} Weights}{A \times N} = \frac{n_1 + 2n_2 + 3n_3 + 4n_4 + 5n_5}{5 \times 641} \]  

Where,

- \( W \) = Weight given to each factor by the respondent (Likert scale ranging from 1-5)
- \( n_1 \) = Number of respondents indicating “strongly agree”, \( n_2 \) is the number of respondents indicating “disagree”, \( n_3 \) is the number of respondents indicating “neutral”, \( n_4 \) is the number of respondents indicating “agreed”, \( n_5 \) is the number of respondents indicating “strongly agreed”
- \( A \) = Highest weight (i.e., 5 in this case)
- \( N \) = Total number of respondents (i.e., 641 in this case)

The relative importance index ranges from 0 to 1 (Naoum, 2007), higher the value of relative importance index for factor and item more important was the reasons for delay in project completion, reasons for project cost increasing, and reasons related to poor quality of construction in real estate companies project. These ranking make it possible to compare the relative importance of the factors. The relative importance index scale used for relative importance index analysis is shown in Table 2.

### Table 1: Guidelines to Interpret Pearson Product-Moment Correlations Coefficients (r)

<table>
<thead>
<tr>
<th>Strength of Association</th>
<th>Pearson Correlation Coefficient (r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weak</td>
<td>0.0-0.29</td>
</tr>
<tr>
<td>Moderate</td>
<td>0.30-0.49</td>
</tr>
<tr>
<td>Strong</td>
<td>0.50-1.00</td>
</tr>
</tbody>
</table>

**Source:** Pallant, 2010; Cohen, 1988

According to Kothari and Garg (2014) the value of the Pearson product-moment correlations coefficients (r) should lie between +1 and –1. A positive values of Pearson product-moment correlations coefficients (r) indicates a positive correlation between the two variables (i.e., changes in both variables take place in the statement direction), whereas negative values of Pearson product-moment correlations coefficients (r) indicate negative correlation (i.e., changes in the two variables taking place in the opposite directions). Whereas, a zero value of Pearson product-moment correlations coefficients (r) indicates that there is no association between the two variables. The value of Pearson product-moment correlations coefficients (r) nearer to +1 or -1 indicates high degree of correlation between the two variables.

To measure attitudes with respect to the questionnaire factors and items, the relative importance index technique was used. The relative index technique has been more used in construction research studies for measuring attitudes with respected to questionnaires factors and items under research study.

The relative importance index was computed based on the following question (1).

The relative importance index ranges from 0 to 1 (Naoum, 2007), higher the value of relative importance index for factor and item more important was the reasons for delay in project completion, reasons for project cost increasing, and reasons related to poor quality of construction in real estate companies project. These ranking make it possible to compare the relative importance of the factors. The relative importance index scale used for relative importance index analysis is shown in Table 2.

### Table 2: Relative Importance Index (RII) Scale

<table>
<thead>
<tr>
<th>RII Scale</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00-0.20</td>
<td>Not critical</td>
</tr>
<tr>
<td>0.21-0.40</td>
<td>Fairly critical</td>
</tr>
<tr>
<td>0.41-0.60</td>
<td>Average critical</td>
</tr>
<tr>
<td>0.61-0.80</td>
<td>Very critical</td>
</tr>
<tr>
<td>0.81-1.00</td>
<td>Extremely critical</td>
</tr>
</tbody>
</table>

**Source:** Bhirud & Vasant (2015)

### 4. DATA COLLECTION AND ANALYSIS

**A. Correlation between Project Delay, Cost, Quality and Project Success**

This research study applied Pearson product-moment correlations coefficients (r) to determine the effects of project delay, cost, and quality on real estate project success.
The strength of relationship between (i) reasons for delay in project completion (PDC), (ii) reasons for project cost increasing (PCI), (iii) reasons related to poor quality of construction (PQC), and dependent variable project success (PS) are shown in Table 3. Table 3 result reflects that all the independent variables such as reasons for delay in project completion (PDC) has a positive correlation, reasons for project cost increasing (PCI) has negative correlation, reasons related to quality of construction (PQC) has positive correlation with the dependent variable (i.e., project success).

Table 3: Product-Moment Correlations Coefficients (r) between Independent and Dependent Variables, N=641

<table>
<thead>
<tr>
<th></th>
<th>SD</th>
<th>PDC</th>
<th>PCI</th>
<th>PQC</th>
<th>PDCQ</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDC</td>
<td>0.211</td>
<td>r</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sig.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCI</td>
<td>0.668</td>
<td>r</td>
<td>0.378**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sig.</td>
<td>0.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PQC</td>
<td>0.166</td>
<td>r</td>
<td>-0.003</td>
<td>0.037</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sig.</td>
<td>0.936</td>
<td>0.347</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDCQ</td>
<td>0.265</td>
<td>r</td>
<td>0.582**</td>
<td>0.948**</td>
<td>0.239**</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sig.</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>PS</td>
<td>0.654</td>
<td>r</td>
<td>0.010</td>
<td>-0.184**</td>
<td>0.019</td>
<td>-0.147**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sig.</td>
<td>0.798</td>
<td>0.000</td>
<td>0.633</td>
<td>0.000</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

Note: SD-Standard deviation, r-Pearson correlation coefficient, Sig.-Significance at 2-tailed, PDCQ-Project delay, cost, and quality, Independent variables-Delay in project completion (PDC), project cost increasing (PCI), Project quality of construction (PQC), and dependent variable-project success (PS)

Source: Computation based on data gathered from author’s field work

(i) Delay in Project Completion (PDC) and Project Success (PS)
The relationship between delay in project completion (PDC) and project success was investigated using Pearson product-moment correlation coefficient (r). There was a very weak, positive correlation between the two variables (Table 2), r = 0.010, n = 641, p > .01 (statistically not significant), reflecting that hypothesis one is rejected (H1: Delay in real estate construction projects has positive strong relationship with project success). Therefore, alternative hypothesis was accepted i.e., delay in real estate construction projects has no positive strong relationship with project success.

(ii) Project Cost Increasing (PCI) and Project Success (PS)
The relationship between project cost increasing (PCI) and project success was investigated using Pearson product-moment correlation coefficient (r). There was a strong, negative correlation between the two variables (Table 2), r = -.814, n = 641, p < .01 (statistically significant), reflecting that hypothesis two is rejected (H2: Cost increasing in real estate construction projects has positive strong relationship with project success). Therefore, alternative hypothesis was accepted i.e., cost increasing in real estate construction projects has no positive strong relationship with project success.

Since the sign of the Pearson product-moment correlations coefficients (r) value is negative (less than 0), the relationship is indirect, indicating that both variables move in the opposite direction. If one variable increases (reasons of project cost increasing-PCI), the other variable decreases (project success-PS) with the same magnitude, and vice versa. It means as the reasons of project cost increasing (PCI) increases, there is a strong likelihood that project success (PS) will also decrease.

(iii) Poor Quality of Construction (PQC) and Project Success (PS)
The relationship between poor quality of construction (PQC) and project success was investigated using Pearson product-moment correlation coefficient (r). There was a very weak, positive correlation between the two variables (Table 2), r = 0.019, n = 641, p > .01 (statistically not significant), reflecting that hypothesis three is rejected (H3: Poor quality of construction in real estate construction projects has positive strong relationship with project success). Therefore, alternative hypothesis was accepted i.e., Poor quality of construction in real estate construction projects has no positive strong relationship with project success.

B. Ranking Reasons for Delay, Cost, and Quality related Problems Factors
There are 20 items for reasons for delay in project completion factor, 16 items for reasons for project cost increasing factor, and 8 items are related to poor quality of construction factor. The level of importance of each factor and item were established by comparing relative importance index for each of the factor and item and accordingly ranking has been done for each factor and item. Table 4 shows a summary of the relative importance index and the rank for each factor and item.

(i) Reasons for Delay in Project Completion
The second most significant factor is delays in project completion in real estate residential projects to be successful. Under this factor, item cost variations is there for materials and equipments used for construction time to time. Table 4 shows that respondents ranked the materials and equipments cost variations, and lack of foreign currency exchange as the first and second
of the most influential cause (0.721 and 0.717: very critical) responsible for project delay among the sixteen items respectively. Followed by materials purchased from abroad countries as third, materials unavailability in local market as fourth, and materials unavailability on time as fifth (0.697, 0.671, and 0.658: very critical). These results agrees with the findings of several researches conducted in different countries to evaluate the most significant causes of project delays as shown in Appendix-A.

Table 4: Relative Importance Index and Ranking factors and Items, N = 641

<table>
<thead>
<tr>
<th>Factors/Items</th>
<th>Importance (Five Point Likert Scale)</th>
<th>Weight</th>
<th>RII</th>
<th>Ranking</th>
<th>Critical</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reasons for Delay in Project Completion (PDC)</strong></td>
<td></td>
<td>0.627</td>
<td>2</td>
<td>Very Critical</td>
<td></td>
</tr>
<tr>
<td>1. Materials, equipments cost variations</td>
<td>8 92 164 259 118</td>
<td>2310</td>
<td>0.721</td>
<td>1</td>
<td>Very Critical</td>
</tr>
<tr>
<td>2. Lack of foreign currency exchange</td>
<td>11 72 217 214 127</td>
<td>2297</td>
<td>0.717</td>
<td>2</td>
<td>Very Critical</td>
</tr>
<tr>
<td>3. Materials coming from abroad</td>
<td>8 86 233 214 100</td>
<td>2235</td>
<td>0.697</td>
<td>3</td>
<td>Very Critical</td>
</tr>
<tr>
<td>4. Materials unavailability local market</td>
<td>12 125 202 226 76</td>
<td>2152</td>
<td>0.671</td>
<td>4</td>
<td>Very Critical</td>
</tr>
<tr>
<td>5. Materials unavailability time</td>
<td>16 144 199 203 79</td>
<td>2108</td>
<td>0.658</td>
<td>5</td>
<td>Very Critical</td>
</tr>
<tr>
<td>6. Collection amount house owner</td>
<td>14 116 293 162 56</td>
<td>2053</td>
<td>0.641</td>
<td>6</td>
<td>Very Critical</td>
</tr>
<tr>
<td>7. Numbers project going</td>
<td>16 145 258 165 57</td>
<td>2025</td>
<td>0.632</td>
<td>7</td>
<td>Very Critical</td>
</tr>
<tr>
<td>8. Lack of coordination</td>
<td>18 169 227 164 63</td>
<td>2008</td>
<td>0.627</td>
<td>8</td>
<td>Very Critical</td>
</tr>
<tr>
<td>9. Skilled manpower shortage</td>
<td>25 164 230 158 64</td>
<td>1995</td>
<td>0.622</td>
<td>9</td>
<td>Very Critical</td>
</tr>
<tr>
<td>10. Design change</td>
<td>17 172 272 132 48</td>
<td>1945</td>
<td>0.607</td>
<td>10</td>
<td>Average Critical</td>
</tr>
<tr>
<td>11. Clearing wastes site</td>
<td>35 147 310 131 32</td>
<td>1943</td>
<td>0.606</td>
<td>11</td>
<td>Average Critical</td>
</tr>
<tr>
<td>12. Time techniques</td>
<td>51 133 241 202 14</td>
<td>1918</td>
<td>0.598</td>
<td>12</td>
<td>Average Critical</td>
</tr>
<tr>
<td>13. Project location</td>
<td>21 194 273 114 39</td>
<td>1879</td>
<td>0.586</td>
<td>13</td>
<td>Average Critical</td>
</tr>
<tr>
<td>14. Budget insufficient</td>
<td>68 202 189 167 15</td>
<td>1782</td>
<td>0.556</td>
<td>14</td>
<td>Average Critical</td>
</tr>
<tr>
<td>15. Finance insufficient</td>
<td>94 177 207 138 25</td>
<td>1746</td>
<td>0.545</td>
<td>15</td>
<td>Average Critical</td>
</tr>
<tr>
<td>16. Machinery unavailability</td>
<td>67 216 212 130 16</td>
<td>1735</td>
<td>0.541</td>
<td>16</td>
<td>Average Critical</td>
</tr>
<tr>
<td><strong>Reasons for Project Cost Increasing (PCI)</strong></td>
<td></td>
<td>0.680</td>
<td>1</td>
<td>Very Critical</td>
<td></td>
</tr>
<tr>
<td>1. Materials price fluctuating</td>
<td>8 48 159 245 180</td>
<td>2461</td>
<td>0.768</td>
<td>1</td>
<td>Very Critical</td>
</tr>
<tr>
<td>2. Cost machinery fluctuating</td>
<td>8 56 174 217 186</td>
<td>2440</td>
<td>0.761</td>
<td>2</td>
<td>Very Critical</td>
</tr>
<tr>
<td>3. Transportation cost fluctuating</td>
<td>6 54 189 221 171</td>
<td>2420</td>
<td>0.755</td>
<td>3</td>
<td>Very Critical</td>
</tr>
<tr>
<td>4. Tendering method</td>
<td>16 84 156 175 210</td>
<td>2402</td>
<td>0.749</td>
<td>4</td>
<td>Very Critical</td>
</tr>
<tr>
<td>5. Machinery maintenance cost</td>
<td>8 54 200 222 157</td>
<td>2389</td>
<td>0.745</td>
<td>5</td>
<td>Very Critical</td>
</tr>
<tr>
<td>6. Cost labor fluctuating</td>
<td>12 70 185 192 182</td>
<td>2385</td>
<td>0.744</td>
<td>6</td>
<td>Very Critical</td>
</tr>
<tr>
<td>7. Interest rates bankers</td>
<td>13 87 189 180 172</td>
<td>2334</td>
<td>0.728</td>
<td>7</td>
<td>Very Critical</td>
</tr>
<tr>
<td>8. Monopoly suppliers</td>
<td>11 119 148 212 151</td>
<td>2296</td>
<td>0.716</td>
<td>8</td>
<td>Very Critical</td>
</tr>
<tr>
<td>9. Currency exchange</td>
<td>10 110 163 244 114</td>
<td>2265</td>
<td>0.707</td>
<td>10</td>
<td>Very Critical</td>
</tr>
<tr>
<td>10. Inflationary pressure</td>
<td>13 105 164 243 116</td>
<td>2267</td>
<td>0.707</td>
<td>9</td>
<td>Very Critical</td>
</tr>
<tr>
<td>11. Local production raw materials</td>
<td>20 125 184 220 92</td>
<td>2162</td>
<td>0.675</td>
<td>11</td>
<td>Very Critical</td>
</tr>
<tr>
<td>12. Estimation methods</td>
<td>30 142 213 155 101</td>
<td>2078</td>
<td>0.648</td>
<td>12</td>
<td>Very Critical</td>
</tr>
<tr>
<td>13. Project financing</td>
<td>12 150 229 184 66</td>
<td>2065</td>
<td>0.644</td>
<td>13</td>
<td>Very Critical</td>
</tr>
<tr>
<td>14. Poor productivity</td>
<td>25 135 248 188 45</td>
<td>2016</td>
<td>0.629</td>
<td>14</td>
<td>Very Critical</td>
</tr>
<tr>
<td>15. Number of competitors</td>
<td>13 131 305 141 51</td>
<td>2009</td>
<td>0.627</td>
<td>15</td>
<td>Very Critical</td>
</tr>
<tr>
<td>17. Financial control site</td>
<td>24 188 224 156 49</td>
<td>1941</td>
<td>0.606</td>
<td>11</td>
<td>Average Critical</td>
</tr>
<tr>
<td>18. Duration contract period</td>
<td>17 170 278 133 43</td>
<td>1938</td>
<td>0.605</td>
<td>18</td>
<td>Average Critical</td>
</tr>
<tr>
<td>19. Contract management</td>
<td>48 149 244 181 19</td>
<td>1897</td>
<td>0.592</td>
<td>19</td>
<td>Average Critical</td>
</tr>
<tr>
<td>20. Project team planning</td>
<td>27 199 238 139 38</td>
<td>1885</td>
<td>0.588</td>
<td>20</td>
<td>Average Critical</td>
</tr>
<tr>
<td><strong>Reasons Related to Poor Quality of Construction (PQC)</strong></td>
<td></td>
<td>0.600</td>
<td>3</td>
<td>Average Critical</td>
<td></td>
</tr>
<tr>
<td>1. Proper machinery</td>
<td>30 90 191 257 73</td>
<td>2176</td>
<td>0.679</td>
<td>1</td>
<td>Very Critical</td>
</tr>
<tr>
<td>2. Unskilled labor</td>
<td>71 266 185 79 40</td>
<td>1674</td>
<td>0.522</td>
<td>2</td>
<td>Average Critical</td>
</tr>
<tr>
<td>3. Low grade materials</td>
<td>83 276 178 73 31</td>
<td>1616</td>
<td>0.504</td>
<td>3</td>
<td>Average Critical</td>
</tr>
<tr>
<td>4. Laboratory passed materials</td>
<td>28 75 172 280 86</td>
<td>2244</td>
<td>0.500</td>
<td>4</td>
<td>Average Critical</td>
</tr>
<tr>
<td>5. Materials purchased certified suppliers</td>
<td>29 75 164 291 82</td>
<td>2245</td>
<td>0.500</td>
<td>5</td>
<td>Average Critical</td>
</tr>
<tr>
<td>6. Low grade machinery</td>
<td>86 280 182 68 25</td>
<td>1589</td>
<td>0.496</td>
<td>6</td>
<td>Average Critical</td>
</tr>
<tr>
<td>7. Materials quality check</td>
<td>88 280 177 69 27</td>
<td>1590</td>
<td>0.496</td>
<td>7</td>
<td>Average Critical</td>
</tr>
<tr>
<td>8. Quality management system</td>
<td>24 77 166 286 88</td>
<td>2260</td>
<td>0.495</td>
<td>8</td>
<td>Average Critical</td>
</tr>
</tbody>
</table>

*Source: Computation based on data gathered from author’s field work*
(ii) Reasons for Project Cost Increasing
The first most significant factor is project cost increasing in real estate residential projects before it becomes successful. Under this factor, item cost variations is there for materials and equipments used for construction time to time. Table 4 shows that respondents ranked the materials price fluctuating, cost of machinery always fluctuating, and transportation cost fluctuating as first, second, and third of the most influential cause (0.768, 0.761, and 0.755: very critical) responsible for project cost increasing among the twenty items respectively. Followed by machinery maintenance cost as fourth, labor cost fluctuating as fifth, and interest rates by bankers as sixth (0.745, 0.744, and 0.728: very critical). These results agree with the findings of several researches conducted in different countries to evaluate the most significant causes of project cost overruns as shown in Appendix-A.

(iii) Reasons related to Poor Quality of Construction
The third significant factor is poor quality of construction in real estate residential house projects. In Table 4, item causing poor quality of construction is due to proper machinery were not used while construction of real estate housing projects is ranked as first (0.679: very critical) followed by unskilled labor used for construction work as second, and low grade materials used in construction of real estate residential housing projects as third of the most influential cause (0.522, 0.504: average critical). Followed by construction materials used which is not passed through laboratory quality tests as fourth, materials are purchased from uncertified suppliers as fifth, and low grade machinery used for construction works as sixth (0.500, 0.500, and 0.496: average critical). These results agree with the findings of several researches conducted in different countries to evaluate the most significant causes of project cost overruns as shown in Appendix-A.

Table 4 revealed that among all the three factors related to real estate projects to be successful, project cost increasing is found to be very critical factor (0.680), delays in project completion is found to be second most very critical factor (0.627), and third factor is poor quality in construction of real estate projects (0.600).

5. CONCLUSION
To make real estate projects to be successful there are many obstacles especially in developing countries like Ethiopia. In this research study three factors viz., delay in construction, project cost increasing, and poor quality of construction in real estate sector has been studied. All three hypotheses stated were rejected and reported that there was no strong positive relationship with project success. Cost increasing factor time to time due to many reasons was found to be the largest obstacles to the real estate construction projects and secondly, delay in construction factor is also contributing to real estate projects to be successful in developing country like Ethiopia. It can be concluded that materials price fluctuating, cost of machinery fluctuating, transportation cost fluctuating, materials and equipments cost variations, lack of foreign currency exchange, and proper machinery were not used for construction were most influential causes (very critical) which become obstacles for real estate projects to be successful in Ethiopia.

Appendix-A: List of Critical Success, Time, Cost, and Quality Factors for Project Success

<table>
<thead>
<tr>
<th>Critical Success Factors</th>
<th>Time Overrun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radujkovic &amp; Sjkavica (2017); Meng (2012); Pinto, Slevin, &amp; English (2009); Toor &amp; Ogunlana (2009); Toor &amp; Ogunlana (2008); Alagbari, Kadir, Salim, &amp; Ernawati (2007); Sambasivan &amp; Soon (2007); Andersen, Jessen, Birchall, &amp; Money (2006); CIDB Malaysia (2006); Kong &amp; Jason (2006); Fortune &amp; White (2006); Low &amp; Chuan (2006); Eriksson (2006); Dainty, Bryman, Price, Greasley, Soetanto, &amp; King (2005); Lim (2005); Narayanan &amp; Lai (2005); Nguyen, Ogunlana, &amp; Lan (2004); Takim, Akintoye, &amp; Kelly (2004); Belout &amp; Gauvreau (2004); Kadefors (2004); Cheung, Ng, Wong, &amp; Suen (2003); Walker &amp; Hampson (2003); Nicolini (2002); Cooke-Davies (2002); Hartman (2002); Akintoye (2000); Chua, Kog, &amp; Loh (1999); Dissanayaka &amp; Kumaraswamy (1999); Kumaraswamy &amp; Chan (1999); Lim &amp; Mohamed (1999); Pinto &amp; Slevin (1988); Walker (1997); Songer &amp; Molenaar (1997); Chan &amp; Kumaraswamy (1996); Munns &amp; Bjemiri (1996); Belassi &amp; Tukel (1996); Mayer, Davis, &amp; Schoorman (1995); Walker (1995); Munns (1995); Sanvindo, Grobler, Parfitt, Guvenis, &amp; Coyle (1992)</td>
<td>Aziz (2013); Gunduz, Nielsen, &amp; Ozdemir (2013); Mahamid (2013); Murray &amp; Seif (2013); Nawaz, Shareef, &amp; Ikram (2013); Pui &amp; Bharath (2013); Danso &amp; Antwi (2012); Modupe, Emmanuel, Agnes, &amp; Bamidele (2012); Abedi, Fathi, &amp; Mohammad (2011); Apolot, Alinatwe, &amp; Tindiwensi (2011); Hamzah, Khoiry, Arshada, Tawil, &amp; Che-Ani (2011); Mahamid (2011); Fugar &amp; Agyakwah-Baah (2010); Yang &amp; Wei (2010); Al-Kharashi &amp; Skitmore (2009); Enshassi, Al-Najjar, &amp; Kumaraswamy (2009); Kaliba, Muya, &amp; Mumba (2009); Luu, Kim, Van Tuan, &amp; Ogunlana (2009); El-razez, Bassioni, &amp; Mobarak (2008); Le-Hoai, Lee, &amp; Lee (2008); Swei, Swei, Abu Hammad, &amp; Shboul (2008); Alagbari, Kadir, &amp; Salim (2007); Moura, Teixeira, &amp; Pires (2007); Sambasivan &amp; Soon (2007); Assaf &amp; Al-Hejji (2006); Omorogie &amp; Radford (2006); Alwi &amp; Hampson (2003); Odeh &amp; Battaineh (2002); Ogunlana, Promkuntong, &amp; Jearkjirm (1996); Assaf, Al-Khalil, &amp; Al-Hazm (1995)</td>
</tr>
</tbody>
</table>

Source: Author’s literature review work
Appendix-A: List of Critical Success, Time, Cost, and Quality Factors for Project Success (Continued)

**Cost Overruns:** Niazi & Painting (2017); Senouci, Ismail, & Eldin (2016); Shah, (2016); Muhammad, Keyvansara, Majida, Shafaghata, Maganah, Lawanc, & Balubaida (2015); Roslan, Zainun, & Memon, (2015); Cheng (2014); Jamaludin, Mohammad, & Ahmad (2014); Memon, Rahman, Abdullah, & Azis (2014); Rosenfeld (2014); Roslan, Zainun, & Memon (2014); Sharma & Goyal (2014); Doloi (2013); Ismail, Rahman, & Memon (2013); Memon, Rahman, & Karim (2013); Rahman, Memon, & Karim (2013); Shanmunugapriya & Subramanian (2013); Memon Rahman, & Azl (2012); Amu & Adesanya (2011); Apolot, Alinaitwe, & Tindiwensi (2011); Abdullah, Rahman, & Azis (2010); Ali & Kamaruzzaman (2010); Ameh, Soyingbe, & Oduasami (2010); Bhargava, Anastasopoulos, Labi, Sinha, & Manning (2010); Cuntarelli, Flyvbjerg, Molin, & Wee (2010); Memon, Rahman, Abdullah, & Abdu (2010); The Swedish National Audit Office (2010); Enshassi, Al-Najjar, & Kamaraswany (2009); Kaliba, Muya, & Mumba (2009); Mosey (2009); Siemiatczyk, (2009); Azhar, Farooqui, & Ahmed (2008); Eshofionie & Patience (2008); Le-Hoai, Lee & Lee (2008); Harisaweni (2007); Moura, Teixeira, & Pires (2007); Oladapo (2007); Omogere & Radford (2006); Koushi, Al-Rashid, & Kartam (2005); Long, Ogunlana, Quang, & Lam, (2004); Odeck, (2004); Bordat, McCallough, & Sinha (2004); Flyvbjerg, Holm, & Buhl (2003); Frimpong, Oluwoye, & Crawford (2003); Jackson (2002); Olujide & Owosagba (2001); Mansfield, Ugwu, & Doran (1994); Jahren & Ashe (1990); Okpala & Aniekwu (1988); Kaming, Olomolaiye, Holt, & Harris (1997)

**Project Cost and Time Control:** Gunduz, Nielsen, & Ozdemir (2013); Murray & Seif (2013); Nawaz, Shareef, & Ikram (2013); Akinsiku & Akinsulure (2012); Danso & Antwi (2012); Abdullah, Azis, & Rahman (2011); Apolot, Alinaitwe, & Tindiwensi (2011); Abdullah, Rahman, & Azis (2010); Ali & Kamaruzzaman (2010); Ameh, Soyingbe, & Oduasami (2010); Creedy, Skitmore, & Wong (2010); Fugar & Agyakwah-Baah (2010); Memon, Rahman, Abdullah & Asmi (2010); Yang & Wei (2010); Olawale & Sun (2010); Abdullah, Rahman, Azis, Tun, & Onn (2009); Al-Khargasli & Skitmore (2009); Enshassi, Al-Najjar, & Kamaraswany (2009); Kaliba, Muya, & Mumba (2009); Azhar, Farooqui, & Ahmed (2008); Latif, Abidin, & Trigunarsyah (2008); Le-Hoai, Lee, & Lee (2008); Sveis, Sveis, Abu Hammad, & Shboul (2008); Alaghbari, Kadir, & Salim (2007); Sambasivan & Soon (2007); Aibinu & Odeyinka (2006); Lo, Fung, & Tung (2006); Omogere & Radford (2006); Iyer & Jha (2005); Koushi, Al-Rashid, & Kartam (2005); Lee et al (2005); Long, Ogunlana, Quang, & Lam (2004); Alwi & Hampson (2003); Baloi & Price (2003); Flyvbjerg, Holm, & Buhl (2003); Aibinu & Jagboro (2002); Chang & Asce (2002); Chang (2002); Odeh & Battaineh (2002); Sonuga (2002); Al-Momani (2000); Kuruoglu & Ergen (2000); Faniran (1999); Egbu (1998); Kumaraswamy, & Chang (1998); Yogeswaran, Kumaraswamy, & Miller (1998); Chan & Kumaraswamy (1997); Kaming, Olomolaiye, Holt, & Harris (1997); Ogunlana, Promkuntong & Jearkjirm (1996); Assaf, Al-Khalil, & Al-Hazmi (1995); Mansfield, Ugwu, & Doran (1994); Dlakwa & Cuplin (1990); Morris (1990); Ardlit, Akan, & Gurdamar (1985)

**Delays:** Maues, Santanta, Santos, Neves, Duarte (2017); Santoso & Soeng (2016); Senouci, Ismail, & Eldin (2016); Shah, (2016); Owoabi, Amusan, Oloke, Olusanya, Tunji Olayeni, Owolabi, & Omuh (2014); Aziz (2013); Sunjka & Jacob (2013); Kazaz, Ulubeyli, & Tuncbilekli (2012); Haseeb, Xinhai-Lu, Bibi, Maloof-ud-Dyian, & Rabbani (2011); Orangi, Palaneeswaran, & Wilson (2011); Fugar & Agyakwah-Baah (2010); Abd El-Razek, Bassioni, & Mobarak (2008); Le-Hoai, Lee, & Lee (2008); Sambasivan & Soon (2007); Sveis, Sveis, Abu Hammad, & Shboul (2008); Acharya, Lee, Kim, & Lee (2006); Aibinu (2006); Assaf & Al-Heiji (2006); Faridi (2006); Lo (2006); Koushi (2005); Frimpong (2003); Odeh & Battaineh (2002); Al-Momani (2000); Al-Khal (1999); Mezher & Tawil (1998); Odeyinka & Yusif (1997); Songer & Molenaar (1997); Ogunlana, Promkuntong & Jearkjirm (1996); Assaf, Al-Khalil, & Al-Hazmi (1995)

**Quality related Problems:** El-Saboni, Aouad, & Sabouni (2009); Thomas & Fernandez, (2008); Ahadzie, Proverbs, & Olomolaiye (2007); Kerzner (2006); Rose (2005); Belout & Gauvreau (2004); Chan & Chan (2004); Collins & Baccarini (2004); Hughes, Tippett, & Thomas (2004); Dvir, Raz, & Shenhar (2003); Westerveld (2003); Young (2003); Cooke-Davies (2002); White & Fortune (2002); Armstrong (2001); Chua, Kog, & Loh (1999); Lim & Mohamed (1999); Linberg (1999); Munns & Bjeirmi (1996); Paullk, Weber, Curtis, & Chrissis (1994); Freeman & Beale (1992); Wit (1988); Ashley, Lurie, & Jaselskis (1987); Ashley (1986); Slevin & Pinto (1986)

Source: Author’s literature review work

6. REFERENCES
Ranking Delay, Cost, Quality Factors For Project Success In Real Estate Companies


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