# INFLUENCE OF PROJECT MACRO PLANNING PROCESS ON PERFORMANCE OF GATED COMMUNITY HOUSING PROJECTS IN NAIROBI COUNTY, KENYA

***Michael Chris Musyoka***
*Facility Mgt. Supervisor / Projects Manager*
*General Motors East Africa Ltd*
*P.O. Box 30527-00100*
*Email: maiko.musyoka@gmail.com*
*Cell phone: +254 725 784982*

***Prof. Christopher Gakuu***
*Director, Open &Distance e-Learning*
*School of continuing and Distance Education*
*P.O. BOX 92-00902, KIKUYU*
*E-mail:cmgakuu@yahoo.com*
*Cell phone: +254 722 841432*

***Dr. Dorothy Ndunge Kyalo***
*Associate Dean, University of Nairobi*
*School of continuing and Distance Education*
*P.O. BOX 92 -00902, KIKUYU*
*E-mail: ndunge.kyalo@yahoo.com*
*Cell phone: +254 724 473490*

**Abstract**
The principal objective of this was to examine the influence of project macro planning process on performance of gated community housing projects in Nairobi County, Kenya. The study population comprised of all active gated community housing projects initiated in 2009 – 2014. A total of 572 respondents were drawn from 143 sampled gated community housing projects from the seventeen sub-counties of Nairobi County using census, stratified, simple random, and purposive sampling techniques. A standardized open ended interview guide and a questionnaire with both open and closed-ended items were used to collect data. Descriptive statistics showed that projects macro planning process had an influence on performance of gated community housing construction projects.The value of $r^2$ was 0.429, indicating that project macro planning process explained42.9% of the variation in the performance in gated community housing projects in Nairobi County, Kenya. The β coefficient was 0.655, indicating that project macro planning process had statistically significant influence on the performance of gated community housing projects (β=0.655, t=10.962, p=0.000<0.05). The β value implied that every unit change on the performance of gated community housing projects is associated with 65.5% changes in project macro planning process.

**Key Words:** Macro planning process, Project environment, Project performance, Gated community housing.

## Background to the Study

Planning is defined as a general term which is used in project management to encompass the ideas commonly referred to as programming, scheduling and organizing. Its aim is to

make sure that all work required to complete the project is achieved in the correct order, in the right place, at the right time, by the right people and equipment, to the right quality, and in the most economical, safe and environmentally acceptable manner (Mawdesley et, al. 1996). There are different planning processes which can be adopted by the housing project managers depending on the nature of their construction project organizations. One of such planning processes is the project macro planning process (pre-construction planning) which takes into consideration the characteristics of complex project planning (Waly and Thabet, 2002). This process takes place during the pre-construction stage of the project and involves the selection of major strategies, reviewing design constructability, the planning of major site operations and construction path, and arranging the primary means, methods and resources for the realization of the work packages. A housing construction project macro planning is of vital importance to its successful delivery and execution (Waly & Thabet, 2002).

An important part of macro planning process in housing construction projects is the creation of the project schedule. The project schedule places all the tasks of the project in a logical and sequential order. This process sets the priorities and schedule for the tasks necessary to complete the operation's objectives. During the macro planning process, the project may be organized in a variety of ways: Sequential - in which the project is separated into stages completely in a consecutive sequence of tasks, Parallel - in which the project contains independent portions that happen simultaneously, and Staggered - in which the different tasks may overlap each other (Thamhain, 2004).

To create a housing construction schedule that is as efficient as possible, project managers use three tools and techniques commonly: the Gantt chart (with critical path method), Line-of-balance (LOB) scheduling, and, more recently, 4D models. However, to obtain efficiency in project scheduling, time is not the only important aspect. The resources required to complete the identified tasks are often considered in conjunction with the creation of the project schedule. The logic behind this is that the duration of the schedule and the structuring of its tasks have a direct relation with the amount and type of resources required. This study analyzed the project macro planning process (pre-construction planning) to establish its influence on the performance of gated community housing construction projects in Nairobi County, Kenya.

**Statement of the Problem**

There has been massive growth in the Kenyan real estate sector with developers coming up with varied housing construction concepts to attract and accommodate the diverse needs of their clients. One concept that has been wholly embraced by various stakeholders in this industry is the idea of gated community housing (Landman, 2012). For a housing construction project to be considered as successful, it must meet certain performance measures such as timely completion, within budget as well as satisfying all the stakeholder's needs in the project. The absence of reworks as well as 'fitness of purpose' for the occupiers has also been considered as a housing construction project success indicator (Landman, 2012).

According to the Kenya National Bureau of Statistics (KNBS) the Kenyan growth population is estimated at 4.2% and is expected to reach 50 million by 2020. Based on these estimates there is an annual demand of 206,000 units of houses and the current supply is

50,000 units per year which creates a shortfall of 156,000 units every year (KNBS, 2013). The government seeks to march the supply of houses to the existing demand by 2030 (GoK, 2005). Ministry of Housing, Land and Urban Development (2011) reported that, among all gated community developments initiated over the recent years, 48% of the housing construction projects in Nairobi County were still incomplete and 10% of these projects had completely stalled.

A review of the results of hundreds of World Bank projects indicated that success or failure of housing construction projects often depends on factors in the general environment, which in turn depends on the type of planning employed by the project manager and the project teams before execution commences (Joseph, 2009). The review pointed out that in the management of projects, planning plays a pivotal role on the project performance and therefore, should be given due attention to form a basis for analysis and overcoming or mitigating on its effect on project performance. Many studies though not conclusive indicate that among other factors, there exist a relationship between project macro planning process and project performance (Akanni et al 2014; Ling et al 2007; Waly and Thabet 2002; and Kim et al., 2008). It is against this background that this study sought to examine the influence of project macro planning process on the performance of housing construction industry, a case of gated community projects in Nairobi County, Kenya.

**Objective of the Study**

The objectives of the study was to examine the extent to which project macro planning process influences performance of gated community housing projects in Nairobi County, Kenya.

**Hypothesis of the study**

The following hypothesis was tested:

$\mathbf{H_o}$ Project macro planning process has no significant influence on the performance of gated community housing projects in Nairobi County, Kenya.

$\mathbf{H_1}$ Project macro planning process has a significant influence on the performance of gated community housing projects in Nairobi County, Kenya.

**Literature review**

According to Cooke-Davies (2002), project performance indicators are defined as measures by which success or failure of a project will be judged. Lim and Mohamed (1999) defined performance indicators as set of principles or standards by which success can be judged. Toor and Ogunlana (2009) suggested the following indicators for measuring project performance: project completion on time, within budget and to specified quality; safety, efficiency, effectiveness, free from defect, meets stakeholders' expectations, and minimal construction disputes and conflicts. Therefore, from this review, it can be noted that performance indicators for housing construction project success is beyond the traditional measures of time, cost and quality, which mainly measures project management success; however, additional indicators emerge that include end user satisfaction, stakeholder satisfaction, safety, environmental impact and minimal disputes or the absence of any legal proceedings. Based on the studies reviewed, this study will adopt project performance indicators as: - Project completed within the budgeted cost, within the scheduled time,

within the specified quality, delivered with described safety and health standards, and within clients satisfaction levels.

In recognition of these unique problems, previous research studies have suggested that there is a need to develop appropriate management tools and techniques specifically tailored to address the type of planning adopted so as to guarantee success of projects in the developing countries (Faniran et al., 2000). Eigege (2005) defines planning as a systematic devise to develop, on a continuing basis, specific courses of action towards a desired objective or goal in the most effective, efficient and economic manner. Macro planning process involves essentially four goals in any proposed task: to offset uncertainty and change, to focus attention on objectives, to make economic operations possible, and to assist managers in control (Krishnamurthy & Ravindra, 2010). This study examined project macro planning process and its influence on performance of housing construction projects in Nairobi County, Kenya.

**Influence of project macro planning process and performance**

Planning is defined as a general term which is used in project management to encompass the ideas commonly referred to as programming, scheduling and organizing. Its aim is to make sure that all work required to complete the project is achieved in the correct order, in the right place, at the right time, by the right people and equipment, to the right quality, and in the most economical, safe and environmentally acceptable manner (Mawdesley et, al. 1996).

There are different planning processes which can be adopted by the project manager(s) depending on the nature of their project organization. One of such planning processes is the macro planning process (Pre-construction planning) which takes into consideration the characteristics of complex project planning (Waly and Thabet, 2002). This process takes place during the pre-construction stage of the project and involves the selection of major strategies, reviewing design constructability, the planning of major site operations and construction path, and arranging the primary means, methods and resources for the realization of the work packages.

A project's macro planning is of vital importance to its successful delivery and execution (Waly & Thabet, 2002).An important part of macro planning process in construction projects is the creation of the project schedule. The project schedule places all the tasks of the project in a logical and sequential order. The macro planning process of most construction projects depends on the market demands and available resources. This process sets the priorities and schedule for the tasks necessary to complete the operation's objectives. During the macro planning process, the project may be organized in a variety of ways: Sequential - in which the project is separated into stages completely in a consecutive sequence of tasks; Parallel - in which the project contains independent portions that happen simultaneously; and Staggered - in which the different tasks may overlap with each other (Thamhain, 2004).

There are nine specific areas that require a project manager's attention and should be incorporated into the macro planning process: Integration - to ensure that the various project elements are effectively coordinated; Scope - to ensure that all the work required (and only the required work) is included; Time - to provide an effective project schedule; Cost - to identify needed resources and maintain budget control; Quality - to ensure functional requirements are met; Human resources - to effectively employ project personnel; Communications - to ensure effective internal and external communications; Risk - to

analyze and mitigate potential risks; and Procurement - to obtain necessary resources from external sources (PMI, 1996). Each of the nine key areas integrated with the way the project has been organized (Sequential, parallel or staggered) will yield different results and the PM should constitute the planning partners with the end result in mind if the project is to be delivered successfully (Thamhain, 2004). Depending on the type of tasks, variations in the sequence of tasks are possible.

The project manager will therefore during the pre-construction stage of the project (macro planning process) need to identify major strategies, review design constructability with the stakeholders, plan for major site operations and the construction path to be followed, and arrange the primary means, methods and resources for the realization of the work packages. These have to be worked with reference to the initial project performance indicators, and taking into account the prevailing project external environment(Thamhain, 2004). For this purpose, the project manager has to use various tools and techniques if the macro planning process will yield the desired results. The various tools and techniques necessary when undertaking the macro planning process in construction projects include but not limited to: Gantt charts; Critical Path Method and Line-of-balance; and 4-Dimensional (4D) models (Wilson, 2002).

**Gantt Charts, Critical path method (CPM), and Line of balance (LOB), and project performance**

Although it has a long history, project planning (and scheduling) first became formalized with the introduction of the Gantt chart by Henry L. Gantt in the early 1900s (Wilson, 2002). Initially, Gantt charts were a production planning tool that the production industry used to plan and manage batch production. Gantt charts use a time phased dependent demand approach to production planning (Wilson, 2002). By comparing the Gantt chart 'as planned' with the Gantt chart 'as built' project managers can analyse the performance of the overall project and isolate tasks and their allocated resources to analyse their performance individually. This makes the Gantt chart a useful tool for both project planning as well as project control. Computer-based tools such as MS Project and Primavera P3/P6make use of Gantt Charts and have set an industry standard for the modern creation of project schedules linked to the resources of a project. These tools also have the ability to apply the Critical Path Method (Lu & Lam, 2008), and indicate the amount of float that non-critical tasks have.

CPM is a method that creates a sequence of tasks based on the dependencies and durations that add up to the longest total project duration. Float is defined as the additional time tasks can use without affecting the overall construction schedule. Galloway (2006) gives an in-depth overview of how the construction industry views and applies CPM in the macro planning and realization of construction projects. She found that CPM scheduling has become a practical standard that is applied even when clients do not specifically request it and that it is also considered to be beneficial in risk management applications.

Another technique that, like CPM, has been used since the 1950s is the Line-of-Balance (LOB) technique (Suhail& Neale, 1994). LOB is a resource-oriented scheduling tool as opposed to CPM, which is characterized as an activity-based scheduling tool (Trimble, 1984). Although it is less widely used than CPM, LOB offers distinct advantages when applied to projects with repetitive tasks (Suhail & Neale, 1994; Tokdemir *et al.*, 2006). With the LOB technique, planners can create a schedule that is optimized for the resources that the repetitive tasks require. Combining LOB and CPM gives the possibility to level

resources and to utilize float times to streamline the scheduling process and achieve project goals related to productivity and reduced costs (Suhail & Neale, 1994). In macro planning for the realization of a construction project, this technique is also useful to examine different scenarios of resources availability and determine are source strategy that is able to match the client's demands in terms of project costs and duration.

**Four dimensional (4D) models and project performance**

Four dimensional (4D) construction macro planning provides the ability to represent construction plans graphically (Heesom & Mahdjoubi, 2002). A 4D model results from the linking of 3D graphic images to the fourth dimension of time (Koo & Fischer, 2000). In the 4D model, the temporal and spatial aspects of the project are inextricably linked, as they are during the actual construction process (Fischer,1997).In recent years, 3D and 4D models have been used in more and more construction projects to support management tasks (Hartmann *et al.*, 2008). Because of the presence of a direct link between 3D design and the project schedule, a 4D model has more areas of application than traditional 2D drawings and a CPM. Other advantages that 4D applications have over traditional 2D methods are, for instance, that they provide the possibility to represent construction plans graphically (Heesom & Mahdjoubi, 2002) and that the visualization of a construction project and its schedule helps planners in the process of identifying potential problems before actual construction starts (McKinney et. al, 1998). Examples from literature of the areas of application of 4D technology are the visualization of a project for marketing and communication purposes, design review (clash detection), cost estimating, bid preparation/procurement (Hartmann et al., 2008),constructability review (Hartmann & Fischer, 2007), site management (Chau et. al, 2004),scheduling, and macro planning (location-based) work-flow (Jongeling &Olofsson, 2007). Heesom and Mahdjoubi (2004) remark that, in general, the utilization of 4D visualization allows a more intuitive comprehension of the construction process than traditional 2D drawings and schedule information.

**Organizing project resources and project performance**

Organizing technique relates to the micro planning of resources that the project requires to reach completion. According to Winch (2002), determining and organizing the project resources is an important factor in 'riding the project life cycle' successfully. These resources can vary from the capital for financing the project to the materials, equipment, and human capital involved in realizing the construction project. In the wide spectrum of resources that are involved in realizing a construction project, the project team is perhaps one of the most important as one of its main tasks is to assure the gathering and proper utilization of the other project resources. Depending on the size and scope of a construction projects, project teams can consist of a few to several hundred persons, each with their own specialties and responsibilities (Winch, 2002). Hobday (2000)states that a project-based organization is able to respond flexibly to changing client needs and that it is also effective in integrating different types of knowledge and skills.

In addition to poorly integrating the necessary types of knowledge and skills, an improperly formed project team can cause delays and budget overruns, which results in the inefficient realization of the project. Furthermore, during the macro planning process, the early involvement of project team members adds expertise and strengthens commitment to the project (PMI, 2004). The project team is by no means a static entity, but changes as the

project moves through the consecutive stages of its life cycle. In the design and macro planning stages, the emphasis of the project team organization is more on specialties such as design, risk identification, and planning. In later stages, the emphasis is more on specialties that deal with realizing the project such as project management, construction crews, and project controllers. However, the persons involved in the earlier stage often still have an important role in later project stages, for instance to solve problems with constructability (Hobday, 2000). Furthermore, because of the complex environment that a construction project represents, authority within an organization becomes more decentralized (Shirazi *et al.*, 1995), making it more difficult to maintain control over the organization. In addition, a construction project team is a temporary organization (Lundin &Soderholm, 1995), which means the smooth operation of the organization may require more effort than organizations that are not temporary. All these have to be factored at the macro planning stage if the construction project has to complete successfully.

**Theoretical Framework**

This study was guided by three Theories – McGregor's theory of X and Y, Critical chain project management theory, and the Theory of performance (ToP).

**McGregor's theory of X and Y**

Douglas McGregor states that people inside an organization can be managed in two ways. The first is which falls under the category negative and the other one is positive. Under the assumptions of category negative, employees inherently do not like work and whenever possible, will attempt to avoid it. Because employees dislike work, they have to be forced, coerced or threatened with punishment to achieve goals. Persons in this category are detrimental to project execution and performance.

Under the assumptions of category positive, physical and mental effort at work is as natural as rest or play. People do exercise self-control and self-direction and they are committed to those goals. Average human beings are willing to take responsibility and exercise imagination, ingenuity and creativity in solving the problems of the organization. An organization that is run on category positive can be described as participative, where the aims of the organization and of the individuals in it are integrated; individuals can achieve their own goals best by directing their efforts towards the success of the project organization, hence promotion of the project performance. This theory will be best suited to guide the project teams for the success of the gated community housing construction projects.

**Critical chain project management theory**

Critical chain project management is the theory of constraints logistical application for project operations. It is named after the essential element; the longest chain of dependent resourced tasks in the project. The aim of the solution is to protect the duration of the project, and therefore completion date, against the effects of individual task structural and resource dependency, variation, and uncertainty. The outcome is a robust and dependable approach that will allow completion of projects on-time, every time, and most importantly within at most 75% of the current duration for single projects and considerably less for individual projects within multi-project environments. The shorter duration provides a sterling opportunity in the marketplace to differentiate ourselves from our competitors who deliver poorer outcomes, and late at that, via other project management methods (Ballard

et al., 2002). Application of this theory will therefore improve and ensure project performance is enhanced in terms of completion on time. It will be used to guide the variable under study (macro planning process) to capture all the critical tasks so as to deliver the project (s) within schedule.

**The Theory of Performance (ToP)**

The theory of performance (ToP) develops and relates six foundational concepts to form a framework that can be used to explain performance as well as performance improvements. To perform is to produce valued results. A performer can be an individual or a group of people engaging in a collaborative effort. Developing performance is a journey, and level of performance describes location in the journey. Current level of performance depends holistically on six components: context, level of knowledge, levels of skills, level of identity, personal factors, and fixed factors. This theory encourages teamwork and a sense of belonging which is a recipe for housing construction projects' performance. Performance levels can only be ascertained as the project progresses through scheduled and periodic reviews, hence this theory will be best suited for this purpose. This theory will be applied to guide and strengthen the dependent variable.

**Conceptual Framework for the study**

The objective of this study was be to examine the extent to which project macro planning process influences performance of gated community housing projects in Nairobi County, Kenya. Three key indicators (tools) of macro planning process were identified – Gantt charts; Critical path method and Line-of-balance; and 4-Dimensional (4D) models. The inter-relationship between the study variables is shown in Figure 1.

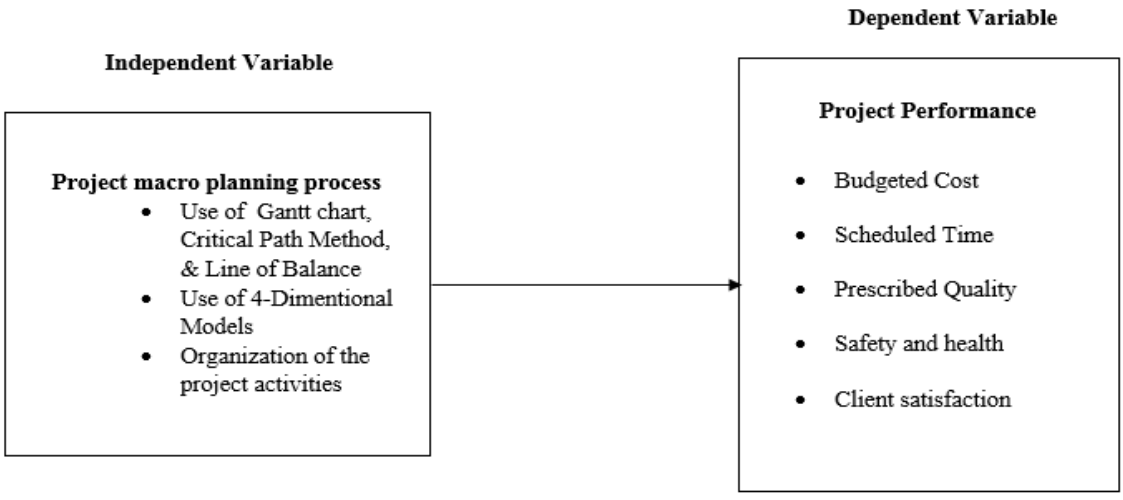


Figure 1: Conceptual framework for the study.

**Research Methodology**

The research paradigm used in this study was pragmatism derived from the work of Peirce, James, Mead and Davey (Creswell, 2013). To pragmatists, knowledge claims arise out of

actions, situations and consequences rather than antecedent conditions. The pragmatic rule states that the current meaning or instrumental or provisional truth value of an expression is to be determined by the experiences or practical consequences of belief in or use of the expression in the world (Johnson & Onwuegbuzia, 2004). Considering that questionnaires with both closed and open ended questions were used as instruments to collect both quantitative and qualitative data in this study, this paradigm was found to be the most suitable to be adopted

This study combined a cross sectional descriptive survey and correlational research design. The use of the two designs were suitable because the study used both descriptive and inferential analysis of data. The target population of the study comprised of 228 gated community housing projects which were active and running, initiated and completed between 2009 and 2014. The study employed a combination of census, stratified random sampling, and purposive sampling techniques. All the sub-Counties were included in the study (census) and this was the first stage. In the second stage, one hundred forty three (143) projects were randomly sampled from the 228 completed projects based on each stratum. In the third stage, client (owner), consultant, main contractor, and gated community facility managers, were selected using purposive sampling method from individual construction housing projects which were sampled above. The total number of respondents was therefore 572, i.e. 143 projects x 4 people from each.

Data collection instruments for this study included use of structured questionnaire with both open and closed ended question, and a standardized open-ended interview guide for consultant(s) and main contractor(s). Questionnaire was used to collect data because of its ability to collect a lot of information from respondents over a short period. Questionnaires are also free from the bias of the researcher.

Four gated community projects from the sample were used for pilot study and were exonerated from the final study sample. The final study sample therefore was 139 gated community projects. Four respondents were selected from each of the sampled gated community housing project consisting of the client, consultant, main contractor and the facility manager. Four questionnaires were administered to each of the 139 gated community projects, totaling to 556, anticipating for responses from each of the four professionals chosen from each gated community housing project.

To ensure construct validity, the questionnaire was verified by a panel of experts made up of the researcher's supervisors and peers. Internal validity was tested by use of triangulation method where the data collection instrument had the same question analyzed based on what the different categories of the respondents had answered (Merriam, 1998). To test for reliability, a pilot study was conducted in four (4) selected housing projects, involving sixteen (16) respondents. Internal consistencies were computed for the pilot study using Cronbach's Alpha co-efficient.

**Findings and Discussions**

A final study sample of 139 gated community housing projects in Nairobi County were selected for this study. Four respondents were selected from each of the sampled gated community housing project consisting of the client, consultant, main contractor and the facility manager. Four questionnaires were administered to each of the 139 gated community projects, totaling to 556. The questionnaires returned from the clients were 92

out of the 139 administered. The same tread applied to consultants who returned 87 and main contractors 88 out of 139 questionnaires administered respectively. Facility managers returned 120 questionnaires out of the 139 administered, and 19 did not return theirs. On overall, out of the 556 questionnaires distributed, 387 were returned for analysis forming a response rate of 69%. Saunders et al. (2003) posed that above 50% response rate is reasonable for statistical generalization. The final study sample size is presented in Table 1

**Table 1: Final study sample size**

| | Number of projects | Number of respondents |
|---|---|---|
| Sample size from population (n') | 143 | 143 x 4 = 572 |
| Pilot study units | 4 | 4 x 4 = 16 |
| Final study sample (n) | 139 | 139 x 4 = 556 |

## Background information of the respondents

The background information of the respondents is shown in Table 2

**Distribution of the respondents by gender**

| Gender | Clients (Frequency) n | Consultants (Frequency) n | Main Contractors (Frequency) n | Facility Managers (Frequency) n | Total Percent % |
|---|---|---|---|---|---|
| Male | 70 | 62 | 80 | 78 | 75 |
| Female | 22 | 25 | 08 | 42 | 25 |
| **Total** | **92** | **87** | **88** | **120** | **100** |

**Distribution of respondents by age**

| Age in years | Clients (frequency) n | Consultants (frequency) n | Main contractors (frequency) n | Facility managers (frequency) n | Total percentage (%) |
|---|---|---|---|---|---|
| < 26 | 0 | 0 | 0 | 0 | 0 |
| 26-30 | 0 | 5 | 7 | 30 | 10.85 |
| 31-35 | 03 | 25 | 10 | 42 | 20.67 |
| 36-40 | 06 | 32 | 27 | 22 | 22.48 |
| 41-45 | 15 | 11 | 29 | 15 | 18.09 |
| 46-50 | 25 | 09 | 13 | 11 | 14.99 |
| > 51 | 43 | 05 | 02 | 0 | 12.92 |
| **Total** | **92** | **87** | **88** | **120** | **100** |

**Distribution of respondents by level of education**

| Level of Education | Clients (Frequency) n | Consultants (Frequency) n | Main Contractors (Frequency) n | Facility Managers (Frequency) n | Total Percentage % |
|---|---|---|---|---|---|
| PhD | 03 | 02 | 0 | 0 | 1.29 |
| Masters | 19 | 37 | 13 | 0 | 17.84 |
| Bachelor's Degree | 25 | 40 | 32 | 38 | 34.88 |
| Diploma | 15 | 08 | 37 | 62 | 31.52 |
| Certificate | 17 | 0 | 06 | 13 | 9.30 |
| Secondary Certificate | 13 | 0 | 0 | 07 | 5.17 |
| **Total** | **92** | **87** | **88** | **120** | **100** |

**Distribution of respondents by number of projects involved**

| Projects involved in 2009 - 2014 | Clients (Frequency) n | Consultants (Frequency) n | Main Contractors (Frequency) n | Facility Managers (Frequency) n | Percentage (%) |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| < 5 | 11 | 13 | 18 | 120 | 41.86 |
| 5-8 | 29 | 29 | 34 | 0 | 23.77 |
| 9-11 | 28 | 33 | 22 | 0 | 21.45 |
| 12-14 | 11 | 06 | 11 | 0 | 7.24 |
| 15-17 | 9 | 3 | 03 | 0 | 3.88 |
| 18-20 | 4 | 2 | 0 | 0 | 1.55 |
| > 21 | 0 | 1 | 0 | 0 | 0.25 |
| **Total** | **92** | **87** | **88** | **120** | **100** |

The research findings in Table 2 indicated that 75% of the respondents were male while 25% of the respondents were female. These findings show that the housing construction industry in Kenya is dominated by male professionals. Though not mandatory and neither a requirement across all sectors, the constitution of Kenya requires that there should be at least a third of either gender in all forums, especially in elective posts!

On age, the findings in indicated that 10.85% of the respondents were between 26-30 years, 20.67% were between 31-35 years, 22.48% were between 36-40 years, 18.09% were between 41-45 years, 14.99% were between 46–50 years and 12.92% were 51 year and above. These findings shows that 68.5% of the professionals and project owners in the housing construction industry are above 36 years, hence experienced and knowledgeable in their respective fields. This trend implies that the older generation dominates this industry and not only affects building design and structure; but it also has a serious impact on the construction workforce. A great deal of knowledge and skills will be lost in the next few decades with fewer professionals lined up for replenishing the market.

On level of education, the research finding indicated that 1.29% of the respondents had a Ph.D. degree, 17.84% had master's degree, 34.88% had bachelor's degree, 31.52% had diploma, 9.30% had college certificate, whereas 5.17% had secondary school certificate. These findings show that majority of the respondents (34.88% and 31.52%) who dominated this industry had a bachelor's degree and college diploma, whereas those with Ph.D. and master's degree combined were 19.13%. Those respondents with college certificate combined with secondary school certificate as their highest qualification were 14.47%. The findings show that this industry is dominated by those with levels of education ranging from a bachelor's degree and a college diploma (66.4%). Those with education higher than the dominant group (master's and Ph.D. degree) were 19.13%, whereas, those below the dominant group (college diploma and secondary certificate) were 14.47%. From interviews with the selected respondents (consultants and main contractors), it was further revealed that the highest level of education (master's and Ph.D.) was solely by the consultants, whereas the dominant group (bachelor's degree and diploma) consisted mainly of the main contractor and the clients. The group with the least education consisted mainly of the facility managers/caretakers.

On number of projects involved in, the research findings indicated that within the period under consideration, 41.86% of the respondents had been involved in less than 5 projects, 23.77 % involved in 5-8 projects, 21.45 % involved in 9-11 projects, 7.24 % involved in 12-14 projects, 3.88 % involved in 15-17 projects, 1.55 % involved in 18-20 projects, and 0.25 % involved in over 21 projects. These findings show that the respondents drawn from consultants and main contractors were involved in more than 9 projects at an average, as majority of clients (52/92) owned more than 9 projects. All facility managers were involved in less than 5 projects – to be specific, each facility manager represented only the gated

community project in question. No facility manager who had more than one gated community project under their watch.

**Tests of assumptions and analysis of Likert type of data**

Test of normality was conducted using Kolmogorov-Smirnov test statistics (KS-test) and Shapiro-Wilk test (SW-test). Shapiro-Wilk test which is able to detect departures from normality due to either skewness or kurtosis or both (Rizali & Wah 2011), was used to counter check the validity of the normality results from the KS-test statistics. The variables of the study were further subjected to multi-collinearity testing using Variance Inflation Factor (VIF) and Tolerance Tests in the regression analysis. Heteroscedasticity may occur when some variables are skewed and others are not. Further, measurement error can cause heteroscedasticity. Based on the assumptions of the classical linear regression model, the researcher held that there was no issues of heteroscedasticity as the data had been assumed to be linear, and also normality distribution of the population had been checked by Kolmogorov-Smirnov and Shapiro-Wilk tests.

**Analysis of Likert- type data and accounting for the error term**

This study adopted the following Likert Scale: 1=To a very little extent; 2=To a little extent; 3=To a moderate extent; 4=To a great extent; and 5=To a very great extent. The following scale was also used: 1=Strongly Disagree; 2=Disagree; 3=Neutral; 4=Agree; and 5=Strongly Agree. It was also assumed that Likert-type data has equidistant so that parametric methods of data analysis could be used (Lantz, 2013). Carifio and Racco (2007) indicates that when using a five point Likert scale the following should be the scoring; strongly agree (SA) 4.2<SA<5.0; agree (A) 3.4<A<4.2; neutral (N) 2.6<N<3.4; disagree (DA) 1.8<DA<2.6 and strongly disagree (SDA) 1.0<SDA<1.8. The scale gives equidistant of 0.8. The same scale was used successfully by Nganga (2014) in his study.

**Analysis of project performance indicators in gated community housing construction**

Project performance in housing construction industry was identified in this study as the dependent variable. Budgeted cost, scheduled time, prescribed quality, safety and health, and clients' satisfaction were identified as indicators of project performance in housing construction industry. Respondents were given items rated on a five point Likert scale. The findings are presented in Table 3

Table 3: **Frequencies and percentages for project performance indicators in housing construction industry**

| Statement | SDA F (%) | DA F (%) | N F (%) | A F (%) | SA F (%) | Total F (%) n |
|---|---|---|---|---|---|---|
| Budget/Cost Related. | | | | | | |
| Cost of the project(s) was as per initial budget for the project | 343 (88.6) | 44 (11.4) | 0 () | 0 (0) | 0 (0) | 387 (100) |
| No variation order (s) were raised for the project | 303 (78.3) | 84 (21.7) | 0 (0) | 0 (0) | 0 (0) | 387 (100) |
| No disagreements were raised on the valuation of work done | 168 (43.4) | 189 (48.8) | 30 (7.8) | 0 (0) | 0 (0) | 387 (100) |
| No funding issues were raised during the project time | 0 (0) | 0 (0) | 27 (7) | 287 (74.1) | 73 (18.9) | 387 (100) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Many provisional sums and prime costs were factored | 0 (0) | 0 (0) | 42 (10.9) | 334 (86.3) | 11 (2.8) | 387 (100) |
| Payments to the main contractor were released without delays. | 20 (5.2) | 329 (85.0) | 38 (9.8) | 0 (0) | 0 (0) | 387 (100) |
| Time Related. | | | | | | |
| Project was not executed within the planned time | 0 (0) | 0 (0) | 3 (0.8) | 20 (5.2) | 364 (94) | 387 (100) |
| Set project duration was not enough for the project | 0 (0) | 0 (0) | 7 (1.8) | 13 (3.4) | 367 (94.8) | 387 (100) |
| There were delay in mobilization by the main contractor | 0 (0) | 5 (1.3) | 30 (7.8) | 352 (90.9) | 0 (0) | 387 (100) |
| Many change requests were placed related to design | 0 (0) | 0 (0) | 8 (2.1) | 321 (82.9) | 58 (15) | 387 (100) |
| There were lengthy routine of government authorities | 0 (0) | 0 (0) | 0 (0) | 100 (25.8) | 287 (74.2) | 387 (100) |
| Irregular attending of project review meetings were recorded | 0 (0) | 0 (0) | 0 (0) | 75 (19.4) | 312 (80.6) | 387 (100) |
| Quality Related. | | | | | | |
| There were issues arising from quality of materials | 0 (0) | 55 (14.2) | 33 (8.5) | 299 (77.3) | 0 (0) | 387 (100) |
| Many re-work issues were raised | 0 (0) | 79 (20.4) | 35 (9.1) | 273 (70.5) | 0 (0) | 387 (100) |
| Inspection schedules were not followed | 0 (0) | 75 (19.4) | 11 (2.8) | 301 (77.8) | 0 (0) | 387 (100) |
| Changes in drawings and specifications were many | 0 (0) | 95 (24.5) | 32 (8.3) | 260 (67.2) | 0 (0) | 387 (100) |
| Inadequate skill of contractor's staff were noticed | 0 (0) | 99 (25.6) | 42 (10.9) | 246 (63.5) | 0 (0) | 387 (100) |
| There were frequent design changes | 0 (0) | 0 (0) | 39 (10.1) | 267 (69) | 81 (20.9) | 387 (100) |
| Safety and Health Related. | | | | | | |
| No fatalities were reported during the project time | 0 (0) | 0 (0) | 0 () | 4 (1) | 383 (99) | 387 (100) |
| No injury compensation issues were raised | 0 () | 87 (22.5) | 40 (10.3) | 260 (67.2) | 0 (0) | 387 (100) |
| No work related injuries were reported | 0 (0) | 78 (20.2) | 13 (3.4) | 296 (76.4) | 0 (0) | 387 (100) |
| Safety orientation and talks were mandatory | 0 (0) | 0 (0) | 18 (4.7) | 67 (17.3) | 302 (78) | 387 (100) |
| Use of personal protective equipment (PPE's) was a must | 0 (0) | 0 (0) | 0 (0) | 97 (25.1) | 290 (74.9) | 387 (100) |
| Daily Pre-task planning before start of work with the team (s) was done | 0 (0) | 0 (0) | 40 (10.3) | 127 (32.8) | 220 (56.9) | 387 (100) |
| Permits were issued for working at heights | 0 (0) | 0 (0) | 50 (12.9) | 187 (48.3) | 150 (38.8) | 387 (100) |
| Scaffolding, personal fall arrest systems (PFAS), and Ladders had an inspection schedule | 0 (0) | 31 (8) | 65 (16.8) | 72 (18.6) | 219 (56.6) | 387 (100) |

| | | | | | | |
|---|---|---|---|---|---|---|
| Permits were issued for working in confined space | 0 (0) | 14 (3.6) | 33 (8.5) | 193 (49.9) | 147 (38) | 387 (100) |
| Permits were issued for hot works | 0 (0) | 20 (5.2) | 29 (7.5) | 189 (48.8) | 149 (38.5) | 387 (100) |
| Safety officer was required full time at site | 0 (0) | 0 (0) | 60 (15.5) | 177 (45.7) | 150 (38.8) | 387 (100) |
| Client satisfaction related. | | | | | | |
| No repeat jobs after completion | 0 (0) | 60 (15.5) | 0 (0) | 327 (84.5) | 0 (0) | 387 (100) |
| No legal issues raised by owner | 0 (0) | 314 (81.1) | 0 (0) | 73 (18.9) | 0 (0) | 387 (100) |
| Defects liability for workmanship was set for more than six months | 0 (0) | 0 (0) | 0 (0) | 69 (17.8) | 318 (82.2) | 387 (100) |
| Client was satisfied with final finishes of the facility (s) | 0 (0) | 54 (14) | 0 (0) | 333 (86) | 0 (0) | 387 (100) |
| There was smooth information coordination between owner and project parties | 0 (0) | 171 (44.2) | 0 (0) | 216 (55.8) | 0 (0) | 387 (100) |
| No Conflicts encountered among involved parties | 0 (0) | 91 (23.5) | 33 (8.5) | 263 (68) | 0 (0) | 162 (100) |

The research findings in Table 3, based on the project budgeted cost show that 88.6% of the respondents indicated that they strongly disagreed with the statement that projects completed as per initial budget, 78.3% strongly disagreed that there were no variation orders raised for their projects, 48.8% disagreed with the statement that there were no disagreements raised on the valuation of work done at their projects, 74.1% agreed that no funding issues were raised during their project time, 86.3% agreed there were many provisional sums and prime costs factored in their projects, and 85.0% disagreed with the statement that payments to the main contractor were released without delays.

Based on project schedule, the research findings on Table 3 show that majority of the respondents strongly agreed that the projects were not executed within the planned time (94.0%), set project duration was not enough for the project (94.8%), there were lengthy routine of government authorities (74.2%), and irregular attending of project review meetings were recorded (80.6%); agreed there were delays in mobilization by the main contractor (90.9%), and many change requests were placed related to design (82.9%). These research findings imply that there were schedule delays and the initial schedule was not antiquate to complete the project.

On the quality related indicator, the research findings in Table 3 show that 73.3% of the respondents agreed that there were issues arising from quality of materials, 70.5% agreed that many re-work issues were raised, 77.8% agreed that inspection schedules were not followed, 67.2% agreed that changes in drawings and specifications were many, 63.5% agreed that inadequate skill of contractor's staff were noticed, and 69.0% agreed that there were frequent design changes in their project (s). The findings indicate that the respondents were in agreement that quality related issues touching on materials, re-works, missed

inspection schedules, changes in drawings and specifications, inadequate skills of the contractors' staff, and frequent design change. All these put together are giving rise to the fact that the projects had quality issues.

Regarding to the safety and health, the research findings in Table 3 show that majority of the respondents strongly agreed with the statement(s) that no fatalities were reported during the project time (99%), safety orientation and talks were mandatory (78%), use of personal protective equipment (PPE's) was a must (74.9%), daily pre-task planning before start of work with the team (s) was done (56.9%), and scaffolding, personal fall arrest systems (PFAS), and Ladders had an inspection schedule (56.6%). The remaining portion of the respondents agreed with the statement(s) that, no injury compensation issues were raised (67.2%), no work related injuries were reported (76.4%), permits were issued for working at heights (48.3%), permits were issued for working in confined space (49.9%), permits were issued for hot works (48.8%) and safety officer was required full time at site (47.5%).The findings imply that the projects were delivered within specified safety and health parameters. This further indicates that safety and health is highly regarded as an indicator of project performance, and measures and checks have been put in place at the construction sites to prevent injuries at the working sites.

Based on the Client satisfaction, the research findings in Table 3 show that 84.5% of the respondents indicated that there were no repeat jobs after completion, 81.1% disagreed there were no legal issues raised by owner, 82.2% strongly agreed defects liability for workmanship was set for more than six months, 86% agreed client was satisfied with final finishes of the facility (s), 55.8% agreed there was smooth information coordination between owner and project parties, and 68% agreed no conflicts were encountered among involved parties. The respondents' results portray that the projects were delivered within above average quality based on how each item was scored; a small percentage (15.5%) indicated that there were repeat jobs after completion, 18.9% agreed there were legal issues raised by the owner, 17.8% agreed defects liability for workmanship was set for more than months, 14% disagreed the client was satisfied with the final finishes of the facilities, 44.2% disagreed there was smooth information coordination between owner and project parties, and 23.5% disagreed with the statement that there were no conflicts among project parties. These findings imply that client satisfaction though highly rated was wanting and needed to be addressed for projects to deliver as per the clients' expectation.

**Overall analysis on Project performance indicators**

The overall and summarized findings on the project performance indicators in gated community housing construction industry is shown in Table 4

Table 4: Means and standard deviations for project performance indicators

| Indicator | n | Min | Max | M | SD |
|---|---|---|---|---|---|
| Budgeted cost | 387 | 1 | 5 | 2.40 | 0.27 |
| Scheduled time | 387 | 1 | 5 | 4.01 | 0.19 |
| Prescribed quality | 387 | 2 | 5 | 3.48 | 0.55 |
| Safety & Health | 387 | 2 | 5 | 4.33 | 0.45 |
| Client satisfaction | 387 | 2 | 5 | 3.53 | 0.54 |
| Overall composite index | 387 | 1 | 5 | 3.55 | 0.20 |

The research findings in Table 4 show that the mean score for the five performance indicators was 3.55 and standard deviation of 0.20. Based on individual composite implementation mean and standard deviation for each indicator; to a very great extent (M=4.33, SD=0.45) projects did perform in health and safety issues; to a great extend projects did perform as per scheduled time, prescribed quality, and client satisfaction (M=4.01, SD=0.19), (M=3.48, SD=0.55), and (M=3.53, SD=0.54) respectively, and to a low extend projects did perform as per budgeted cost (M=2.40, SD=0.27).

From the observed small standard deviations, it implies that the respondents were concentrated around the mean and didn't have significant variations. The overall composite index for the indicators combined took the same trend, portraying a concentration of the responses around the mean. The group of respondents being studied emerged to have a similar scoring trend that did not have a wide variation from the mean, and the results generally implied that the project indicators combined were highly regarded by the respondents and needed to be taken into account to have projects in housing construction industry perform as per client's satisfaction.

From the open ended questionnaire items, the researcher had required the respondents to list two performance challenges encountered in implementation of gated community housing projects, and suggest ways in which implementation of gated community housing projects could be made more effective and efficient. A summary of the research findings from the responses indicated that the respondents had similar answers to the closed ended questions in the questionnaire. The respondents narrated schedule and budget overruns, design constructability issues resulting to changes from the initial plan, unrealistic project schedule that does not take into account all the tasks required to deliver the project, and quality issues of the completed product resulting to client dissatisfaction. Suggesting ways in which implementation of gated community housing projects could be made more effective, the respondents listed the following; development of effective project schedule, matching tasks with resources and skill to execute them, employing a sound pre-construction planning process, development of a quality system and procedure, coming up with regular site project review meeting, and use of computer aided design tool (CAD) to makes the project designs accurate and easy to store for referencing purposes.

For triangulation purposes, the researcher had items related to the project performance indicators in the standardized interview guide which were meant for consultants and main contractors. The summarized research findings from the respondents showed that the interview with the consultants and the main contractors produced results that were similar with those given for the open ended questionnaire items and also complimented the results to the closed ended questionnaire items though in a different version.

**Influence of project macro planning process on project performance**

The respondents were requested to indicate the extent to which project macro planning process influenced performance in the housing construction industry. They were given thirteen items rated on a five point Likert scale. The responses are presented in Table 6 and Table 5

**Table 5: Frequencies and percentages for project macro planning process**

| Statement | NV | RL | OC | FQ | AW | Total |
|---|---|---|---|---|---|---|

| | | F (%) | F (%) | F (%) | F (%) | F (%) | n (%) |
|---|---|---|---|---|---|---|---|
| a) | Structural drawings level of adequacy impacts on project performance | 0 (0) | 0 (0) | 0 (0) | 67 (17.3) | 320 (82.7) | 387 (100) |
| b) | Clear project specification details influence project performance | 0 (0) | 2 (0.52) | 0 (0) | 35 (9.08) | 350 (90.4) | 387 (100) |
| c) | A clear and well defined quality management plan impacts on project performance | 0 (0) | 0 (0) | 0 (0) | 33 (10.1) | 354 (91.5) | 387 (100) |
| d) | Clear strategy on interaction & coordination of project tasks promotes performance | 0 (0) | 0 (0) | 0 (0) | 39 (10.1) | 348 (89.9) | 387 (100) |
| e) | A project schedule which includes all required work influence performance. | 0 (0) | 0 (0) | 0 (0) | 24 (6.2) | 363 (93.8) | 387 (100) |
| f) | A programme that shows all required resources and budget control initiatives promotes performance. | 0 (0) | 0 (0) | 0 (0) | 48 (12.4) | 339 (87.60) | 387 (100) |
| g) | Matching project tasks with appropriate skilled personnel promotes project success. | 0 (0) | 0 (0) | 0 (0) | 82 (21.2) | 305 (78.8) | 387 (100) |
| h) | Personnel training enhances project performance. | 0 (0) | 0 (0) | 0 (0) | 97 (25.1) | 290 (74.9) | 387 (100) |
| i) | Involvement of project team(s) enhances project performance. | 0 (0) | 0 (0) | 0 (0) | 45 (11.6) | 342 (88.4) | 387 (100) |
| j) | A sound communication strategy both internal and external enhances success of the project. | 0 (0) | 0 (0) | 0 (0) | 100 (25.8) | 287 (74.2) | 387 (100) |
| k) | A well-defined risk mitigation strategy promotes project performance. | 0 (0) | 0 (0) | 0 (0) | 124 (32.0) | 263 (68) | 387 (100) |
| l) | A strategy for balancing people, materials, equipment and time schedule promotes performance | 0 (0) | 0 (0) | 0 (0) | 86 (22.2) | 301 (77.8) | 387 (100) |
| m) | A defined procurement strategy for necessary resources from external sources influence performance. | 0 (0) | 0 (0) | 0 (0) | 138 (35.7) | 249 (64.3) | 387 (100) |

The research findings on Table 5 show that most of the respondents concurred that always structural drawings level of adequacy impacts on project performance (82.7%), always clear project specification details influence project performance (90.4%), always a clear and well defined quality management plan impacts on project performance (91.5%), always clear strategy on interaction & coordination of project tasks promotes performance (89.9%), always a project schedule which includes all required work influence performance (93.8%), always a programme that shows all required resources and budget control initiatives promotes performance (87.6%), always matching project tasks with appropriate skilled personnel promotes project success (78.8%), always personnel training enhances project performance (74.9%), always involvement of project team(s) enhances project performance (88.4%), always a sound communication strategy both internal and external enhances success of the project (74.2%), always a well-defined risk mitigation strategy promotes project performance (68%), always a strategy for balancing people, materials,

equipment and time schedule promotes performance (77.8%), and always a defined procurement strategy for necessary resources from external sources influence performance (64.3%).However, a small group had a slightly different opinion though still complimenting the responses of the majority, they rated the following item as shown: rarely does a clear project specification details influence project performance (0.52%). This was a deviation from the norm as all the other items were scored at frequently (FQ) and always (AW).

**Table 6: Means and standard deviations for project macro planning process**

| Statement | n | Min | Max | M | SD |
|---|---|---|---|---|---|
| a) Structural drawings level of adequacy impacts on project performance | 387 | 3 | 5 | 4.13 | 0.51 |
| b) Clear project specification details influence project performance | 387 | 3 | 5 | 4.04 | 0.50 |
| c) A clear and well defined quality management plan impacts on project performance | 387 | 3 | 5 | 4.20 | 0.50 |
| d) Clear strategy on interaction & coordination of project tasks promotes performance | 387 | 4 | 5 | 4.63 | 0.38 |
| e) A project schedule which includes all required work influence performance. | 387 | 4 | 5 | 4.32 | 0.29 |
| f) A programme that shows all required resources and budget control initiatives promotes performance. | 387 | 3 | 5 | 4.52 | 0.29 |
| g) Matching project tasks with appropriate skilled personnel promotes project success. | 387 | 4 | 5 | 4.90 | 0.30 |
| h) Personnel training enhances project performance. | 387 | 4 | 5 | 4.62 | 0.24 |
| i) Involvement of project team(s) enhances project performance. | 387 | 4 | 5 | 4.52 | 0.33 |
| j) A sound communication strategy both internal and external enhances success of the project. | 387 | 4 | 5 | 4.32 | 0.41 |
| k) A well-defined risk mitigation strategy promotes project performance. | 387 | 4 | 5 | 4.02 | 0.43 |
| l) A strategy for balancing people, materials, equipment and time schedule promotes performance | 387 | 4 | 5 | 4.53 | 0.32 |
| m) A defined procurement strategy for necessary resources from external sources influence performance. | 387 | 4 | 5 | 4.37 | 0.43 |
| **Extent to which project macro planning process influence performance in gated community housing projects** | **387** | **3** | **5** | **4.30** | **0.18** |

The research findings in Table 6 indicate that the mean score for the thirteen statements for the project macro planning process was 4.30 and standard deviation of 0.18. From individual items' responses, respondents indicated that: always structural drawings' level of adequacy impacts on project performance (M=4.12, SD=0.51), clear project specification details influence project performance (M=4.04, SD=0.50), a clear and well defined quality management plan impacts on project performance (M=4.20, SD=0.50), clear strategy on interaction & coordination of project tasks promotes performance (M=4.63, SD=0.38), a project schedule which includes all required work influence performance (M=4.32, SD=0.29), a programme that shows all required resources and budget control initiatives promotes performance (M=4.52, SD=0.29), matching project tasks with appropriate skilled personnel promotes project success (M=4.90, SD=0.30), personnel training enhances project performance (M=4.62, SD=0.24), involvement of project team(s) enhances project performance (M=4.52, SD=0.33), a sound communication strategy both internal and external enhances success of the project (M=4.32, SD=0.41), a well-defined risk mitigation strategy promotes project performance (M=4.02, SD=0.43), a strategy for balancing people, materials, equipment and time schedule promotes performance (M=4.53, SD=0.32), and a defined procurement strategy for necessary resources from external sources influence performance (M=4.37, SD=0.43).

The results implied that the respondents regarded projects macro planning process very high in terms of its influence on performance of gated community housing construction projects. This can be seen by analysing the mean from each item and the small standard deviation which indicates how concentrated the responses were around the mean (less than one standard deviation around the mean. The overall mean and standard deviation also shows the same tread (M = 4.3, SD = 0.18) and is in agreement with the general trend of the responses populating close to the mean. From this findings it can be inferred that the respondents were of the same opinion and in agreement that project macro planning process is very important in project execution and performance.

**Correlational analysis of macro planning process and performance of housing construction projects**

Correlational analysis using Pearson's Product Moment technique was done to determine the relationship between macro planning process and performance of housing construction projects. It was meant to identify the strength and direction of the association between the independent and the dependent variable. The results are summarized in Table 7.

**Table 7: Correlation results for macro planning process and project performance in housing construction industry in Kenya.**

| | | **Macro planning process** |
|---|---|---|
| Performance in gated community housing projects | Pearson Correlation | 0.575** |
| | Sig. (2-tailed) | 0.000 |
| | N | 387 |

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

The correlation results in Table 7 indicate positive and significant coefficients between macro planning process and performance of housing construction projects, (r= 0.575, p-value<0.01). This results implied a high and significant relationship between project macro planning process and performance of housing construction projects.

**Inferential analysis of influence of macro planning process on performance of gated community housing projects**

The objective of the study was to determine the extent to which project macro planning process influences performance of gated community projects in Nairobi County, Kenya. Project macro planning process in housing construction industry was the independent variable in the study. The null hypothesis ($H_0$:Project macro planning process has no significant influence on the performance of gated community projects in Nairobi County, Kenya) was tested using the following linear regression model:

$Y = a + \beta_4 X_4 + e$

Where ;

Y= Project performance in gated community projects
a=constant
$\beta_4$= Beta coefficient
$X_4$= Project Macro planning process
e= error term

The results are presented in table 8.

**Table 8: Regression results of influence of project macro planning process on performance of gated community housing projects**

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | P-Value |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| Constant | 1.140 | 0.136 | | 8.356 | 0.000 |
| Macro planning strategy | 0.553 | 0.50 | 0.655 | 10.962 | 0.000 |

Predictors: (Constant), Macro planning process
Dependent Variable: **Performance in gated community housing projects**

**R= 0.655**
**R square=0.429**
**t=10.962 at level of significance p = 0.000<0.05**

The study findings in Table 8 show that r is equal to 0.654, indicating that project macro planning process has a strong influence on performance in gated community housing projects. The value of r squared is 0.429, indicating that project macro planning process explains 42.9 % of the variation in the performance in gated community housing projects in Nairobi County, Kenya. The β coefficient is 0.655, indicating that project macro planning process had statistically significant influence on the performance of gated community housing projects (β=0.655, t=10.962, p=0.000<0.05). The β value imply that every unit change on the performance of gated community housing projects is associated with 65.5% changes in project macro planning process.

The overall t=10.962 with p = 0.000 <0.05 suggests that there was a statistically significant relationship between project macro planning process and performance in gated community projects in Nairobi County, Kenya. Based on the research findings we reject the null hypothesis which stated that project macro planning process has no significant influence on the performance of gated community projects in Nairobi County, Kenya and conclude

that project macro planning process has a statistically significant influence on the performance of gated community projects in Nairobi County, Kenya. Using the statistical findings the regression model can be substituted as follows; $Y= 1.140+0.655X_4$

Where; Y= Project performance in gated community projects
$X_4$= Project macro planning process

Past studies confirm that project macro planning process (pre-construction planning) is of vital importance to the success of any project and its successful delivery and execution (Waly & Thabet, 2002). According to Thabet et al. (2002), an important part of macro planning process in construction projects is the creation of the project schedule. The project schedule places all the tasks of the project in a logical and sequential order. The macro planning process of most construction projects depends on the market demand and available resources. This process sets the priorities and schedule for the tasks necessary to complete the operation's objectives. Thamhain, (2004) concurs that during the macro planning process, the project may be organized in a variety of ways: sequential - in which the project is separated into stages completely in a consecutive sequence of tasks, parallel - in which the project contains independent portions that happen simultaneously, and staggered - in which the different tasks may overlap with each other and all these have a positive influence on the project performance. The results of this study are therefore in agreement with the past studies and are confirming there exists a positive and significant relationship between project macro planning process and performance of housing construction projects.

Summary of the research findings from open ended questions indicated that the respondents had similar answers to the closed ended questions in the questionnaire. The responses also went out of the way to mention other key items that needed to be considered for improved performance of the gated community housing projects like; association of structural drawings with execution planning, satisfaction of a peculiar site condition, giving owner/client responsibility for schedule planning and funding, and development of an effective project schedule. The responses complimented the closed ended questions in the questionnaire.

For triangulation purposes, the researcher also had items related to the project macro planning process in the standardized interview guide which were meant for consultants and main contractors. From each category (consultants and contractors), five respondents were chosen for the interviews. The findings from the respondents showed that the interview with the consultants and the main contractors produced results that were in agreement with those given for the open ended questionnaire items and also complimented results to the closed ended questionnaire items.

**Conclusion and Recommendations**

This section presents the conclusions made in the study in the context of the findings. The conclusion was made in line with the objective and hypothesis testing. The objective of this study was be to examine the extent to which project macro planning process influences performance of gated community housing projects in Nairobi County, Kenya. Three key indicators (tools) of macro planning process were identified – Gantt charts; Critical path method and Line-of-balance; and 4-Dimensional (4D) models. These indicators were tested using thirteen questionnaire items. The research findings were $R^2$= 0.429, t =4.578, P = 0.000<0.05.The null hypothesis was rejected and was concluded that project macro

planning process had a statistically significant influence on the performance of gated community projects in Nairobi County, Kenya. It is recommended that the construction industry should have appropriate policies on projects' macro planning process so as to enhance performance of housing construction projects.

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