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PROJECT MANAGERS' PERFORMANCE ON SUSTAINABLE CONSTRUCTION OF RESIDENTIAL ESTATES IN ABUJA, NIGERIA

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ABSTRACT

Encouraged by the support given to the sustainability agenda globally by the United Nations, Nigeria along with many other countries is slowly focusing on achieving a sustainable built environment. This paper assessed the performance of project managers on sustainable construction of residential estates in Abuja, Nigeria by examining project managers' perception of their own competence, and the performance of project managers on the sustainable construction of residential estates. Data was collected from 26 Project Managers using close-ended-design questionnaires and analyzed through descriptive statistical methods (Mean Score and Relative Importance Index). Historical project data was also obtained on 22 residential estate projects, and was analysed using Percentage analysis. Findings from data analysis revealed that Project Managers are rated high in ten competencies and moderate in six competencies namely Budgeting, Risk management, and Emotional intelligence. The competencies of Project Managers had the strongest influence on project quality performance. All three of the traditional 'iron triangle' of project performance indices (cost; quality; time) were highly influenced by technical competencies such as Budgeting and Procurement management. it was recommended that Project Managers participate in Continuing Professional Development (CPD) in order to hone their competencies in areas such as budgeting, risk management, and emotional intelligence where some weakness has been identified in this study.

Keywords: construction, performance, project manager, residential and sustainability.

INTRODUCTION

Nigeria, like many other countries globally is beginning to focus on achieving a sustainable built environment (Dimuna and Omatsone, 2010; Akande *et al.*, 2015). With the support given to the sustainability agenda by the United Nations, construction professionals have to work towards attaining a high level of satisfaction of occupants' safety and comfort within the constraints of the sustainable development (SD) agenda requirements. A globally accepted definition of sustainable development provided in the Brundtland Report is 'meeting the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987). Sustainable development is now a major part of the mission statement of many global organisations, national institutions, corporate companies, states and localities (Kates *et al.*, 2005). Buildings play a major role in the degradation of the natural environment (Mora *et al.*, 2011) through the consumption of major amounts of energy, water, and land usage. The high

percentage of non-renewable resources consumed by it makes the building industry one of the least sustainable industries (Edwards, 2010). The built environment accounts for 40% of waste and greenhouse gases generated (CIOB, 2004). Buildings use as much as 45% of generated energy for air-conditioning and heating (Reed *et al.*, 2011), one-sixth of the world's fresh water usage, and one-quarter of wood harvested (Emmanuel, 2004).

The NCI is bedevilled with poor design and construction that uses harmful and non-renewable materials (Abigo *et al.*, 2012) as well as non-adherence to building practices that result in functional, healthy, and fit-for-purpose buildings (Jiboye, 2012). Adejimi (2005) noted that none of the building professionals in the NCI takes responsibility for unsustainable and unsatisfactory buildings. The project manager, who only coordinates the process of design and construction, is left in a frustrating position. This paper focuses on the competency and performance of the project manager at the construction stage; the aim is to assess the performance of project managers on sustainable construction of residential estates in Abuja, Nigeria, with a view to enhancing sustainability in mass housing delivery. As a means of achieving this aim, this paper examined: (i) project managers' perception of their competency, and (ii) project managers' performance on the sustainable construction of residential estate projects.

LITERATURE REVIEW

Sustainable Construction

Sustainable development and environmental protection have become a major focus for governments based on scientific evidence that existing buildings consume a high amount of energy and materials, while also releasing significant quantities of harmful greenhouse gases (Thilakaratne and Lew, 2011). Efforts to reduce the ecological footprint of the construction industry threw up green building during the green movement of the 1970s to 1980s (Retzlaff, 2010). The underlying principle has been to find alternatives to traditional construction; such new methods of construction must save energy and reduce environmental pollution. Accordingly, green building construction (GBC) is another way of describing sustainable construction (SC), which is an important means of reducing environmental pollution and improving quality of life (Tan *et al.*, 2011). SC has been touted as a significant measure to mitigate the significant (and mostly negative) impacts of the building stock on the environment, society, and economy (Zuo and Zhao, 2014). The theoretical and practical aim of green building

or sustainable construction is to design and construct buildings using recycled materials, less water, less energy, and resource efficient techniques (Olubunmi *et al*., 2016).

The success of SC projects is measured by a wide range of indicators primarily because of differences in cultural and climatic conditions across the globe. Sang *et al*. (2018) found through literature analysis that the various definitions of the key success indicators all aim at minimal destruction of the environmental system. The United Kingdom in 1990 established the first environmental certification system, the Building Research Establishment Environmental Assessment Method (BREEAM); it covered nine aspects: management, health, and comfort, energy, transportation, water, materials, land use and ecology, garbage, and pollution (Lee and Burnett, 2008). Globally, the most widely used evaluation system for sustainable construction is The Leadership in Energy & Environmental Design (LEED) rating system. LEED consists of seven systems and multiple indicators, namely sustainable building sites, water efficiency, energy and atmosphere, resources and materials, indoor air quality, innovations in design, and regional priority (Suzer, 2015). There are many similar evaluation systems such as the Comprehensive Assessment System for Built Environment Efficiency (CASBEE) in Japan, the German Sustainable Building Council (DGNB) in Germany, and the Building Environmental Assessment Method (BEAM) in Hong Kong (Sang *et al*., 2018).

Sustainable construction has been studied from different perspectives. Tabassi *et al*. (2016) studied project manager leadership in sustainable building projects and identified six groups of success indicators: energy efficiency, indoor environmental quality, sustainable site planning and management, materials and resources, water efficiency, and innovation. Mattoni *et al*. (2018) defined six macro-indicator groups (site, water, energy, comfort and safety, materials and outdoor quality) derived from a comparative study of various evaluation systems. The multiplicity of SC standards in China was studied by Ye *et al*. (2015) and revealed the existence of 17 national and trade standards and more than 50 local standards. The results of Sang *et al*. (2018) demonstrated that Leadership and organization, Target management, and Emotional intelligence of project managers are important factors that affect SC performance.

Project Managers' Competence

A project manager, according to Zwikael and Smyrk (2011) is the person contractually responsible for meeting the project's output targets; within the construction industry, project managers initiate, plan, execute, monitor and close projects. The five key stages of project

management in construction (initiating, planning, executing, monitoring and closing) involve a multiplicity of participants. Thus, the primary role of project managers is coordinating construction activities by the different team members to ensure that they perform the right tasks at the proper time (Gido and Clements, 2012). Project managers must ensure that people involved with the design and construction process possess the appropriate knowledge and resources needed to accomplish their assigned tasks (Sutton, 2011).

Competence has been defined as "the ability of an individual, a team, or a company to mobilize and combine resources (i.e., knowledge, skills, and attitudes) in order to implement an activity in a situation" (Loufrani-Fedida and Missonier, 2015). Although project manager leadership competencies are critical factors of failure or success that can be used to assess project performance (Anantatmula, 2010; Nixon *et al*., 2012), this is an area in which limited research has been conducted (Anantatmula, 2010; Fung, 2014). Jabar *et al*. (2018) found that project managers in Malaysian Industrialized Building System (IBS) construction projects have to undertake extra roles which required additional competency as compared to the generic construction projects.

Quite a number of frameworks for the evaluation of competency can be identified in project management. Examples include the International Project Management Association (IPMA) 'Competence Baseline' and the 'Guide to the Project Management Body of Knowledge (PMBOK)', developed by the Project Management Institute (PMI, 2013). The Competence Baseline of IPMA classified 46 competency elements into contextual, behavioural, and technical groups of competencies. On the other hand, the PMBOK identified project management competences in ten knowledge areas (PMI, 2013). However, these competency models do not reflect leadership competencies required to improve project performance (Hollenbeck *et al*., 2006).

Performance of Project Managers

Performance of projects in the construction industry has been measured in a variety of ways; compliance with cost, schedule and quality targets has been used traditionally (Meng, 2012). Although project management processes have a significant impact on project time and cost (Almahmoud *et al*., 2012), these metrics alone are no longer sufficient to assess project performance (Nixon *et al*., 2012). Project performance encompasses other dimensions such as quality performance and stakeholder satisfaction, which must be considered in order to fully

measure project performance (Almahmoud *et al*., 2012; Yang *et al*, 2014; Berssaneti and Carvalho, 2015). There is evidence of the influence of project managers' leadership competence on project performance; Ahmed and Anantatmula (2017) demonstrated that all five leadership competencies of project managers are significantly related to achievement of project performance in terms of schedule, cost, and quality as well as stakeholder satisfaction.

METHODOLOGY

This study adopted a quantitative research design approach which involved the use of questionnaires and historical project data. A structured questionnaire was designed in five sections, using Likert-style response options. Data was collected through a simple random questionnaire survey of 28 recently completed mass housing projects in Abuja; only 26 questionnaires however contained valid data. Historical project data on initial and final costs and completion times were obtained for 22 projects. The study was limited to construction professionals who are performing project management roles on mass housing projects. They may be registered Project Managers or registered members of ARCON, CORBON/NIOB, NSE/COREN & NIQS/QSRBN (which are the recognised associations for the allied professions of Architecture, Building, Civil/Structural/Electrical Engineering and Quantity Surveying). It is believed that they have adequate knowledge about the state of project management practice in Nigeria and can answer the questions of this study. The data was analysed using descriptive statistical method (Mean Score and Relative Importance Index), which allowed the ranking of competencies and performance of Project Managers. Historical project data was analysed using Percentage analysis.

RESULTS AND DISCUSSION

Respondent Demographics

A breakdown of the demographics of the data collected through questionnaire is provided in Table 1. Female respondents constituted just 11.5% of the sample. Male respondents thus dominated the questionnaire survey, and this meant that the results will unavoidably be skewed towards a male point of view. This is unavoidable, as it reflects the current reality of gender imbalance in construction industries the world over. It also shows that the Nigeria Construction

Industry (NCI) is not an exception in this respect. Within the NCI, the job of Project Manager is often performed by people from diverse professional backgrounds. There appears to be no clear-cut legislation on who should perform project management roles on construction projects. Engineers were most plentiful in the sample (some 42.6%). This is probably because of the different specialisations such as civil, mechanical and electrical engineering that were simply grouped together as 'engineers.

The educational background of the respondents comprised mainly possession of higher national diplomas (HND) and bachelor degrees (B.Sc) in construction disciplines; some 61.5% of the sample fell into this group. The rest 38.5% comprised respondents who had obtained a second, more advanced degree. In this case, such respondents had obtained a master's degree. It was found that a little over two thirds of the study had worked for less than 16 years. 19.2% of the respondents had worked for between 16 years and 25 years, while the rest 11.5% of the sample had worked for more than 25 years.

Table 1: Demographic analysis of questionnaire survey results

Demographic parameters		**Frequency**	**Percentage**
Gender	Female	3	11.5
	Male	23	88.5
Profession	Architect	4	15.4
	Builder	1	3.8
	Engineer	12	46.2
	Estate Surveyor	0	0.0
	Quantity Surveyor	5	19.2
	Town Planner	0	0.0
	Other (specify)	4	15.4
Education	OND/NCE	0	0.0
	HND/B.Sc	16	61.5
	M.Sc	10	38.5
	Ph.D	0	0.0
Experience	Less than 5 yrs	10	38.5
	6 yrs – 15 yrs	8	30.8
	16 yrs – 25 yrs	5	19.2
	More than 25 yrs	3	11.5

Source: Field Work, (2020)

Perception of Project Managers' Competence

The results presented in Table 2 can be clearly delineated into two main groups of competencies, on the basis of MS and/or RII. The first group comprises competencies that respondents perceived themselves as being highly competent in, since the MSs were higher than 3.50. The ten competencies in this group were Interpersonal skill, Scoping, Integration, Quality management, Scheduling, Networking ability, Document and contract administration,

Transformational leadership, Apparent sincerity and Procurement management. This group was dominated by technical competencies (4 out of 10).

The other group comprised 6 competencies in which respondents were only moderately competent, based on the observation that MS lay between 2.50 and 3.49. These six competencies included Budgeting, Risk management, Interpersonal influence, Emotional intelligence, Visioning and Social astuteness. There was no consensus among the respondents on any of the competencies. Consensus attainment is indicated by a situation where the sum of responses in the 'very high competence (VHC)' and 'high competence (HC)' categories are at least 70% of all responses. The highest level of agreement observed was 68% in the case of 'Scoping', which was a 'Conceptual' competence. The only technical competence where the level of agreement exceeded 60% was 'quality management'.

Table 2: Ranking of project managers' competencies

Competency group	Competency components	Mean Score	SD	RII	Rank	Level of agreement	Remark
Human	Interpersonal skill	3.68	1.38	0.71	1	68	No consensus
Conceptual	Scoping	3.64	1.08	0.70	2	64	No consensus
Conceptual	Integration	3.64	1.08	0.70	2	62	No consensus
Technical	Quality management	3.62	1.17	0.72	4	60	No consensus
Technical	Scheduling	3.58	1.33	0.72	5	58	No consensus
Political	Networking ability	3.58	1.27	0.72	6	58	No consensus
Technical	Document and contract administration	3.58	1.14	0.72	7	58	No consensus
Human	Transformational leadership	3.58	1.06	0.72	8	58	No consensus
Political	Apparent sincerity	3.54	1.17	0.71	9	58	No consensus
Technical	Procurement management	3.54	1.14	0.71	10	54	No consensus
Technical	Budgeting	3.42	1.14	0.68	11	50	No consensus
Technical	Risk management	3.35	1.20	0.67	12	50	No consensus
Political	Interpersonal influence	3.35	1.06	0.67	13	50	No consensus
Human	Emotional intelligence	3.31	1.05	0.66	14	50	No consensus
Conceptual	Visioning	3.31	0.93	0.66	15	35	No consensus
Political	Social astuteness	3.04	0.77	0.61	16	27	No consensus

Source: Field Work, (2020)

Notes: MS = Mean Score; SD = Standard Deviation

These results were in agreement with the findings in previous studies that had canvassed the need for additional competencies for project managers (Yepes *et al.*, 2012; Jabar *et al.*, 2018). With project managers being highly competent in only 10 out of the 16 competencies examined, this study has established the need for action to improve the competency of project managers.

Project Managers' Performance

Project managers' performance was measured using five (5) indices of construction projects against sixteen (16) project management (PM) competency components. The five (5) indices of

construction projects were (i) Cost (ii) Dispute resolution (iii) Health and safety (iv) Quality and (v) Time. The paper employed a 3-item semantic scale to show level of influence ('3' for 'High Influence'; '2' for 'Moderate Influence'; '1' for 'Low Influence'). A score of 2.50 or higher is thus required to indicate high level of influence.

Table 3 revealed that the three 'conceptual' competencies (Scoping, Integration and Visioning) have significant influence only on the cost, quality and time performance. The cost of projects was most strongly influenced by 'Scoping' competency (MS = 2.58); respondents did not believe that the abilities to scope, integrate and vision a residential housing estate project would significantly affect how the project performs in terms of (i) dispute resolution and (ii) health and safety. 'Human' competency (composed of Emotional intelligence, Interpersonal skill and Transformational leadership) had significant influence only on the health and safety, quality and time performance of residential housing estate projects. The implication of this is that the Interpersonal skill of project managers does not significantly affect the cost, dispute resolution, health and safety and time performance of projects. Emotional intelligence of project managers does not significantly affect the cost, dispute resolution, and health and safety performance of projects. While the findings of the study agreed with Sunindijo (2015) regarding influence of conceptual competencies on cost and schedule performance, it did not follow Todorovic *et al*. (2015) position entirely; this study provided no evidence that dispute resolution and health and safety should be adopted as part of project managers' performance metrics.

Only two of the four (4) competencies under the 'Political' competency group exerted significant influence on the quality performance of projects. These were Interpersonal influence, which had a MS of 2.62 and Apparent sincerity (MS = 2.65). It was interesting that the political competency of project managers has significant effect on only quality performance. This might indicate a belief in the pivotal position of quality in construction; it has the ability to affect all other performance indices. The 'Technical' competency of project managers comprised Scheduling, Budgeting, Quality management, Document and contract administration, Risk management and Procurement management. Only dispute resolution performance of projects was uninfluenced by any of the six 'technical' competencies. Risk management competency exerted significant influence on only performance of projects in term of quality. This might be an indication of the low level of familiarity with risk management by project managers.

Table 3: Influence of 'Conceptual' competencies on project performance

Competency group	Competency components	Cost		Dispute resolution		Health and Safety		Quality		Time	
		MS	**SD**	**MS**	**SD**	**MS**	**SD**	**MS**	**SD**	**MS**	**SD**
Conceptual	Scoping	**2.58**	0.64	2.20	0.58	2.38	0.70	**2.65**	0.63	**2.62**	0.64
Conceptual	Integration	**2.50**	0.71	2.19	0.57	2.48	0.65	**2.68**	0.56	**2.62**	0.64
Conceptual	Visioning	**2.50**	0.65	2.27	0.60	2.27	0.72	**2.69**	0.55	**2.62**	0.70
Human	Emotional intelligence	2.12	0.71	2.31	0.74	2.46	0.65	**2.56**	0.65	**2.50**	0.72
Human	Interpersonal skill	2.35	0.75	2.27	0.72	2.31	0.62	**2.50**	0.71	2.46	0.71
Human	Transformational leadership	2.42	0.64	2.42	0.64	**2.62**	0.50	**2.73**	0.45	**2.54**	0.65
Political	Social astuteness	2.15	0.78	2.23	0.71	2.31	0.74	2.38	0.70	2.27	0.78
Political	Interpersonal influence	2.31	0.62	2.46	0.51	2.42	0.58	**2.62**	0.50	2.42	0.58
Political	Networking ability	2.35	0.56	2.38	0.64	2.42	0.58	2.42	0.58	2.42	0.58
Political	Apparent sincerity	2.42	0.70	2.27	0.60	2.48	0.59	**2.65**	0.63	2.46	0.71
Technical	Scheduling	**2.65**	0.56	2.32	0.63	**2.58**	0.58	**2.62**	0.70	**2.62**	0.57
Technical	Budgeting	**2.54**	0.65	2.19	0.63	2.38	0.57	**2.69**	0.47	**2.64**	0.57
Technical	Quality management	**2.50**	0.65	2.35	0.56	**2.50**	0.58	**2.77**	0.51	**2.54**	0.58
Technical	Document and contract administration	**2.58**	0.58	2.31	0.68	2.42	0.64	**2.58**	0.58	**2.54**	0.65
Technical	Risk management	2.40	0.71	2.35	0.63	2.46	0.51	**2.62**	0.50	2.35	0.69
Technical	Procurement management	**2.50**	0.71	2.23	0.65	2.42	0.64	**2.58**	0.58	**2.54**	0.58

Source: Field Work, (2020)
Notes: MS = Mean Score; SD = Standard Deviation; **Bold face** type indicates significant MS values

The results presented above generally agree with previous researchers (such as Berssaneti and Carvalho, 2015) where traditional measures of project performance are considered (cost, time and quality). The study does not provide support for the use of other dimensions such as dispute resolution, health and safety, risk management and stakeholder satisfaction to measure project managers' performance as advocated by Ahmed and Anantatmula (2017).

Cost and Time Performance of Projects

Composite line charts were employed to show the variations in cost and time performance. To control for the effect of size of project, the gross floor area of the projects was included in each chart. The salient points observed in Fig. 1 include a small but noticeable improvement in the cost performance of projects as the size of the projects increase; the costs of larger projects thus tended to be closer to their initial planned costs. Project managers have apparently been able to complete projects at costs ranging between 0% and 30% higher than were initially planned. Since

larger projects tend to have more clearly-defined project management structures, this finding is in line with Ibbs and Reginato (2002) that good project management in construction is correlated with lower cost.

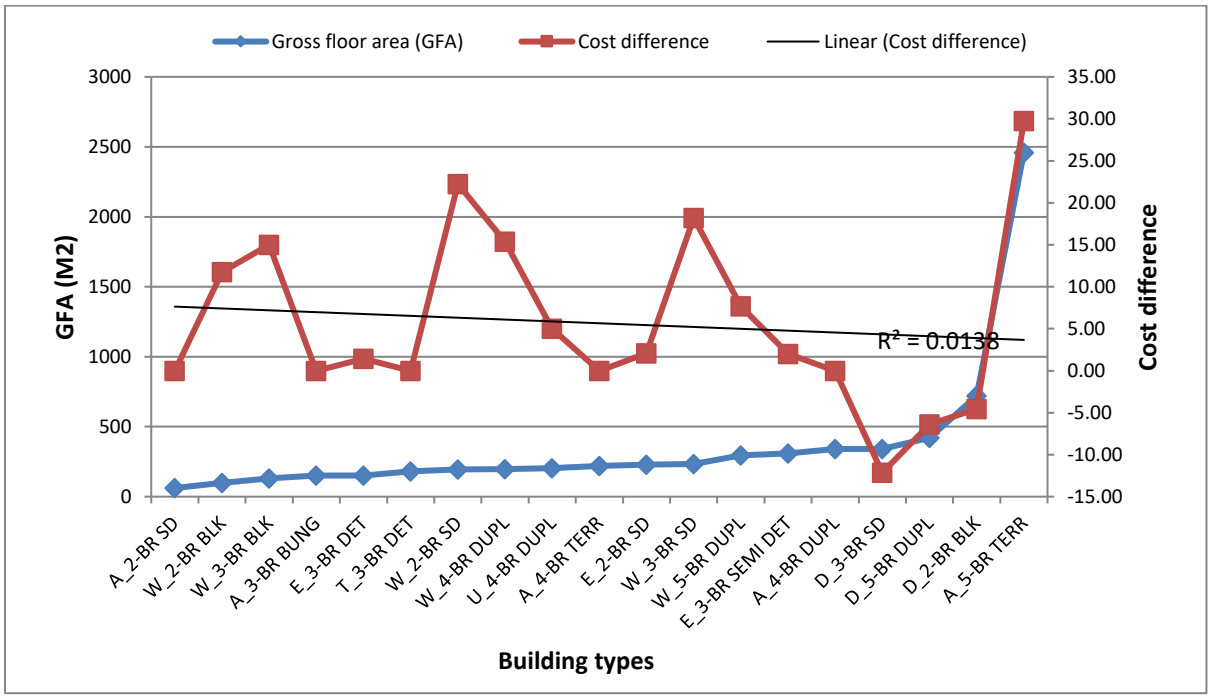

Fig. 1: Difference between initial and final costs

The time performance of projects, which was presented in Fig. 2, showed that projects were generally completed between 0% and 100% of their initially planned periods. The upward sloping trend line indicated that larger projects tended to be completed at longer periods than initially planned. These results reveal that time performance of residential housing estate projects should be an area of concern for project managers. In fact writers such as Meng (2012) argue that schedule is the key factor affecting project performance. The success of efforts to improve project schedule performance can also be expected to have positive impact on project cost performance, since Ahadzie *et al.* (2014) has identified a close relationship between project cost and time.

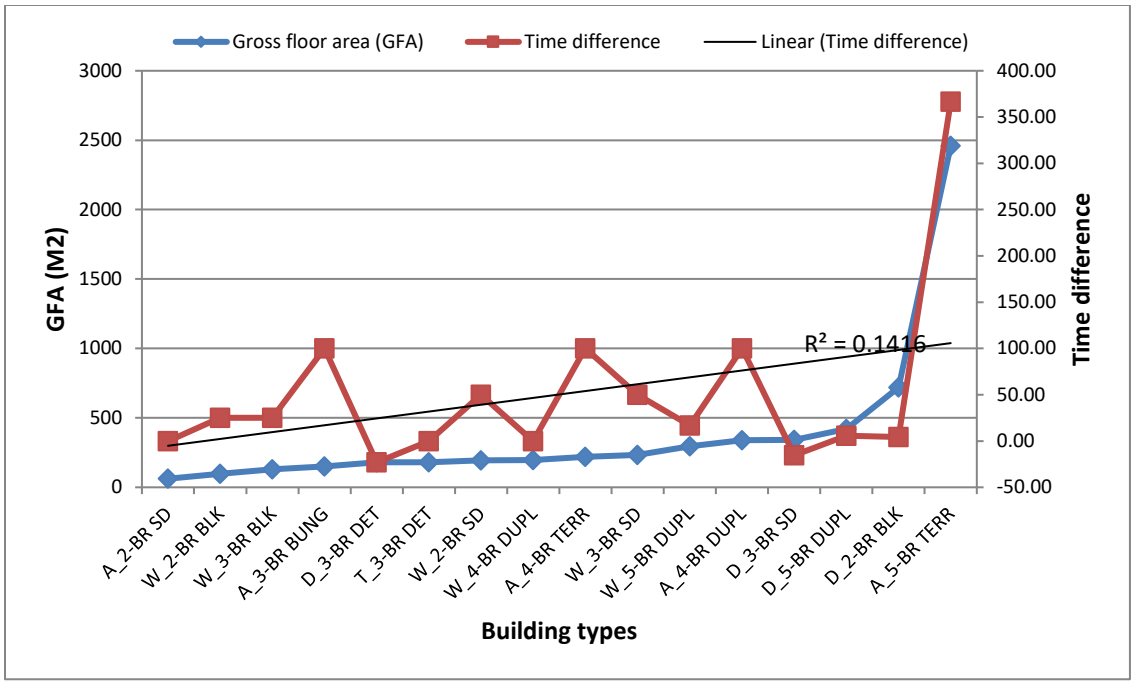

Fig. 2: Difference between initial and final time schedules

CONCLUSION

The paper revealed that Project Managers are rated high in ten competencies and moderate in six competencies that include Budgeting, Risk management, and Emotional intelligence. All three of the traditional 'iron triangle' of project performance indices (cost; quality; time) were highly influenced by technical competencies such as Budgeting and Procurement management. It was inferred from the data that larger projects had better cost performance, but poorer schedule performance. Residential estate projects were generally completed at up to 30% higher than initial costs, and up to 100% of initially scheduled completion periods. Further action is needed to improve the competency of project managers; however, the study does not provide support for the use of other dimensions such as dispute resolution, health and safety, risk management and stakeholder satisfaction to measure project managers' performance

Based on the findings, it was recommended that Project Managers participate in Continuing Professional Development (CPD) in order to hone their competencies in areas such as Budgeting, Risk management, and Emotional intelligence where some weakness has been identified in this study. Project Managers should pay greater attention to managing project schedules, because significant unplanned extensions in completion times are bound to have some negative effect on the cost and quality performance of projects. This is an area where improvements in ability to

apply soft competencies such as those in the Political category (Social astuteness, Interpersonal influence, Networking ability, and Apparent sincerity) will be useful.

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