A Review of Time Management Factors in Construction Project Delivery

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A recurring challenge encountered by numerous stakeholders globally in the building construction sector is delay in project delivery. Time management can be regarded as an indispensable chain among numerous processes required to achieve successful project delivery. In the built environment there is a common consensus that timely completion, quality criterion and completion within cost estimate are the major performance deliverables considered in appraising the successes of construction project. Timely completion to the satisfaction of stakeholders is a crucial factor in construction project worldwide. However, poor compliance with time management processes occasioned with paucity of information on specific principles as well as practices influencing time management seems to have contributed a lot to failure on timely delivery of construction project most especially in Nigeria. The study was conducted using qualitative research design in which information was basically obtained from available literature sources which were sorted out and categorized in to relevant factors. This paper finds out through review factors relevant to successful construction project delivery. Findings revealed that thirty-one (31) time management factors were identified and categorized in to: influencing processes, principles and practices. In conclusion, time management per se is actually managing our behaviours in relation to time. Hence, this study recommends solutions that will ensure effective and efficient construction project delivery.

Keywords: Construction Project Delivery, Practices, Principles, Processes, Time Management

1. INTRODUCTION

A recurring challenge encountered by numerous stakeholders globally in the building construction sector is delay in project delivery. Time management (TM) can be regarded as an indispensable chain among numerous processes required to achieve success in project delivery. In Africa for example after extensive review of most studies on project performances, the general consensus by most construction stakeholders and the public was that the construction sector is not that forthcoming both in efficiency and effectiveness in project delivery. Studies such as in (Project Management Institute [PMI], 2017), Chin and Abdulhamid (2015), (Chartered Institute of Building [CIOB], 2008) are in corroboration that poor time management can result in delay completion and even outright failure of construction project and efficient utilization of time will lead to successful attainment of the project objectives. In Nigeria, it was reported that the industry produces nearly 70% of the nation's fixed capital formation and contributes between 1-3% to employment generation (Kadiri & Shittu, 2015). Yet, the construction sector has been witnessing numerous challenges like poor performance in terms of estimated budgeted cost, agreed quality and agreed timely completion period. Though, a lot of research has been undertaken on the concept of time in the construction sector. However, poor compliance with time management processes occasioned with paucity of information on the principles as well as practices influencing time management seems to have contributed a lot to failure on timely delivery of construction project in Nigeria. Therefore, this paper tends to proffer a multi-facet approach by identifying and reviewing time management factors in construction project delivery in Nigeria with a view to ensuring timely completion.

2. LITERATURE REVIEW

This section reviewed relevant literature to shed light on both the independent and dependent variables of the study.

2.1 Project Time Management Concept

According to PMI (2017) time is an integral part of life. However, many people and organizations do not actively manage it. Chan and Kumaraswamy (2002) stated that construction time is increasingly important because it often serves as a crucial benchmarking for assessing the performance of a project and the efficiency of the project organization. Westland (2006) posited that time management is the process of recording and controlling time spent by staff on the project. Adeyinka (2012) in his study defines time management as a set of principles, practices, skills, tools and system that helps you use your time to accomplish what you want. Time management is a process of managing time according to the requirements of different assignments and activities with the goal of ensuring organizational success and maximizing benefits by utilizing, saving and not wasting time or energy (Sahito & Vaisanen, 2017).

2.2 Time Management Factors in Construction Project

Fig. 1 shows the conceptual framework implemented for the study. It consists of the independent variables and dependent variable. The framework hypotheses that time management factors: processes, principles and practices, which are the independent variables will influence construction project delivery most especially timely completion. However, this postulation is not immune to the interference of other external factors which might affect its operation.

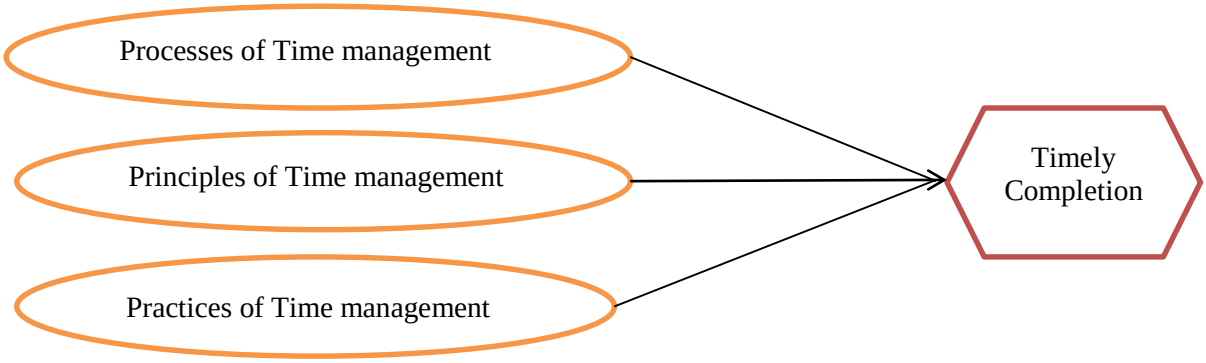

Figure 1: Conceptual framework Source: Author

2.3 Construction Project Delivery

Most researchers in the built environment are unanimous that timely completion, quality criterion and completion within cost estimate are the major performance deliverables considered. In addition, expected returns on investment and stakeholders' satisfaction are are also crucial yardsticks for appraising the successes of construction project. Most researchers such as: (Abdulkadir *et al.* 2017; Egwunatum, 2017; Hao *et al.*, 2008; Chan and Kumaraswamy 2002) are in corroboration on measures of project delivery. The management of time is crucial to the successful completion of a project (PMI, 2017). For example, Usman (2017) in his studies of time and cost overrun in Nigeria has concluded that significant number of projects experienced time overrun of between 25-50%. Inuwa (2014) in his studies of project planning of indigenous contractors in Nigeria has rate cost and time performance with cumulative average of 43.02%. Timely completion of project has remained a key issue in need of holistic solution in the Nigerian construction sector.

3.0 METHODOLOGY

This preliminary study was conducted as part of a Master's degree study in Project Management in Abubakar Tafawa Balewa University Bauchi, Nigeria to identify and assess time management factors in construction project delivery. This study was part of a larger research as depicted in the proposed conceptual framework in fig 1. As such, identifying and reviewing time management factors in construction project delivery in Nigeria is the main thrust of this paper. Qualitative research design using content analysis was employed for the study. It is the most suitable research design and is usually associated with the evaluation of social dimensions. Content analysis means analyzing the contents of interviews or observational field notes in order to identify the main themes that emerge from the responses given by your respondents or the observation notes made by you as a researcher (Kumar, 2011). It is the most easily replicable research method coupled with the ease with which reliability could be established particularly when considering trends over a period of time (Nweze, 2016). The subject under consideration required the interpretation and description of what constitutes time management factors. As such, the factors of time management were identified and analyzed from various sources such as journals, conference proceedings, text books and relevant websites. Finally, the time management factors obtained were presented based on relevant categories and themes developed for the study.

4.0 RESULTS AND DISCUSSION

Basically, the various factors that can influence timely completion in construction project are presented across literature in this section.

4.1 Processes of Construction Time Management

Project time management includes the processes required to manage the timely completion of the project (PMI, 2013). In addition, there are seven (7) processes involving several activities in constriction time management as presented in Table 1.

Table 1: Processes Influencing Timely Completion

Factors	Activities Involve
1. Plan Schedule Management	• The process of establishing the policies, procedures, documentation for planning, developing, managing, executing, and controlling the project schedule.
2. Effectively define activities to be performed	• The process of identifying and documenting the specific actions to be performed to produce the project deliverables.
3. Sequencing the project task	• It involves the process of identifying and documenting relationships among the project activities.
4. Estimating activity resource requirement	• The process of estimating the type and quantities of material, human resources, equipment, or supplies required to perform each activity.
5. Effectively estimate each task duration	• The process of estimating the number of work periods needed to complete individual activities with the estimated resources.
6. Developing schedule of the project	• The process of analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule model for project execution and monitoring and controlling.
7. Controlling schedule of the project	• The process of monitoring the status of the project to update the project schedule and manage changes to the schedule baseline.

Adapted: PMI (2013)

4.2 Principles of Construction Time Management

Basically, knowledge gap seems to exist in the project management literature regarding principles that are most effective for specific performance criteria like timely completion per se. in view of the aforementioned, the principles of time management are reviewed globally as presented in Table 2.

Table 2: Principles Influencing Timely Completion

Factors	Sources
Planning	▪ Ayodeji *et al.* (2017), Sahito and Vaisanen (2017), Khamaksorn (2016), Eshaghieh and Eslami (2015), Chin and Abdulhamid (2015), Bahadori *et al.* (2015), Yakubu and Edna (2015), Amiri *et al.* (2014).
Identification of purpose (setting goals)	▪ Murithi *et al.* (2017) Sahito and Vaisanen (2017), Amade *et al.* (2015), Eshaghieh and Eslami (2015), Bahadori *et al.* (2015), Amiri *et al.* (2014).
Prioritization of activities	▪ Odumeru (2013), Amiri *et al.* (2014), Eshaghieh and Eslami (2015), Bahadori *et al.* (2015), Sahito and Vaisanen (2017), Yakubu and Edna (2015).
Delegation of responsibilities	▪ Sahito and Vaisanen (2017), Khamaksorn (2016), Eshaghieh and Eslami (2015), Bahadori *et al.* (2015), Tracy (2013), Olmstead (2010).
Scheduling of activities	▪ Sahito and Vaisanen (2017), Khamaksorn (2016), Eshaghieh and Eslami (2015), Yakubu and Edna (2015), Amiri *et al.* (2014), Sunke (2009), Passaheim (2009), Chapman and Rupured (2008).
Accountability, integrity and responsibility	▪ Sahito and Vaisanen (2017), Acharya *et al.* (2014), Inuwa (2014), Adeyinka (2012), Ssonko (2010), Bivins (2006).
Minimizing time wasters (e.g. emails, unnecessary calls, social media chatting and unscheduled visitors etc.)	▪ Sahito and Vaisanen (2017), Eshaghieh and Eslami (2015).
Monitoring, control and evaluation	▪ Sahito and Vaisanen (2017), Ayodeji *et al.* (2017), Murithi *et al.* (2017), Amade *et al.* (2015), Inuwa (2014), Amiri *et al.*(2014), Ofori (2013), Memon *et al.* (2012), UNDP (2009), Passenheim (2009).
Communication and teamwork	▪ Ayodeji *et al.* (2017), Bahadori *et al.* (2015), Amade *et al.* (2015), Acharya *et al.* (2014), Inuwa (2014), Ofori (2013), Lohiya (2010), UNDP (2009), Adjei (2009).
Involvement of Stakeholders	▪ Kobusingye *et al.* (2017), Bizon-Gorecka and Gorecki (2017), Amade *et al.* (2015), Olander and Landin (2015).

Source: Author

4.3 Practices of Construction Time Management

Timely delivery of construction project is a global challenge and ideal practices should be implemented to reduce its impact on the overall project performance. Basically, there are no well documented practices solely applicable to ensure timely completion of construction. This study proposed practices such as: motivation, economic and management policies as crucial for effective time management of construction. Table 3 present some practices used across literature globally.

Table 3: Practices Influencing Timely Completion

Factors	Sources
a) Availability of Plants, Equipment and Machineries	• Manaf and Razali (2007), Ugwu and Attah (2016), Inuwa (2014), Wanbui *et al.* (2015), Enshassi *et al.* (2009), Adjei (2009).
b) Availability of materials	• Ogundipe *et al.*(2018), Sarowar *et al.* (2018), Ugwu and Attah (2016), Solanke and Fapohunda (2016), Balwin and Bordoli (2014), Inuwa (2014), Acharya *et al.* (2014), Patel and Vyas (2011), Enshassi *et al.* (2009).
c) Availability of supervision	• Ogundipe *et al.* (2018), Ugwu and Attah (2016), Andi (2014), Adjei (2009), Alwi *et al.* (2001).
d) Commitment and providing specific direction	• Ugwu and Attah (2016), Amade *et al.* (2015), Bhangale and Devalkar (2013), Ofori (2013), Memon *et al.* (2012), Archer *et al.* (2010), Adjei (2009), Toor and Ofori (2008), Burke and Barron (2007), Odusami *et al.* (2003).
e) Setting timelines and project deadline	• Ugwu and Attah (2016), Amiri *et al.* (2014).
f) Setting specific goals for people to achieve	• Ugwu and Attah (2016), Ofori (2013), Adjei (2009).
g) Monitoring and updates on the progress of work	• Adebayo *et al.* (2018), Murithi *et al.* (2017), Jack *et al.* (2016), Ugwu and Attah (2016), Amade *et al.* (2015), Memon *et al.* (2012), Olawale and Sun (2010), Bennet (2003).
h) Involving team members	• Ugwu and Attah (2016), Ibrahim *et al.* (2011).
i) Employment of skillful workers	• Bello (2017), Bilau *et al.* (2015), Inuwa (2014), Acharya *et al.* (2014), Othman (2012), Memon *et al.* (2012), Darren *et al.* (2012),Bustani (2000).
j) Job security	• Ugwu and Attah (2016), Adjei (2009).
k) A sense of belonging and identification with the project team	• Ugwu and Attah (2016), Othman (2012), Adjei (2009), Enshassi *et al.* (2009), Andi (2004).
l) Opportunity for extending skills and experience through continuous learning and challenging task	• Ugwu and Attah (2016), Enshassi *et al.* (2009), Adjei (2009), Andi (2004).
m) Recognition of contribution	• Ugwu and Attah (2016), Eshaghieh and Eslami (2015), Acharya *et al.* (2014), Othman (2012), Andi (2004).
n) Exercise of power	• Ugwu and Attah (2016), Eshaghieh and Eslami (2015), Acharya *et al.* (2014).

Source: Author

Table 4: Validation Report of TM Factors

S/n	Academic Qualification	Observations	Remarks	Actions to be Taken
1	Construction Academic professional (PhD) Architecture	-All the factors of principles, processes and practices time management proposed are all viable		
		-Avoid using YES/NO option as it might eliminate respondents with intermediate view	-Avoid using nominal scale where necessary	-6- point ordinal likert scale will be used to assess all variables as well as important additional questions as the study progress
2	Construction Academic professional (PhD), Major in Quantity Surveying and Construction Management	All the independent variables (principles, processes and practices proposed are essential) except minimizing time wasters which is useful but not essential	-Some variables need modifications	-Some of the independent variables will be modified in terms of wordings so as to eliminate similarities or close meanings and semantics
		-Some of the Processes of Time Management proposed can be marge with one another.	-Some processes of Time Management identified to be merged	-More modifications to be done to eliminate wording commonality as the study progress
		-Use ordinal scale of 5 to test the variables	-Use ordinal scale of ≥ 5-scale to test variables or important factors.	-6- point ordinal likert scale will be used to assess all variables as well as important additional questions as the study progress
3	Construction field expert (MSc) in Construction Technology and Contracting	-Practices of Time Management such as providing specific direction and job security are not necessary.	-More than 85% of the independent variables proposed are essential with few reservation	-More clarifications and modifications of some the of the independent variables to be carryout to eliminates commonality as the study progress
		-Processes of TM such as sequencing of activities & estimating resource requirement are useful but not essential	75% seems essential for this study	All necessary modifications to be carryout as the study progress
		-Principles such as delegation, accountability and responsibilities are useful but not essential.	More than 70% were remarked as essential for this study	Modifications to be carryout as the study progress
4	Construction field expert (M-Tech) Major in Architecture and Consultancy	-All the independent variables identified as proposed are relevant	32% deemed useful but not essential while 68% were essential to the study	

Source: Authors Field work

4.4 Pre-Testing and Validation of Time Management Factors

This research used a convenience sample of 4 respondents to conduct a pilot survey to pre-test the proposed study variables identified through interview of relevant experts. Among the respondents were two academic staff who major in Architecture, Quantity surveying as well as management in the construction industry respectively; they comprised of Senior Lecturers all PhD holders, the remaining two experts are professionals with vast experience who had at some times been engaged by the clients, contractors or consultants. All the experts have more than 10 years of working experience in the industry.

Questions were posed to the four respondents about the study variables through interview in order to elicit responses. Their comments and observations were acted upon to ensure comprehensibility, an error-free and duplication of factors. Corrections and adjustment was done were necessary. Table 4, is a representation of the validation reports, it depicts among others observations, remarks and actions taken to improve the study.

5.0 DISCUSSION

The objective of the study was to identify time management factors in construction project in Nigeria. The study used secondary data obtained through extensive review of available literature and content validity conducted to test the identified factors by experts. The factors obtained were further grouped in to: principles, processes and influencing practices. Construction project time management variables were identified in literatures but not many were found in Nigeria base literatures, most of these factors were identified in other parts of the world which could be applicable or differ from the Nigerian construction industry perspective as the case may be. After the extensive review and interview, a total of thirty-one (31) time management factors were identified and remarkably acknowledged by four experts that validates the content. As such, 10 factors were identified for principles, 7 factors for processes and 14 factors were identified as Practices influencing timely completion of construction project, and the factors were presented alongside their various sources as depicted in Table 1, 2 and 3 respectively.

6.0 CONCLUSION AND RECOMMENDATIONS

Timely completion to the satisfaction of stakeholders is one of the key factors in determining the success or otherwise of construction project worldwide. Thus, construction project time management is the application and adherence with principles, processes and practices solely geared towards timely delivery of project. This paper has identified through review thirty-one (31) time management factors relevant to successful construction project timely completions which were categorized in to: influencing processes, principles and practices. The following recommendations are proffer for effective and efficient construction project delivery:

- Construction stakeholders should as a matter of necessity synergized, employed and strictly adhered with the proposed processes, principles and practices of time management as a guideline in order to reduced delay during the construction project processes.
- There should be mechanisms to checkmate and sanction erring contractors, conniving client representatives and hold construction stakeholders accountable for poor performance most especially completion on schedule.

7.0 SUGGESTIONS FOR FURTHER RESEARCH

It is suggested that indicators of timely delivery of construction project need to be identify due to existing gap in most literature reviewed. The future study is expected to be carried out in details to assess this proposed framework and thus be able to develop a more comprehensive framework all geared toward timely delivery of construction project.

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