



Effect of Poor Specification on Building Project Cost: An Exploratory Survey of Key Building Actors in Canaanland, Ota, Nigeria

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ABSTRACT

At the outset of every building project, the client's expectations are primarily quality, time and cost. However, copious research evidence has shown that majority of construction projects in Nigeria are not always procured exactly on the basis of these parameters. The overall profitability and accountability of building projects is increasingly becoming a concern for clients due to variations which arise in the course of executing projects thereby, altering the initial contract sum. Unsound and Unused specification documents have been adjudged to be one of the main factors which lead to variation. This study is therefore aimed at evaluating the impact of poor specifications which give rise to variations, with a view to assess its effect on cost of building projects. In achieving the objectives of this study, the data was derived via two strategies, namely; review of pertinent literature on specification documents to generate the content and quality of specification clauses and the use of structured questionnaires administered to randomly selected Building professionals and clients typically involved in generating and using specification documents in Canaanland. The data was analyzed with a combination of content analysis and descriptive statistics. The findings of this study reveal that important details that should be contained in specification documents are often omitted and this leads to variations at the project execution stage. Recommendations were therefore made for Architects to meticulously provide quality specification details before the commencement of building projects.

Keywords: Poor Specification, Building Project, Project Cost, Variation

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1. INTRODUCTION

Specification refers to the description of the physical or functional characteristics, or of the nature of a supply, service, or construction item; the requirements to be satisfied by a product, material, or process indicating, if appropriate, the procedures to determine whether the requirements are satisfied. (Adewale, Oluwatayo, Uwakonye, & Ogunkoya, 2018). In other words, a specification is a declaration of the characteristics of a product, process or service a user wishes to purchase, and consequently, which the supplier is expected to supply. It is a very sensitive and determinant factor of the quality of construction and is essential during the stages of material procurement, tendering and costing (Adewale, Aderonmu, Awoyera, Fulani, Jegede, & Erebor, 2016).



Unlike other manufacturing processes in the industrial culture, the construction of buildings is very complex and highly diversified, hence the design and erection processes are usually separated (Sunday & Clinton, 2017). This simply means that, design is done by a separate party referred to as the consultant architect whereas construction is executed by another party working independently, known as the contractor. The construction industry in Nigeria is suffused with challenges of standard construction procedures which are dependent on quality of materials and workmanship and can be easily addressed with proper specification documents (Adenike, 2006). Unfortunately, there are no proper building regulations guiding specifications in Nigeria. Consequently, designers use specification standards and codes from different countries despite the fact that local requirements differ (Anigbogu & Anunike, 2014).

According to Bamisile (2004), specifications constitute a vital part of contractual documents which are meant to foster quality delivery and management of projects, however, they are absent very often in building projects executed in Nigeria. Also, Architect's drawings and specifications in Nigeria are frequently not meticulous; hence the quantity surveyors are saddled with the task of using their discretion in the preparation of bills. The aim of this study is to evaluate the impact of poor specifications which give rise to variations, with a view to assess its effect on cost of building projects. The objectives of the study are to examine the contents of specification clauses and to identify the bottlenecks of implementing specifications.

2. LITERATURE REVIEW

2.1 Overview of Specification Writing

Specifications, according to American Institute of Architects (AIA, 2007) is said to be, the part of a contract document that consists of the written requirements for materials, equipment's, systems, standards, workmanship for the work, and performance of related services to be used during the course of the project, and as such should contain instructions such as type, color, grade, options, quality of materials and performance of workmanship to be used. Specifications can be written using different approaches. The two most common approaches are the performance-based specification and descriptive specification. Specifying based on performance, describes the performance criteria to be met by the material, it is more concerned with the desired results rather than the steps taken to achieve those results. This method allows the contractor a wide choice of materials or methods of workmanship provided the desired end results are obtained. The other approach commonly used is the Descriptive specification approach; this method outlines, exactly, how the contractor must perform his service or how the product is made. It is used when proprietary information is prohibited (e.g., on public-funded projects) or when adequate standards are not available to use as references. (Master spec, 2009). Apart from the approaches mentioned above, designers can choose to combine two or more approaches, an example, is the Master Spec system of specification which contains elements of the performance based approach but is generally descriptive in nature

2.2 Specification Problems in Architectural Practice

Specification standards and building regulation are important drivers for good standard of construction but suffers a lot of challenges. In Nigeria for example there are very few national standards for building construction and even most are not even known (Bamisile, 2004). According to Gelder (2007) specification problems in practice can be divided into two main groups which are unsound specification and unused specification. Unused specification can come up if specification is not well written. Unused Specification also arises when the goods and services that are been specified by the architects are not used during construction. The reasons for unsound specifications are improper use or misquoting of standards, not following regulations, stating more contents than needed which is not important for the job and conflict with the architectural drawing (Gelder, 2007). Consistency in the entire contract document and too much wordy and complicated sentence structure in specification document are some useful yardsticks to measure the quality of specification (Lam, Kumaraswamy, & Thomas, 2004 and Gelder, 2007).



In general, to improve the standard of construction there should be a co-ordinated and committed participation of all stakeholders in the construction industry using the specifications as the key document for a quality construction management (Serpell, Solminihac, & Figari, 2002 and Jefferies, 2003).

2.3 Effects of poor Specification writing

Specification writing essential goal is to help in avoiding time wastage, wastage of money and other various resources and additionally working in consistence to the owner's requirements. The Nigerian construction industry is filled with so many problems affecting the construction standards often caused by materials quality and workmanship services which are avoidable through proper utilization of specification (Adewale et al 2018). Specification writing in Nigeria is faced with some incessant issues of hesitance of contractors to grasp quality culture; ambiguities, absence of coordination between the consultants, insignificant clauses, all leading to the lack of proper practice of specification in Nigeria construction practice.

Furthermore according to Lam, Kumaraswamy, and Ng (2001), Nigeria specification writing suffers different deficiencies caused by documents inconsistency, unavailability of information and data, utilization of unfamiliar standards and differential in languages are among the challenges leading to the shortfalls. The act of focusing more on the graphical illustrations at the impairment of specifications by the architects and engineers in Nigeria has made specification to be ignored and sometimes neglected in the practice (Haruna, 2006). From the few articles articulated, it is obvious that the architectural practice in Nigeria is faced with various difficulties through poor utilization of specification writing and if not tended to promptly can lead to more construction failures.

As indicated by Bamisile (2004), Nigeria architects often fail to detail their working drawings and this open the gap for the quantity surveyor to do the specification writing to their discretion. Numerous Nigerian designers lack the adequate knowledge concerning the capacity, performance and execution of the material and components they often specify (Adafin et al., 2011 and Folorunsho and Ahmad, 2013).

2.4 Variations Arising from Poor Specifications

A major clog in the wheel of successfully executing buildings in the construction industry is variation (Kaming 2012). According to Mhando, Mlinga and Alinaitwe (2017), variations in building contracts typically alludes to an adjustment in the works started by the architect, engineer, the employer or different factors, all things considered. It might include the change of any sort or standard of materials to be utilized in the works. According to Ramus and Birchall 1998, variations may arise in any of the following situations, among others; when the architect needs or wishes to vary the design or the specification, when a discrepancy is discovered between any two or more of the contract documents, when a discrepancy is discovered between any statutory requirement and any of the contract documents and When an error in or omission from the contract bills is discovered.

Variation caused by standard of materials can be attributed to poor specification writing (Bhadmus et al 2015). Mhando et al (2017) opines that the situation of variations in developing countries is continuously heightened with the paucity of proper specification documents, due to poor knowledge of materials and their applications usually deficient at design stage (Anigbogu, 2014). The impact of poor specification on building projects is often times variation which inherently implies cost overruns and time extension of project duration (Oladapo 2007).



3. RESEARCH METHODOLOGY

The methodological framework was designed to systematically collect data from a small population of study according to Kansei Engineering (K.E) type II which deals with perception of the elements in the sample size. The method of data collection began with designing the variables, followed by the questionnaire instrument which comprised of three sections, and finally the specimen selection. In achieving the objectives of this study, the data was derived via two strategies, namely; review of pertinent literature on specification documents to generate the content and quality of specification clauses and the use of structured questionnaires administered to randomly selected building professionals typically involved in generating and using specification documents in covenant university Canaanland and Canaan city ongoing housing project. The choice of study area is premised on the multi billion naira construction projects in Canaanland. A total of 56 questionnaires were distributed to building professionals on site, 40 valid questionnaires were retrieved and the data was analyzed with a combination of content analysis and SPSS statistical package. The results are presented with the use of descriptive statistics as shown in the tables and charts below.



4. DATA ANALYSIS AND PRESENTATION

The questionnaire was structured into three sections to elicit information from respondents. The sections contained five items about social demographics of respondents, six items about use of specification documents and five items about perception of the document users on project cost. The data collated and analyzed are represented and discussed as follows.

4.1 Social Demographics

The demographics of the respondents reveal that a greater percentage of the professionals involved in building projects in the study area are male with 52.5% of them within the age of 31-40 years. Also, 42.5% have only first degree with dominant professional experience range of 6-15 years. Out of the total respondents, Architects and Engineers constituted 37.5% each, Quantity surveyors constituted 17.5% and contractors 7.5%.

Variable	Frequency	Percentage (%)
<i>Sex</i>		
Male	30	75
Female	10	25
Total	40	100
<i>Educational Qualification</i>		
HND	10	25
B.sc/B.Eng/B.Tech	17	42.5
M.Sc/M.Eng/MBA	13	32.5
<i>Age (Years)</i>		
20-30	6	15.0
31-40	21	52.5
41-50	10	25.0
51-60	3	7.5
Above 60	0	0
<i>Professional Experience (Years)</i>		
Less than 5	6	15.0
6-15	20	50.0
16-30	14	35.0
<i>Profession</i>		
Architect	15	37.5
Engineer	15	37.5
Quantity Surveyor	7	17.5
Contractor	3	7.5



4.2 Use of Specification Documents

In this section, respondents were asked about the actions they take when unspecified materials are used, the frequency of specification document usage, the approach to writing specifications, and their follow up on specification documents, inspection of materials delivered to the site and their knowledge of material availability before specifying. The results are presented in pie charts as follows.

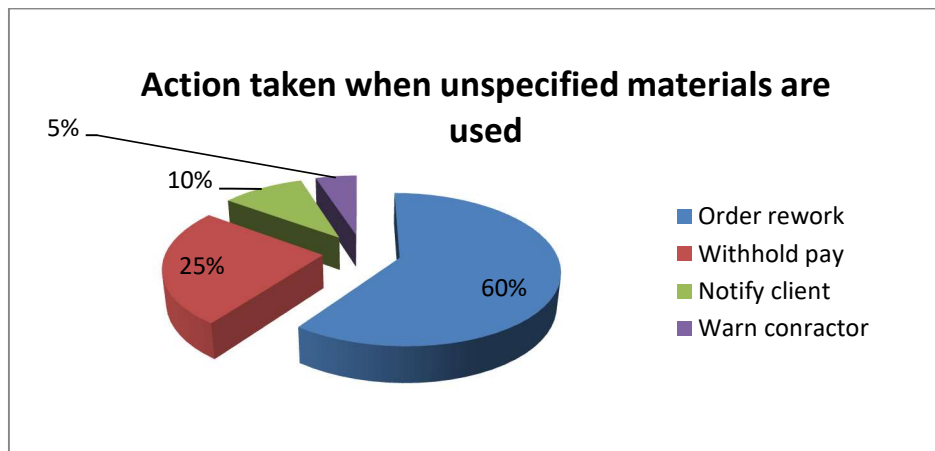


Fig 1: Actions taken by respondents when unspecified materials are used

The chart above reveals the actions professionals take when materials not specified are used. 60% of the investigated professionals order contractors to redo the works with the specified materials, 25% of them withhold payments, 10% notify the client while 5% issue warning to the clients. Inferentially, ordering reworks is the best option to ensure that contractors adhere to specification documents.

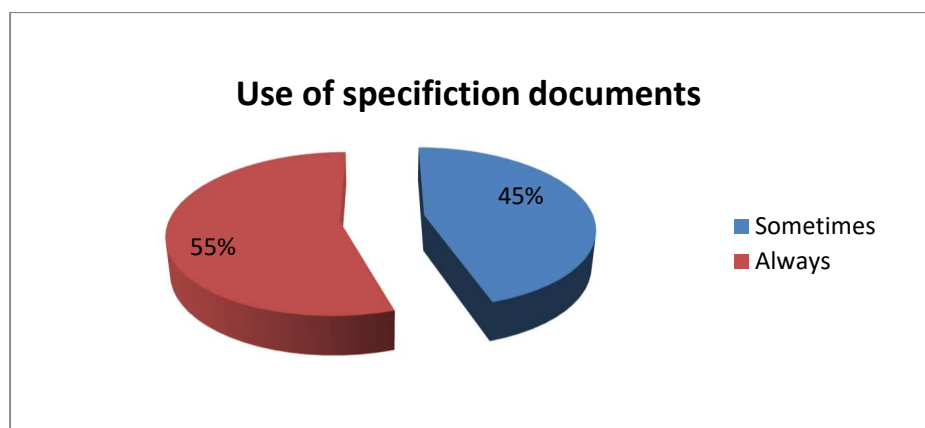


Fig 2: Respondents usage of specification documents

While 55% of the professionals investigated revealed the constant use of specification documents on construction projects, 45% reported inconsistency. This can be attributed to lack of enforcement on the use of specification documents on sites.

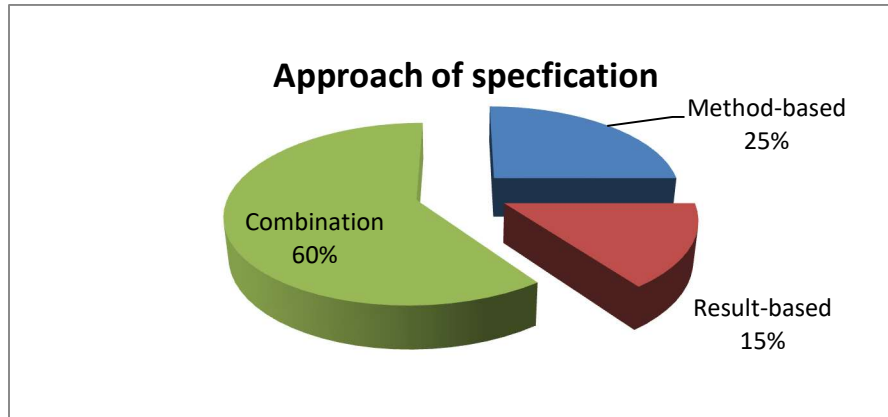


Fig 3: Respondents approach to specification writing

Specification writing is result based, method based or a combination of the both approaches. 60% of the professionals combine the approaches, 25% use the method based while 15% adopt the result based approach. It can be deduced from this chart that to ensure efficiency, the method and result based approaches may be combined.

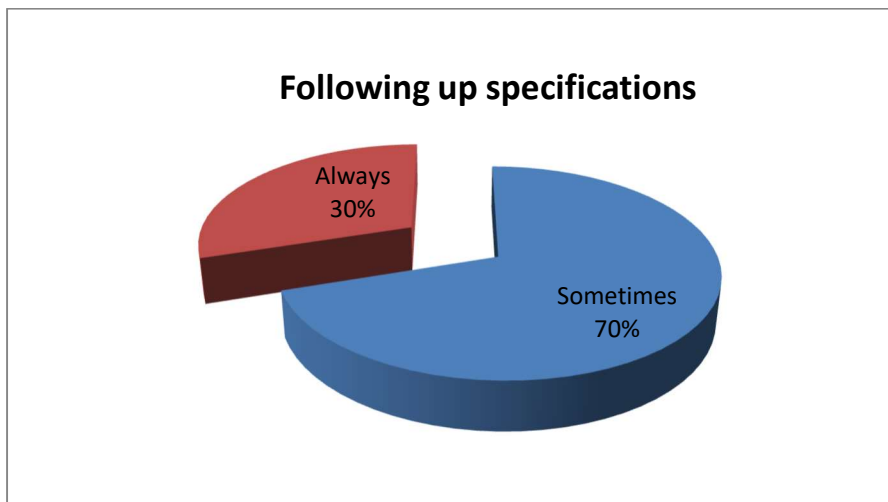


Fig 4: Respondents follow up on specification documents

The construction process is cyclic as such there must be congruence between specifying materials and ensuring the materials specified are used by the contractor. 30% of the respondents always follow up their specification while 70% are not consistent with the follow up process

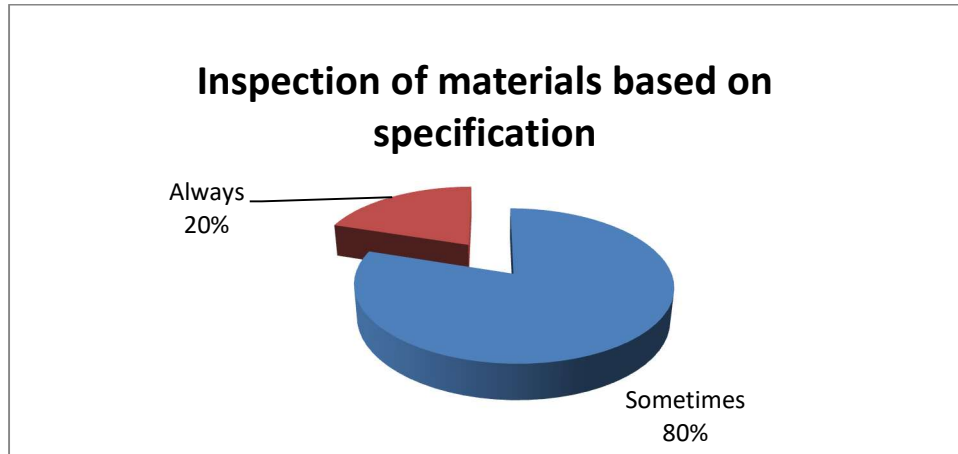


Fig 5: Respondents inspection of materials specified

20% of the respondents always inspect works to ensure that the materials specified are used accordingly, while 80% are not consistent in the inspection to ensure adherence. The negligence can be attributed to inconsistencies from the client and lack of ethical considerations from the professionals.

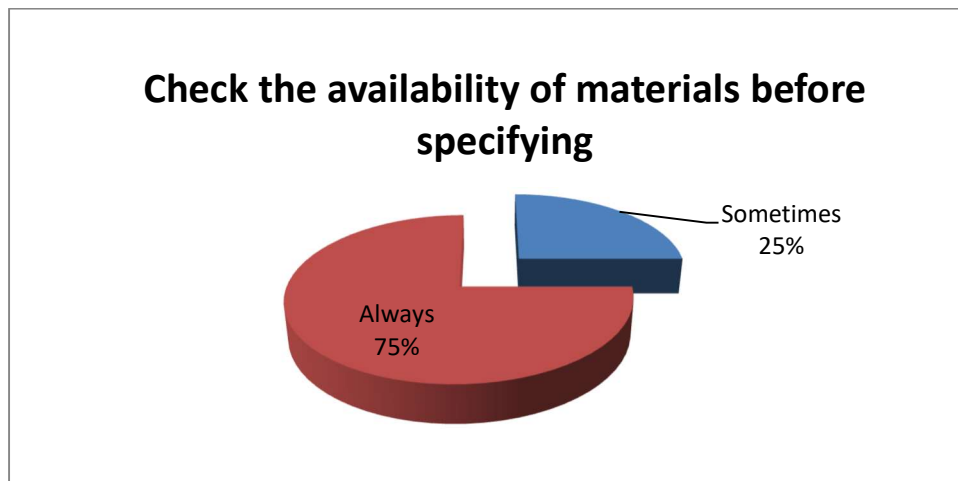


Fig 6: Respondents knowledge of materials before specifying

Knowledge base of building materials is key to its specification. 75% of the respondents specify materials based on its availability, while 25% are not always sure before specifying. To avoid issues of substitution leading to cost overruns, professionals must have a good knowledge base of building materials before specifying.



4.3 Perception of Respondents

S/N	Statement	Agree	Strongly Agree	Undecided	Disagree	Strongly Disagree	Total %
1	Most Variations that occur during construction can be attributed to poor specification.	30%	42.5%	5%	20%	2.5%	100%
2	Variations arising during the construction stage can be reduced if important details are included in the specification document	47.5%	52.5%	0%	0%	0%	100%
3	Drafting and enforcement of local standards of specification will greatly reduce problems that arise from poor specification.	52.5%	42.5%	0%	5%	0%	100%
4	Proper Specification documents foster effective delivery of a building project within the budget.	57.5%	40%	2.5%	0%	0%	100%
5	Specification documents should be detailed at the working drawing stage before invitation to tender.	30%	70%	0%	0%	0%	100%

From the forgoing, the building professionals investigated are highly aware of the effects of poor specification but attribute gross negligence to lack of standards and enforcement by regulatory bodies. The results reveal that if specification documents are detailed before invitation to tender, most variations occurring during the construction stage leading to cost overruns can be reduced immensely.

5. CONCLUSION AND RECOMMENDATIONS

The research identifies the effects of poor specification writing on project cost in Canaan city, Ota, Nigeria. It implies that poor specification writing is a major cause of variation in construction projects execution thereby leading to increase in project costs. The research also highlights that even where specification documents were engaged, the requirements and standards were hardly enforced, mainly due to the inability of the artisans to understand the components of the specification document. The inability to understand above stated document is probably because most architects opt for unskilled labor to bring to reality their designs, Rather than engaging specialist contractors who are well versed in the use and execution of specification documents, Consequently, faulty designs are produced, which then have to be re-worked, thereby adding to the overall cost of the project.

It therefore holds on professional architects to take up the responsibility of engaging the services of specialist contractors, as part of the design team in their organizations. Furthermore, the specifiers should try as much as possible to be more concise and straightforward when writing specification documents so as to ensure easy and prompt understanding for all who are to use the document.

It is recommended that architects imbibe the practice of including specifications from the preliminary design stage, to avoid discrepancies among the contract/tender documents. Also, architects should imbibe the habit of doing market survey on regular bases to keep up-to-date record of building materials.



REFERENCES

1. Adafin, J. K., Ayodele, E. O. and Daramola, O. (2011). An assessment of factors affecting material stock control practice on selected construction sites in Nigeria. *Continental J. Environmental Design and Management*, 1 (1), 22 - 31, 2011 © Wilolud Journals, 2011 <http://www.wiloludjournal.com> Printed in Nigeria
2. Adenike, S.O. (2006). Memorandum on the frequent collapse of buildings by Ogun State Housing Corporation. Public Hearing on Frequent Collapse of Buildings by House of Representatives Committee on Housing and Urban Development, 6th - 7th March.
3. Adewale, B.A., Oluwatayo, A.A., Uwakonye, O.U., & Ogunkoya A.B. (2018). Shortfalls of Specification Writing in Nigerian Architectural Practice. *International Journal of Civil Eng & Tech*. Volume 9, issue 7, pp. 497-506.
4. Adewale, B., Aderonmu, P., Awoyera, P., Fulani, O., Jegede, F., & Erebor, E. (2016). Pedagogic Tenets of Specification Writing in Architectural Education, Construction and Practice. Retrieved September 26, 2018 from <https://www.researchgate.net/publication/313230595>
5. AIA Document A20 Houston bar Association, 2007. <http://www.hba.org/wpcontent/uploads/2014/.../B-2-AIA-Doc-A201-2007>.
6. Anigbogu, N. A., & Anunike, E. B. (2004). Standard of Materials Specifications; Their Implementation and Enforcement on Building Construction Project in Nigeria. *ATBU Journal of Environmental Technology*, 3(1), pp. 33-44.
7. Bamisile, A. (2004). *Building Production Management*. Lagos: Foresight Press Ltd.
8. Bhadmus T.R and Ayodele O.I and Ahmed, Sa'id. (2015). The Causes of Variation Order of Construction Industry in Nigeria.
9. Folorunsho, C. O. and Ahmad, M. H. (2013). Parameters for Building Materials Specifications in Lagos, Nigeria 2013. <http://sgo.sagepub.com/content/3/3/2158244013497724>
10. Gelder, J. (2007). NBS Educator: Specifications: Problems in practice. www.then.com.
11. Haruna, I. A. *Architectural Practice*, 2008. <http://www.ibrahimharuna.com/jmcp/index.php/articles/80-architectural-practice/index.html>
12. Jefferies, M.C., Chen, S.E., McGeorge, W.D. & Esparon, J.P. (2003). Introducing quality assurance in the Seychelles construction industry. *Construction Management and Economics*, 21, 603-611.
13. Kaming, P.F., (2012), "Factors influencing construction time and cost overruns on high rise projects in Indonesia", *Construction Management Vol. 15 No. 1*, pp. 83-94.
14. Lam, P. T., Kumaraswamy, M., and Ng, S. T. (2001). The Multiple Roles of Specifications in Lean Construction. In *Proceedings IGLC-9-Ninety Annual Conference of the Int. Group for Lean Construction*.
15. *Master Spec. Guide to Writing Specification*. New Zealand, 2009.
16. Mhando, Y.B. and Mlinga, R.S and Alinaitwe, H.M. (2017) Perspectives of the Causes of Variations in Public Building
17. Projects in Tanzania, *International Journal of Construction Engineering and Management*, Vol. 6 No. 1, 2017, pp. 1-12. doi: 10.5923/j.ijcem.20170601.01.
18. Oladapo, A.A (2007). A quantitative assessment of the cost and time impact of variation orders On construction projects. *Journal of Engineering, Design and Technology*. 5. 35-48. 10.1108/17260530710746597
19. Ramus, J. and Birchall, S. (1998), *Contract Practice for Surveyors*, 3rd ed., Laxtons, Oxford.
20. Serpell, A., Solminihac, H.D. & Figari, C. (2002). A general diagnosis of construction quality in Chile. *Construction Management and Economics*, 20, 413-421.
21. Sunday, O., & Clinton, O. (2017). Impact of Design Errors on Variation Cost of Selected Building Project in Nigeria. *Procedia Engineering*, 196(June), 847-856. <https://doi.org/10.1016/j.proeng.2017.08.016>