

IMPROVING PROJECT DELIVERY PROCESS USING
LEAN CONSTRUCTION APPROACH

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DEDICATION

This research work is dedicated to late father Alhaji Adamu Dan Malam and my late wife Fatima Mohammed, may Allah SWT grant them *Jannatul Firdaus*

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ABSTRACT

The poor image of the Nigerian construction industry arising from suboptimal performance in project delivery due to colossal wastes is well documented in existing literature. However, effort to proffer solutions to the problems of waste on site has been marginal. After an in-depth literature review it was established that, lean construction approach has been adopted to address waste and non-value adding activities and improved productivity in project delivery. Therefore, this study is aimed at proposing a lean implementation framework (LIF) that will guide the site implementation of lean construction tools to address the waste occurrence menace. Accordingly, action research using mixed-mode approach was adopted, data related to waste occurrences and benefits of lean construction was collected. This was conducted in two phases. The first phase sought to explore the frequency and level of waste and non-value adding activities occurrences in project delivery in Nigerian construction sites. To achieve this aim, data was collected using survey questionnaire administered to 400 experts in construction industry, and tested for internal reliability using Cronbach Alpha. Consequently, the data was analysed using descriptive and inferential statistics and validated using one sample t-test. The results showed the existence of wastes that leads to cost and time overrun. The second phase assessed six lean construction tools via six case study sites. Data was collected through observation, interview, questionnaire and site diary, and analysed thematically using content analysis. The results were validated using methodological triangulation. The results showed that the application of lean construction techniques in Nigerian construction sites could address the problems of waste and non-value adding activities and improve productivity. The study identifies several challenges and barriers that could impede the implementation of lean construction, including lack of knowledge on lean approach, cultural issues, misconception by participants, and lack of involvement of designers in the implementation process. In view of these findings, the study recognises training, enlightenment on benefits of lean, involvement of designers in the implementation process, simplifying the process, trust between the project participants and collaborative planning as strategies for addressing the problems. To facilitate implementation of the suggested solutions to waste occurrences, a lean implementation framework (LIF) was developed to guide the site implementation of lean construction for improving the project delivery process. The LIF was validated using expert opinions by face to face interview, and the result revealed that the framework could be a guide for implementation of lean in construction site.

ABSTRAK

Imej buruk industri pembinaan Nigeria disebabkan oleh prestasi yang kurang memuaskan dalam pelaksanaan projek. Ianya kerana terdapat pembaziran secara berleluasa terhadap bahan binaan di tapak binaan. Namun begitu, usaha untuk menyelesaikan masalah pembaziran sisa di tapak binaan adalah terhad. Setelah kajian literatur yang mendalam dilaksanakan, adalah terbukti bahawa Sistem Pembinaan *Lean* boleh diterima pakai untuk menyelesaikan masalah pembaziran tersebut, menambah nilai aktiviti di tapak serta peningkatan produktiviti dalam pelaksanaan projek. Oleh itu, kajian ini bertujuan untuk mencadangkan rangka pelaksanaan pembinaan *lean* yang boleh digunakan sebagai garis panduan pembinaan di tapak untuk mengatasi gejala pembaziran. Sehubungan dengan itu, pendekatan *mixed mode* digunakan untuk mengenalpasti tahap pembaziran serta kebaikan Sistem Pembinaan *Lean*. Kajian ini dijalankan dalam dua fasa. Fasa pertama adalah untuk memperolehi tahap pembuangan sisa dan aktiviti tidak tambah nilai di tapak. Matlamat ini dicapai menggunakan borang soal selidik yang diedarkan kepada 400 pakar dalam industri pembinaan, data tersebut diuji untuk kebolehpercayaan menggunakan ujian Cronbach Alpha. Data juga dianalisis menggunakan Statistik Diskriptif dan Inferensial. Data disahkan melalui ujian-t. Hasil kajian menunjukkan kewujudan sisa buangan membawa kos dan masa tambahan kepada projek. Fasa kedua pula adalah untuk menilai enam alat pembinaan *lean* yang diuji di enam alat pembinaan sebagai kajian kes. Data dikumpul melalui pemerhatian, temubual, soal selidik dan kajian dairi di tapak. Content analisis digunakan untuk menganalisa data. Hasil kajian disahkan menggunakan metodologi *triangulasi*. Keputusan kajian menunjukkan penggunaan teknik pembinaan *lean* di tapak-tapak binaan di Nigeria boleh menangani masalah sisa pembuangan dan aktiviti tidak tambah nilai serta boleh meningkatkan produktiviti. Kajian ini mengenalpasti beberapa cabaran yang boleh menghalang penggunaan sistem pembinaan *lean* seperti kurang pengetahuan tentang sistem tersebut, isu-isu budaya, kurang penglibatan pihak perunding dalam proses pembinaan projek. Justeru itu, kajian ini mencadangkan latihan, kesedaran tentang sistem pembinaan *lean*, penglibatan perunding berkenaan dalam proses pembinaan *lean*, memudahkan proses pembinaan, kepercayaan antara pasukan projek serta bersama-sama menubuhkan strategi untuk mengatasi masalah. Untuk memudahkan pelaksanaan penyelesaian yang dicadangkan, satu rangka pelaksanaan *lean* dikemukakan sebagai panduan di tapak binaan untuk mempertingkatkan proses pelaksanaan projek. Rangka pelaksanaan pembinaan *lean* ini disahkan menggunakan pendapat para pakar, keputusan yang diperolehi mendedahkan rangka kerja pelaksanaan *lean* di tapak binaan.

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LIST OF ABBREVIATIONS

GDP	-	Gross Domestic Product
NIOB	-	Nigerian Institute of Building
USA	-	United States of America
UK	-	United Kingdom
NBS	-	National Bureau of Statistics
SPSS	-	Statistical Package for Social Science
NIP	-	National Implementation Plan
3Cs	-	Commitment, Consistency and Continuity
3Ps	-	Policies, Projects and Programs
CIDB	-	Construction Industry Development Board
AGM	-	Annual General Meeting
CI	-	Construction Industry
BLDG	-	Building
CAGR	-	Compound Aggregate Growth Rate
PPP	-	Public Private Partnership
DBFT	-	Design, Build, Financed and Transfer
BOO	-	Build, Operate and Own
BOT	-	Build, Operate and Transfer
DBFO	-	Design Build, Finance and Operate
BOOST	-	Build, Own, Operate, Subsidize and Transfer
BOOT	-	Build Operate, Own and Transfer
BLT	-	Build Lease and Transfer
ROT	-	Renovate Operate and Transfer
IFOA	-	Integrated Form of Agreement
BOQ	-	Bill of Quantities
LCI	-	Lean Construction Institute
CII	-	Construction Industry Institute

JIT	-	Just-In-Time
TQM	-	Total Quality Management
TPS	-	Toyota Production System
TFV	-	Transformation, Flow, Value
LPDS	-	Lean Project Delivery System
MS	-	Master Schedule
PS	-	Phase Schedule
RPS	-	Reverse Phase Schedule
LP	-	Lookahead Planning
SWLA	-	Six Week Lookahead
FWLA	-	Four Week Lookahead
WWP	-	Weekly Work Plan
PPC	-	Percentage Plan Completed
FISCA	-	Factors Influencing Scottish Construction Accidents
PDCA	-	Plan, Do, Check & Act
5S	-	Seiri, Seiton, Seiso, Seiketsu Shitsuke
LIP	-	Lean Implementation Programme
CE	-	Construction Excellence
BRE	-	British Research Establishment
CPM	-	Critical Path Method
IGLC	-	International Group for Lean Construction
LPS	-	Last Planner System
WBS	-	Work Breakdown Structures
TQC	-	Total Quality Control
LEA	-	Lean Enterprise Architecture
QFD	-	Quality Function Deployment
KIVP	-	Knowledge Innovation Visible Planning
EME	-	Extended Manufacturing Enterprise
FA	-	Factor Analysis
NGO	-	Non-Governmental Organisation
N	-	Number
WOLI	-	Waste Occurrences Level Indicator
WSM	-	Material Waste
WST	-	Time Waste

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CHAPTER 1

INTRODUCTION

1.0 Introduction

The motivation behind the study was based on the call by the federal government of Nigeria for the transformation of the key sectors of the economy through its transformational agenda 2011 to 2015 programs. The Nigerian construction industry is one of the key sectors of the Nigerian economy; it contributes about 3.74% of gross domestic product (GDP) in 2011 (Statistics, 2012). A challenge was thrown to professionals in the construction industry by Hon. Minister of Housing to come up with a holistic solution of addressing the current problems in the construction industry for sustainable development (42nd National Conference/AGM NIOB, 2012). This study will look at the possibility of applying lean construction tools in construction sites in Nigeria, and assess its suitability in managing and controlling activities in the project delivery process for the minimization or possibly elimination of waste and non-value adding activities, for improving the construction process and the creation of value to the owner, by improving productivity.

1.1 Background of the Research

The Nigerian construction industry is characterised with high cost of production, time overrun, uncompleted projects, poor quality of work, accidents and

so on (Abdulhameed *et al.*, 2012; Oyewobi *et al.*, 2011). The industry is also facing continues decrease in profit margin which lead to claims for variations (Adamu and Howell, 2012; Adamu *et al.*, 2012). All these ensuing from poor project planning (Olusegun and Machael, 2011; Oke and Ogunsemi, 2011; Adamu and Abdulhamid, 2012), uncompleted design during the project delivery (Aina and Wahab, 2011; Windapo and Matins 2010), waste generation due to bureaucracy, delay from material suppliers, variations and poor site management (Dlakwa and Culpin, 1990; Oke and Ogunsemi, 2011; Adeagbo, 2014), and unethical behaviours in some government works in form of fraudulence practice and kickback (Mansfield *et al.*, 1994; Olomolaye *et al.*, 1987). All these problems are peculiar to the Nigerian construction industry which attribute to its low productivity, high cost and time overrun, poor quality of the products produced.

The Nigerian construction industry as a major sector of the economy requires attention for the transformation agenda to be successful. Nigeria, just like any other developing country in line with her Vision 20:2020 and indeed its Transformation Agenda 2015, recognized the need to use infrastructural development as a means of firing the Nigerian economy and uplifting the wellbeing of its citizenry. The need for the use of best practice in the provision of these infrastructures is necessary. In this respect, it was recognised by extant that lean construction has made a colossal impact within the construction industry of developed nations. Such as USA, UK, Denmark, Chile, Finland, Brazil are so on. Also, some developing countries have recorded improvements in their project delivery process after the application of lean construction approach (Ballard and Howell, 2003). Application of lean construction tools was investigated by (Salem *et al.*, 2005; Gonzalez *et al.*, 2010; Ballard *et al.*, 2009; Loong *et al.*, 2010; Al Sehaimi *et al.*, 2009; Yu *et al.*, 2009; Adamu and Howell, 2012; Adamu *et al.*, 2012), the result has shown a substantial improvement in the project performance of the projects in the countries applied.

1.1.1 Lean Construction

Lean Construction was developed based on production management method of project delivery, is a new technique of project delivery that can be adopted to any type of construction, mainly suitable for quick, uncertain and complex project (Howell, 1999). Lean Construction is just as the current practice has objective of better meeting customers need while using of minimum or smaller amount of everything, but different from the current practice because production management philosophy is the basis of lean construction. It is a “physics” of construction. “Physics” is the word borrowed from production philosophy, which means “factory of physics” an exceptional wording on production management (Hopp and Spearman, 1996). Lean management in production has made a great revolution to the manufacturing industry, from design stage, supply chain and assembling. When adapted from manufacturing to construction, it changes the method of the work right through the project delivery process. The lean management approach differs from traditional management approach, as lean pull concept of scheduling opposes to traditional push concept. Lean construction emerges from the objectives of lean production systems, i.e. minimization of waste and maximization of end value to users using specific approaches by applying them in the new concept of project delivery (Howell, 1999). Because of these changes:

- The delivery process of a facility and the definition of the facility were designed collectively to better meet the user’s expectation and support client purposes. Negative iterations are reduced in the process while positive iterations are allowed and supported.
- Work is planned all through the process to reduce waste and increase value at the project delivery level.
- Effort for improvement of performance and its’ management are targeted towards improving general project performance. As it is better than to increase the speed of an activity or reduction of cost.
- “Control” is redefined from “results monitored” to “make effects to occur”. The planning and control of the systems performance were measured and improved.

1.2 The Problem Statement

The current yield of the Nigerian construction industry suffers continues decrease, as its contribution to GDP continues to fluctuate up and down every year as per report of the National Bureau of Statistics (2012). The average GDP contribution of Building and Construction sector for ten year after the independence records shows that, from 1971-1980 was 8.3%, 1981-1990 was 2.3%, 1991-2000 was 1.8%, 2001-2010 was 1.8% and for 2011 was 1.79%. While in the last quarter of 2012 it records 1.14%. As per records of NBS (2015), the average GDP contribution of the construction sector for 2012 maintained 1.79% and dropped to 1.62% in 2013. In 2014, the contribution made in 2013 dropped down by 0.46%. Currently, the record from NBS shows that the construction sector recoded GDP contribution of 11.24% in 2015 and dropped to 7.47% in 2016 (NBS, 2016) with all the efforts of investment in the sector by public and private sectors. The industry is also characterized with continued decrease of profit margin, increase in defects and rework, cost and time overrun, abandoned and uncompleted project due poor project definition, control and management of the project delivery process, unnecessary waste generation and non-value adding activity (Olusegun and Machael, 2011; Oke and Ogunsemi, 2011). Even so, it was demonstrated that lack of proper application of innovative approaches is among the many contributing factors associated with the recorded failure in the GDP contribution and a poor image of the industry (Adamu and Howell, 2012; Adamu *et al.*, 2012; Adeagbo, 2014). Accordingly, waste generation and non-value adding activities were also found to be attributing factors in the poor project delivery (Oke and Ogunsemi, 1991; Dlakwa and Culpin, 1990; Adeagbo, 2014; Ahiakwo *et al.*, 2012; Ahiakwo *et al.*, 2014). All this research identified these problems without offering solution of solving them. The success of any project is largely dependent upon proper tools of planning, control, management, and elimination of waste and non-value activities in the industry, (Sacks and Goldin, 2007; Memon *et al.*, 2013) as enunciated by the extant.

However, recently the lean construction community outlined that research should be centred on developing practical solutions to explicitly solve problems not only to identify them (Alschaimi and Koskela, 2008). Accordingly, to solve the prevailing problems within the Nigerian construction industry, a novel research

approach that can go beyond the normal traditional research of descriptive or explanatory research should be adopted to address the persistent practical construction management problems, and contribute to construction management knowledge. An action research, constructive research and design science research are suggested to be the best suitable research model for this situation (Aken, 2005; Jarvinen, 2007; Azhar, *et al.*, 2010; Koskela, 2008; Alsehaimi *et al.*, 2009; Voordijk, 2009; Jang *et al.*, 2010).

Challenging the traditional construction approach, lean construction approach is a production-based management philosophy that stresses the removal of waste and non-value adding activities in the project delivery process. Starting from the project design stage to delivery processes of a construction project using lean ideologies advocated by Ohno (Fewings, 2013). It is a continuous process for the elimination of material and time wastages, with determination of meeting or exceeding client's requirements, at the same time focusing on the value stream and pursuing continuous perfection in the project delivery process (Koskela *et al.* 2002; Salem and Zimmer 2004).

It was enunciated by extant that adopting lean construction approach in project delivery on sites could address the problem of waste and non-value adding activities occurrences (Houvila and Koskela, 1998; Howell and Ballard, 1999; Saurin *et al.*, 2002; Thomas *et al.*, 2005; Salem *et al.* 2007; Schafer *et al.*, 2008; Mossman 2009). The lean construction concept has been adopted by some developed nations in their construction industry at the project sites, and remarkable benefits were achieved at the projects levels (Nahmens and Ikuma, 2009; Koranda *et al.*, 2012). Lean construction tools have been used in many countries to improve co-ordination, planning, control, productivity, communication, collaboration, teamwork, learning and project performance success in projects (Alarcon, 1997; Tommelein and Ballard, 1997; Fiallo and Revelo, 2002; Ballard *et al.*, 2009; Gonzalez *et al.*, 2010; Mossman, 2012). Nevertheless, there is no any empirical evidence that relays the implementation of lean construction concepts in the Nigerian construction sites.

After assessing the peculiar problems of waste and non-value adding activities occurrences in Nigerian construction sites, and the benefits of addressing these menaces associated with lean construction approach, this research gap was identified.

1.3 Research Gap

After enlightening the economic role, the construction industry played in Nigerian, and its ugly status in terms of waste generation and non-value adding activities occurrences in the project delivery process. Consequently, with recognition of the effect of waste and non-value adding activities, which leads to cost and time overrun, and decrease in productivity and profit margin, there is no comprehensive data on frequency and level of waste and non-value adding activities occurrence in the project delivery process. Similarly, there is scarce information on how to address these menaces in the construction site. Subsequently, there is little attempt to use lean construction to improve the project delivery process in terms of waste and non-value adding activities occurrences in the construction site. Based on this gap, this research come with this aims. To develop a framework for the implementation of the lean construction in Nigerian construction site to improve the project delivery process. To achieve the research, aim the following research questions were raised.

1.4 Research Question

- 1 *What is the frequency and level waste generation and non-value adding activity occurrence in the current project delivery of Nigerian construction sites?* This question is aimed at exploring the literature to generate a survey questionnaire using expert opinion to establish the frequency and level of waste and non-value adding activities occurrence in the current project delivery process in the Nigerian construction industry.
- 2 *Can the adoption of lean construction approach in Nigerian construction sites eliminate waste and non-value adding activities in the project delivery process?* This question is aimed at broadening our knowledge to understand the benefits of applying lean construction approach in Nigeria construction sites, through assessing the implementation of lean tools in the case study sites.
- 3 *How can lean construction approach be implemented in Nigerian construction sites to improve the project delivery process?* This question aims

to propose a detail framework for the implementation of lean construction in the construction sites to address the problems of colossal waste and non-value adding activities occurrences in project delivery process of Nigeria.

To answer the research questions and pursuance to achieving the main aim of the research, the following objectives were developed.

1.5 Objective of the Research

1. To determines the frequency and level of waste and non-value adding activities occurrences in the current projects delivery process in Nigerian construction sites.
2. To assess the implementation of lean construction techniques in Nigeria construction sites, and established its contribution towards the elimination of waste and non-value adding activities.
3. To develop and propose a framework for the implementation of lean construction in Nigerian construction site.

1.6 Significance of the Research

The poor image of Nigerian construction industry in terms of waste and non-value adding activities occurrence is well documented in literature. Similarly, the application of lean construction to address the problem of waste and non-value adding activities has been established by many researches. Therefore, this research will contribute to the body of knowledge by revealing.

- ❖ The frequency and level of waste generation and non-value adding activities occurrences in Nigerian project delivery processes.

- ❖ A clear picture for the benefits of lean construction implementation in the Nigerian construction site to address the problems of waste and non-value adding activities.
- ❖ Remarkably, the study has come up with lean construction implementation framework to guide the government and organizations to implement lean construction on sites to eliminate waste and non-value adding activities. This will be presented as a gizmo of project delivery process improvement.

To guide the research and pursuant to these objectives, the study was design to be conducted within certain parameters.

1.7 Focus and Scope of the Research

The Nigerian construction industry is very broad; therefore, the scope of this research is to establish the frequency and level of waste and non-value adding activities in the project delivery process, and assess the implementation of six lean construction tools within six construction sites in Nigeria. This study cannot pretend to address all problems in Nigerian construction industry; therefore, it is necessary to specify the boundary of knowledge behind the study. The research will focus on project delivery process at construction sites only. This will involve the planning, control and management of the construction process, because of its impact to cost, quality, safety and time. Looking at the percentage of the projects being carried out by government, medium and small contractors, lean construction approach will be applied in medium and small projects executed by government and the private sector. The projects may be handled by contracts and direct labour. The research will be conducted using building construction in academics' environment and residential in three different cities and locations. However, issue discussed will be equally relevant to other complex project in term of the lean construction implementation process.

1.8 Research Methodology

This study adopted an action research model, using mixed mode for data collection. Action Research Model is a method use to facilitate change by participating or being involve in the system's operation in a diagnostic, active learning, problem finding and problem solving process (Jarvinen, 2007). Action research is either research initiated to solve an immediate problem or a reflective process of progressive problem solving led by individuals working with others in teams or as part of a "community of practice" to improve the way they address issues and solve problems (John and Sons, 2010). There ten features why using action research, these will be discussed in detail in Methodology chapter.

The study relies on a literature review to develop the survey questionnaire for the realisation of the first objective. The survey was undertaken within the professional in the construction industry, which includes architect's engineers, project managers, builders, quantity surveyors and others. The quantitative data collected will be analysed using descriptive and inferential statistics using the Statistical Package For Social Science (SPSS) software to explore the frequency and level of material and time waste occurrences in current project delivery process. Cronbach Alpha will be used to test the internal reliability of the questionnaire.

The second research question will be addressed using established data from case studies sites and empirical data from the survey and semi structured interview. The research will adopt mixed mode model using pragmatic approach, based on the principles of phenomenology combining both quantitative and qualitative data. Phenomenological approach commonly used in construction environment for inquiry offers an opportunity for a brood description of a phenomenon of everyday experience to achieve an understanding of its essential structure (Malagon-Maldonado, 2014). The action research via case studies experiments conducted will answer the second research question. Literature of previous research on implementation of lean construction will be reviewed to understand how the tools will be implemented in the site. Site diary, minutes of meeting, interview, pictures, questionnaire survey and documentations are the instruments of data collection. Data collected will be analysed

thematically using classical content analysis for the interview, descriptive and inferential statistic for the questionnaire. The lean projects are compared with non-lean implemented projects to identify the benefit of the lean construction implementation. The data collected and analysed will be synthesised to develop a lean implementation framework. The framework will show how lean construction approach will improve the project delivery process in construction site in terms of waste and non-value adding activities. Detail methodology will be described in chapter 4 including the sampling method adopted.

1.9 Limitations of the Research

This research was conducted in Nigerian construction sites, using the site and the practitioners in the construction industry as unit of analysis. Lean construction is not yet implemented in construction site in Nigeria, therefore, there are limited practitioners with knowledge on lean construction implementations. The data collection procedure was limited to the case study sites only, and people involved in training conducted and the lean projects execution.

Due to this limitation, the research was conducted in the projects that were managed using lean construction approach only, and validations were made with expert that have experience in lean construction practice.

1.10 Structure of Thesis

The thesis will be consisting of seven chapters organised in logical and systematic manner to accomplish the research aim and objectives, through addressing the research questions. The detail flow chart is presented in Figure 1.1.

The first chapter gives an introduction of the research, by highlighting the background of the research, and how the studies was conducted from literature review to development of the research problem and research gap. Furthermore, the research goal was defined by stating the aim of the study. Subsequently, the research questions and objectives were stated and clearly outlined. The significance of the research was outlined, and the scope and focus of the study was identified And the methodology adopted for the research was outlined, followed by the research limitations. And finally, the structure of the thesis was presented in Figure 1.1.

The second chapter reviews literature on Nigerians transformational agenda and the theory on the Nigerian construction industry in term of investment and output and the problems of traditional project delivery. Comprehensive literature review on waste and non-value adding activity that exist and efforts in addressing the problems were discussed in this chapter.

The third chapter entails an in-depth review of literature and on theoretical background of lean construction, and outline the benefits achieved by the adoption of lean construction approach by developed nations and emerging economy. Different lean frameworks developed from previous studies were reviewed and conceptual framework was developed in this chapter.

The fourth chapter will outline the research methodology used for the study. It presents in detail the philosophical paradigm, theories, strategies and methods adopted during the research. It gives details of how the research was conducted in responds to the research problem and question. That is describing different research models and research designs and reason for selecting action research using mixed mode model. It will demonstrate how quantitative and qualitative data are collected and analysed to address the objective of the research.

The fifth chapter presents data analysis, discussions and findings for quantitative data. Subsequently, synthesised the results and generates an analytical outcome to present the frequency and level of waste and non-value adding activities existing in current project delivery process of Nigerian construction industry.

The sixth chapter presents the lean construction implementation reports, how data was collected and analysed. Then, presents the findings for both quantitative and qualitative data. Subsequently, synthesised the results and generates an analytical outcome to present the framework. The framework and its relevance are also presented. The validation of the framework process and its result are also presented in this chapter.

The seventh chapter will summarise the finding and draw conclusion of the research, and make recommendations for practice as well as area for further research.



Figure 1.1 : Research structure

REFERENCES

- Abdulhameed, A. S., Bungwon, H. D., and Sheyin, A. Y. (2012). Construction Methodology in the Delivery of Building Projects in Nigeria. *Proceedings of 42nd National Conference and Annual General Meeting of Nigerian Institute of Building* 78-88. 11th-15th July; Enugu Nigeria
- Abdelhamid, T., and Salem, S. (2005). Lean construction: a new paradigm for managing construction projects. In *The International Workshop on Innovations in Materials and Design of Civil Infrastructure, Cairo Egypt*. http://www.researchgate.net/publication/242085758_Lean_Construction_New_Paradigm_For_Managing_Construction_Projects, accessed 02/09/2013
- Abdulai, T. R. (2007) *The Operation of Urban Traditional Landholding Institutions in Sub-Saharan Africa: A Ghana Study*. PhD Thesis, School of Engineering and the Built Environment, University of Wolverhampton.
- Abdullah, F. and Rajgopal, J. (2003) Lean Manufacturing in the Process industry. *Proceedings of the Industrial Engineers Annual Research Conference*, 1-6 September, Norcross, GA.
- Abdullahi, S., Abdul Razak, A., Abu-Bakar, A., and Sarrazin, I. (2009). Towards Producing Best Practice in Malaysian Construction Industry; The Barriers in Implementing the Lean Construction Approach. *Proceedings of International Conference of Construction Industry*, 30th July-1st August, 2009, Padang Indonesia.
- Abdulmalek F. A. and Rajgopal J. (2007) Analyzing the Benefits of Lean Manufacturing and Value Stream Mapping via Simulation: A Process Sector

- Case Study. *International Journal of Production Economics*, **107**, pp. 223–236.
- Achanga, P. (2007). *Development of an impact assessment framework for lean manufacturing within SMEs*. A PhD thesis submitted to Cranfield University for the requirement of Doctor of Philosophy
- Adamu, I., and Howell, G. A. (2012). Applying Last Planner in Nigerian Construction Industry. *Proceedings of 20th Annual Conference of International Group for Lean Construction*. . 18th-20th July San Diego, CA, USA.
- Adamu, S., and Abdulhamid, R. A., (2012). Lean Construction Techniques Implementation in Nigeria Construction Industry. *Canadian Journal on Environment, Construction and Civil Engineering* (3) 4 Pp.186-192
- Adamu, S., Howell, G. A. , and Abdulhamid, R. (2012). Adopting Lean Construction Technique in Nigerian Construction Industry. *International Journal of Scientific and Engineering Research*, 3(12).
- Adeagbo, A. (2014) Overview of The Building And Construction Sector In The Nigerian Economy *Jorind* 12 (2) December, 2014. ISSN 1596-8308. www.transcampus.org/journals; www.ajol.info/journals/jorind Economic Policy Research Department Nigerian Institute of Social and Economic Research, Ibadan
- Adesanya, O. (2008). Project Procurement Path. *The Journal of the Federation of Construction Industry*, 23(3), 6-21.
- Adewuyi, T. O. and Odesola I. A. (2015) Factors Affecting Material Waste on Construction Sites in Nigeria *Journal of Engineering and Technology* Vol 6. No. 1 January-June
- Adewuyi, T.O. And Otali, M. (2013) Evaluation of Causes of Construction Material Waste -- Case of Rivers State, Nigeria *Ethiopian Journal of Environmental Studies and Management Vol. 6 Supplement 2013*
- Ahiakwo, O., Suresh, S., Oloke, D. and Khatib, J. (2012). Client Perspective for the Implementation of Lean Construction in Nigerian Construction Industry. *Proceedings 4th West Africa Built Environment Research (WABER) Conference*, , 133-146.

- Ahiakwo, O., Oloke, D. and Suresh, S (2014) Improving Project Planning and Control in Construction by implementing Last Planner Systems in Nigeria. *International Council for Research and Innovations in Building and Construction* (CIB W107 2014) 28th – 30th Jan
- Aibinu, A.A., and Jagboro, G.O. (2002). The Effects of Construction Delay on Project Delivery in Nigerian Construction Industry. *International Journal of Project Management*, 20(8), 593-599.
- Aina, O. O., and Wahab, A. B. (2011). An Assessment of Build Ability Problems in Nigeria. *Construction Industry Global Journal of Research Engineering*, 2(11).
- Aiyetan, O. and Smallwood, J. (2013) Materials Management and Waste Minimisation on Construction Sites In Lagos State, Nigeria. *Proceedings of the 4th International Conference on Engineering, Project, and Production Management* (EPPM), pp. 1161-1172,
- Aken, J. E. V. (2005). Management Research as a Design Science: Articulating the Research Products of Mode 2 Knowledge Production in Management. *British Journal of Management*, 16(1), 19-36. doi: 10.1111/j.1467-8551.2005.00437.x
- Akinkurolere, O. O. and Franklin, S. O. (2005) Investigation into waste management on construction sites in South Western Nigeria; *American Journal of Applied Sciences*,
- Akintoye, A. (1995) *Just-in-Time Application and Implementation for Building; Material Management Construction Management and Economics*, 1995 - Taylor & Francis London. 1995. pp. 35-46
- Al-Hajj, A., & Hamani, K. (2011). Material Waste in the UAE Construction Industry: Main Causes and Minimization Practices. *Architectural Engineering and Design Management*, 7(4), 221-235. DOI: 10.1080/17452007.2011.594576
- Alarcon, L. F. (1994). "Tools for the Identification and Reduction of Waste in Construction Projects." In *Lean Construction*, Alarcon (Ed.), A.A. Balkema, Rotterdam, the Netherlands, pp. 365-377.

- Alarcon, L. F. (1995). *Training Field Personnel to Identify Waste and Improvement Opportunities in Construction Projects.* In Alarcon Luis (Ed.), *Lean Construction*, A.A. Balkema, Netherlands, 1997.
- Alarcon, L. (ed.). (1997). *Lean Construction*. A.A. Balkema: Rotterdam.
- Alarcon, L. (2001) Lean construction in Chile: a national strategy and local results, in: *3rd Annual Lean Construction Congress*, <www.leanconstruction.org>.
- Alarcon, L. F., Diethelm, S. and Rojo, O. (2002) Collaborative Implementation of Lean Planning Systems in ChiLean Construction Companies, *Proceedings of the 10th Annual Conference of the International Group for Lean Construction*. Gramado, Brazil, 6 - 8 August 2002.
- Alarcon, L. F., Diethelm, S., Rojo, O., and Calderon, R. (2006). Assessing the Impact of Implementing Lean Construction *Proceedings of the 13 Annual Conference of the International Group for Lean Construction, Sidney Australia July*.
- Alarcon, L., Diethelm, S., Rojo O. and Calderon R. (2008) Assessing the impacts of implementing Lean Construction, *Revista Ingenierfa de Construcción* 23(1), available at www.ing.puc.cl/ric.
- Alinaitwe, H. M. (2009) Prioritising Lean Construction Barriers in Uganda's Construction Industry. *Journal of Construction in Developing Countries*, 14(1), pp. 15-29.
- Alshaimi, A., and Koskela, L. (2008). What can be learned from studies on delays in construction *Proceedings of 16th Annual Conference of International Group for Lean Construction* July 16–18, University of Salford, U.K
- Alshaimi, A., Tzortzopoulos, P. and Koskela, L. (2009) Last planner system: Experiences from pilot implementation in the Middle East *Proceedings of the 17th Annual Conference of the International Group for Lean Construction*. pp.53-65. January 2014, Lekki Lagos, Nigeria
- Alshaimi, A., Koskela, L., and Tzortzopoulos, P. (2013). Need for alternative research approaches in construction management: Case of delay studies. *Journal of Management Engineering.*, 29(4), 407–413

- Al-Sudairi, A A, Diekman, J, K, Songer, A D" and Brown, H, M, (1999), "Simulation of construction processes: traditional practices versus lean construction," *Proceedings of IGLC-7*, Berkeley, CA, July 26-28, 1999,39-50,
- Alwi, S. Hampson, K. and Mohamed, S. (2002) Waste in the Indonesian construction projects. In *Proceedings The 1st International Conference of CIB W107 - Creating a sustainable Construction Industry in Developing Countries* pp. 305-315, 11–13 November 2002, Spier, South Africa.
- Andersen, B., Bolviken, T., Hege, S. D., and Sol, S. (2008). Approching Construction as a Logistical, Economical and Social Process. *Proceedings of 16th Annual Conference of International Group for Lean Construction*. July 16- 18. Manchester, England.
- Anderson, C. (2010). Presenting and evaluating qualitative research. *American Journal of Pharmaceutical Education*, 74(8).
- Ankrah, N.A. (2007) *An investigation into the impact of culture on construction project performance*, PhD Thesis, School of Engineering and the Built Environment, University of Wolverhampton.
- Aronson, J. (1994) A Pragmatic View of Thematic Analysis. *The Qualitative Report*, 2(1).
- Arditi, D., Akan, G. T., and Gurdamar, S. (1985) Reasons for Delays in Public Projects in Turkey. *Construction Management Economics*, Vol. 3
- Assaf, S., and Al-Hejji, S., (2006). Causes of delay in largte constructin projects. *International Journal of Project Management*, 24 349–357.
- Assaf, S. A. ASCE, M, AI-Khalil, M. and AI-Hazml, M. (1995) Causes of Delay in Large Building Construction Projects; *Journal of Management in Engineering/* March/April 1995/45 11(2): 45-50
- Attride-Stirling, J. (2001). Thematic networks: an analytic tool for qualitative research. *Qualitative Research*, 1(3), 385-405.
- Awotona, A. (1990). Nigerian Government Participation in Housing Policy 1970-1980. *Habitat International*, 14(10), 17-40.

- Ayangade, J.A., Wahab, A.B., and Alake, O. (2009). An Investigation of the Performance of Due Process Mechanism in the Execution of Construction Project in Nigeria. *Civil Engineering Dimension*, 11(1), 1-7.
- Azhar, s., Ahmed, I., and Sein, M.K. (2010). Action Research as a Proactive method for construction management. *Journal of Construction ,Engineering and Management*, 136(1).
- Aziz R. F. and Hafez, S. M. (2013) Applying lean thinking in construction and performance improvement; *Alexandria Engineering Journal* 52, 679–695
- Babatunde, S.O. (2012). Quantitative Assessment of Construction Material Wastage in the Nigerian Construction Industry *Journal of Emerging Trends in Economics and Management Sciencies (JETEMS)*, 3(3), 238-241.
- Babatunde, S.O., Opawole, A. I. and Ujaddughe, I.C. . (2010). An Appraisal of Project Procurement Methods in the Nigerian Construction Industry. *Civil Engineering Dimension*, 12(1), 1-7.
- Babbie, E., F. Halley, and J. Zaino. (2007). *Adventures in Social Research:Data Analysis Using SPSS 14.0 And 15.0 For Windows*. 6th Edition Pine Forge Press, Thousand Oaks, California, USA.
- Babbie, E., F. Halley, and J. Zaino. (2003). *Adventures in Social Research: Data Analysis Using SPSS 11.0/11.5 For Windows*. Pine Forge Press, Thousand Oaks, California, USA.
- Babbie, E. (1990) *Survey research methods*. 2 ed. Belmont, CA: Wadsworth.
- Bailey, C. A. (2007) *A Guide to Qualitative Field Research*. 2nd ed. London: Pine Forge
- Ballard, G. (1999) “Improving work flow reliability.” *Proceedings of 7th Conference of International Group for Lean Construction*, 26-28 July, University of California, Berkeley, CA, USA,, 275–286
- Ballard. H. G., (2000) *The Last Planner System of Production Control*, PhD Thesis, University of Birmingham, UK.
- Ballard, G, and Howell, G. A. (1997). Implementing Lean Construction: improving down stream performance *Lean Construction*, Alarcon, L. (ed), A. A. Balkema, Rotterdam, The Netherlands,, 111-125.

- Ballard, G. and Howell, G. (1998). "Shielding production: Essential step in production control." *Journal of Construction and Engineering Management*, 124, 1, 11–17.
- Ballard, G. and Howell, G. (1999) Bringing light to the dark side of lean construction: a response to Stuart Green. In *Proceedings of IGLC 6th Annual Conference*, Sao Paulo, Brazil, August 13-15 available at <http://cic.vtt./lean/conferences.htm>
- Ballard, G. and Howell, G. A. (2003). Lean Project Management. *Building Research and Information*, 2(31), 119-133.
- Ballard, G., Kim, Y.W., Jang, J.W., and Liu, M. (2007). Road Map for Lean Implementation at the Project Level, Research Report 234-11, Construction Industry Institute, The University of Texas at Austin, Texas, USA, 426.
- Ballard, G., Hammond, J. and Nickerson, R. (2009) Production control principles Proceedings of International Group for Lean Construction (IGLC-17) International conference.
- Ballard, Glenn, and Howell, G. A. (2004). Competing Construction Management Paradigm. *Lean Construction Journal*, 1(1), 38-45.
- Ballard, Glenn and Koskela, Lauri (1998). "On the Agenda for Design Management Research." Proceedings of the 6th Annual Conference of the International Group for Lean Construction, Guaruja Beach, Brazil, August, 1998.
- Banawi, A. A and Bilec, M (2014) "Applying Lean, Green, and Six-Sigma Framework to Improve Exterior Construction Process in Saudi Arabia", *KICEM Journal of Construction Engineering and Project Management*, vol. 4, no. 2, pp. 12-22,.
- Banik, G. (1999). Construction productivity improvement. *ASC Proceedings 35th Annual Conference of Associated Schools of Construction*. San Luis Obispo, CA., 165-178.
- Barrie, D. S. and Paulson, B. C. (1992). Professional Construction Management, Toronto: McGraw-Hill International Edition.
- Barry, W.J. (2012). Is Modern American Education Promoting a Sane Society? *International Journal of Science*, Vol. 2, 69–81

- Bashir A. M., Suresh S., Oloke, D. A., Proverbs, D. G. and Gameson R. (2013) "Application of Lean Construction Tools in the UK Contracting Companies-Findings from Qualitative Studies". Proceeding for Architectural Technology Institute Conference, Pennsylvania University, April 2013.
- Bashir A. M., Suresh S., Oloke, D. A., Proverbs, D. G. and Gameson R. (2010). Barriers Towards the Sustainable Implementation of Lean Construction in the United Kindom Construction Organisations. *ARCOM DOCTORAL WORKSHOP SUSTAINABILITY STRATEGIES IN CONSTRUCTION*.
- Bayou, M.E., de Korvin, A., 2008. Measuring the Leanness of Manufacturing Systems –A Case Study of Ford Motor Company and General Motors. *Journal of Engineering Management* 25 (4), 287–304.
- Berg, B. L. (1998). *Qualitative Research Methods For The Social Sciences*, 2nd Edition Boston: Pearson.
- Berg, B. L. (2009). *Qualitative Research Methods For The Social Sciences*, 4th Edition Boston: Pearson.
- Bertelsen, S. (2004). Lean Construction: Where are we and how we proceed. *Lean Construction Journal*, 1(1), 46-49.
- Bertelsen, S. (2002). Bridging the gap-towards a Comprehensive Understanding of Lean Construction. *Proceedings of 10th Annual Conference of International Group for Lean Construction. Gramado, Brazil*.
- Bhatla, A., Pradhan, B. and Choi, J. O (2016) Identifying Wastes in Construction Process and Implementing the Last Planner System in India *KICEM Journal of Construction Engineering and Project Management* Online ISSN 2233-9582 <http://dx.doi.org/10.6106/JCEPM.2016.6.1.011>
- Bird, C. M. (2005) How I stopped dreading and learned to love transcription. *Qualitative Inquiry*, 11(2), 226-248.
- Bjornfot, A. (2008). An Engineering Perspective on Lean Construction Theory. *Proceedings of 16th Annual Conference of International Group for Lean Construction. Gramado, Brazil*.

- Blum, D. K., and Amy, P. E. (2005). Strategies to win: Six Steps of Creating Problem Statement in Doctoral Research. *Journal of College Teaching and Learning*, 2(11), 47–52.
- Bogdan, R. and Knopp, B.S. (2002). *Qualitative Research for Education* (4th ed.), Boston: Allyn and Bacon.
- Bossink, B. A. G. and Brouwers, H. J. H. (1996) Quantification and Source Evaluation. *Journal of Construction, Engineering and Management*. March, 55-60
- Bowling, M. (2000) Convergence problems of general-sum multiagent reinforcement learning Proc. 17th International Conference on Machine Learning, Stanford, CA, Morgan Kaufmann, San Francisco, CA (2000), pp. 89–94
- Boyatzis, R. E. (1998). *Transforming Qualitative Information: Thematic Analysis and Code Development*. Thousand Oaks: SAGE Publications.
- Braun, V. and Clarke, V. (2006) Using Thematic Analysis in Psychology. *Qualitative Research in Psychology*, 3 (2). pp. 77-101.
- Braun, V. and Wilkinson, S. (2003) ‘Liability or Asset? Women Talk about the Vagina’, *Psychology of Women Section Review* 5(2): 28–42.
- British Research Establish (2013). *SMARTWaste*. Available at <http://www.smartwaste.co.uk/>(accessed 25/03/2013).
- Bruvoll, A. and Ibenholt, K. (1997). “Future waste generation: Forecasts on the basis of a macroeconomic model.” *Resources, Conservation and Recycling*, 19(2), 137-149
- Bryman, A. (2008) *Social Research Methods*. 3rd ed. Oxford: Oxford University Press.
- Bryman, A. (2004) *Social research methods*. 2nd ed. Oxford: Oxford University Press.
- Bryman, A., and Cramer, D. (2005). *Quantitative data analysis with SPSS 12 and 13*. New York: Routledge.
- Bryson, B., and Yetmen, . (2010). *The Owner’s Dilemma*. Atlanta, Gorgia: . *Greenway Communication, LLC*. Retrieved from www.greenway.us.
- Building., Nigerian Institute of. (2012). Transformational Agenda and Building Production in Nigeria. *Proceedings of 42nd National Conference and Annual General Meeting of Nigerian Institute of Building*.

- Burr, G. (1998). Contextualizing critical care family needs through triangulation: An Australian study. *Intensive & Critical Care Nursing*, 14(4), 161–169.
- Burtonshaw-gunn, S. A. (2009). *Risk and Financial Management in Construction*, England: Gower Publishing Limited.
- Cambell, D. T., and Stanley, J. C. (1963). *Experimental and Quasi-Experimental Design for Research*. Chicago, II: Rand McNally College Publishing Company.
- Castka, P., Bamber, C. and Sharp, J. (2004). Benchmarking Intangible Assets: Enhancing Teamwork Performance using Self Assessment. *Benchmarking*, 11(6): 571–583.
- Chin, Chan-Sun, and Russell, J. S. (2008). Improving Performance of Process Flow. *Proceedings of 16th Annual Conference of International Group for Lean Construction. Manchester, England.*
- Chandra M. M. (2010) Development of Rating Scale in Lean Construction; A thesis submitted to the Division of Graduate Studies and Research; University of Cincinnati In partial fulfilment of the requirements for the degree of MASTER OF SCIENCE;
- Chen, P. H. (2008). “Integration of cost and schedule using extensive matrix method and spreadsheets.” *Automation in Construction*, 18(1), 32-41.
- Chen, Q., Bamber, C., and Sharp, J. (2004). Lean Application on Residential Construction Site. *Proceedings of ASCE Speciality Conference of Leadership and Management in Construction.*
- Christian, J. and Hachey, D. (1995) Effects of Delay Times on Production Rates In Construction, *Journal of Construction Engineering And Management* 121 (1): 20-26
- Chong Hooi, C. and Abu-Bakar, A. (2015). Linking Organizational Culture to lean Implementation in the Malaysian Construction Industry: A Conceptual Framework, *Advance Journal of Environmental Biology*, 9(4); 102-105

- Chua, D. K. H. and Godinot, M. (2006). "Use of a WBS matrix to improve interface management in projects." *Journal of Construction Engineering and Management*, 132(1), 67-79.
- Ciampa, D. 1991 Total Quality: a user's guide for implementation; The Wageningen UR Library Catalogue
- City of San José (2012). *Construction and Demolition Recycling*. City of San José, California, United States. Available at <<http://www.sjrecycles.org/construction-demolition/cddd.asp>>
- Clarke, A and Dawson, R.. (1999) Evaluation Research: an Introduction to Principles, Methods and Practice. London: SAGE.
- Clausing, D. (1996). Total Quality Development. A step-by-step guide to world-class concurrent engineering Cambridge Massachusetts: American Society of Mechanical Engineers Press
- Cochran, K. M. and Townsend, T. G. (2010). "Estimating construction and demolition debris generation using a materials flow analysis approach." *Waste Management*, 30(11), 2247-2254.
- Collins, J. and Hussey, R. (2003). Business Research: A practical guide for undergraduate and postgraduate students. 2nd edition. Palgrave Macmillan
- Common, G., Johansen, D., and Greenwood, D. (2000). A Survey of the take up of lean construction in the UK construction industry *proceedings of 8th Annual Conference of International Group for Lean Construction. Brighton.*
- Conte, A. S. I. (2002). Lean Construction; From Theory to Practice. *Proceedings of the 10 Annual Conference of the International Group for Lean Construction, .*
- Construction Industry Institute (2012). The Application of Lean manufacturing Principles to Construction. https://www.construction-institute.org/scriptcontent/more/rr191_11_more.cfm accessed 08/01/12.
- Coppey, M. (1999). Developing and maintaining employee commitment and involvement in lean construction. *Proceedings of 8th Annual Conference International Group for Lean Construction Brighton, UK.*

- Craven DJ, Okraglik HM, Eilenberg JM (1994). Construction waste and a new design methodology, in Kilbert CJ, (ed). Sustainable Construction, Centre for Construction and Environment, Gainesville, FL., pp.89-98.
- Creswell, J. W. (2009) *Research Design; Quantitative, Qualitative and Mixed Methods Approaches*. 3rd ed. London: SAGE Publications.
- Creswell, J. W. (2003) *Research Design; Quantitative, Qualitative and Mixed Methods Approaches*. 2nd ed. London: SAGE Publications.
- Creswell, J. W. (2006) *Qualitative Inquiry and Research Design: Choosing among Five Approaches*. 2nd ed. London: SAGE Publications
- Cresswell, J. W. (2012). *Educational Research; Planning, Conducting and Evaluating Quantitative and Qualitative Research* (4th ed.). Boston MA PEARSON Education, Inc.
- Creswell, J. W., and Clark, V. L. Plano. (2011). *Designing and conducting Mixed Method Research* (2nd ed.). Thousand Oaks, CA: Sage.
- Creswell, J. W. & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory into Practice*, 39(3), 124-131.
- Crute, V., Ward Y., Brown S., and Graves A. (2003) Implementing Lean in Aerospace—Challenging the Assumptions and Understanding the Challenges. *Technovation*, 23, pp.917-928.
- Cua, K.O., McKone, K.E., and Schroeder, R.G. (2001). Relationships Between Implementation of TQM, JIT and TPM and Manufacturing Performance. *Journal of Operations Management*, 19(6): 675–694.
- Cuttcliffe, J. R., and McKenna, H. P. (1999). Establishing the Credibility of Qualitative Research Findings: The Plot Thickens. *Journal of Advanced Nursing*, 30(2), 111–131.
- D Vaus, D. (2002). *Survey in Social Reseach*. Austeralia: Allen and Unwin.
- Daniel, W. H. (2006). *Construction Management* (Vol. 1). USA: John Wiley and sons Inc.
- DEFRA, (2006). Department for Environment Food & Rural Affairs UK emissions of greenhouse gases <http://www.defra.gov.uk/environment/statistics/globalatmos/gagccukem.htm#gatb3S>

- Dantata, S. A. (2008). General Overview of Nigerian Construction Industry. *M Sc thesis*
- Denscombe, M. (2007) *The Good Research Guide for Small Scale Social Research Projects*. 3rd ed. Glasgow: Bell and Bain Ltd.
- Denscombe, M. (2010) *The Good Research Guide for Small Scale Social Research Projects*. 4th ed. London: Open University Press.
- Denzin, N. K. (2001). *Interpretive Interactionism*. SAGE Publications.
- Denzin, N. and Lincoln, Y. (2005) Introduction: The discipline and practice of qualitative research, *Handbook of Qualitative Research* (2nd ed.), Thousand Oaks, CA: Sage
- Denzin, N. K., and Lincoln, S. Y. (2008). *Strategies of Qualitative inquiry* (2nd ed.). SAGE Publications Ltd.
- Denzin, N. K., and Lincoln, Y. (2000). *Qualitative research*. Thousand Oaks ua, Thesis in Massachusetts Institute of Technology.
- Deshpande, S. Filson, E. Salem, O. and. Mille, R. (2012) Lean techniques in the management of the design of an industrial *project*, *Journal of Management in Engineering* 28 (2), 221–223.
- Dickson E, Singh S, Cheung D. S. and Wyatt C. C. (2007) Application of Lean Manufacturing Techniques in the Emergency Department. *Journal of Emergency Medicine*, 37(2), pp. 177-182.
- Dimancescu, D. (1992), *Seamless Enterprise: Making Cross Functional Management Work*, Harper Business, New York, NY: John Wiley & Sons
- Dlakwa, M. and Culpin, M. (1990). Reasons for overrun in public sector construction in Nigeria. *International Journal of Project Management*, 8(4), 237-241.
- Donaghy, R. (2009) One Death is Too Many: Inquiry into the Underlying Causes of Construction Fatal Accidents. [online]. [cited on 15 February 2011] <http://www.dwp.gov.uk/docs/one-death-is-too-many.pdf>
- Doolen, T.L. and Hacker, M.E. (2005), “A review of lean assessment in organizations: an exploratory study of lean practices by electronics manufacturers”, *Journal of Manufacturing Systems*, Vol. 24 No. 1, pp. 55-67.

- Dos Santos, A. Powell, J. Sharp, J. and Formoso, C. (1998) Principle of Transparency applied in Construction; *Proceedings of IGLC6 Annual Conference of International Group for Lean Construction. Guaraja, Brazil.*
- Druke, J. and White, G. (1996). Managing people in construction, London: Institute of Personnel and Development.
- Dulaimi, M. F., and Tanamas, C. (2001). The principles and applications of lean construction in Singapore. In *Proceedings of the 9th Annual Conference of the IGLC. Kent Ridge Crescent, Singapore*
- Economic Commission for Africa (2009). *Africa Review Report on Waste Management (Summary)*. E/ECA/CFSSD/6/9, Addis Ababa, Ethiopia.
- Egan, S. J. (1998). *Rethinking Construction: The Report of Construction Task Force*. London UK: Department of Environment, Transport and Regions and HMSO.
- Elliott, Alan C. and Woodward, W. A. (2007) *Statistical Analysis Quike Reference Guidebook; with SPSS Example: Library of Congress Cataloging USA SAGE Publication London*
- Elo, S., and Kyngäs, H. (2008). The Qualitative Content Analysis Process. *Journal of Advanced Nursing*, 62(1), 107–115.
- Elo, S., Kääriäinen, M., Kanste, O., Pölkki, T., Utriainen, K., and Kyngäs, H. (2014). *Qualitative Content Analysis. SAGE Open*, 4(1), 2158244014522633
- Enshassi, A (1996) *Materials control and waste on building sites*, Building Research & Information, 24:1, 31-34, DOI: 10.1080/09613219608727495
- Faniran, O.O., Oluwoye J.O., and Lenard, D. (1997). “Application of the Lean Production Concept to Improving the Construction Planning Process.” Proc. *Proceedings of Annual Conference of International Group for Lean Construction IGLC-5, Gold Coast, Australia*
- Farrell, P. (2011) *Writing a Built Environment Dissertation: Practical Guidance and Examples*. 1st ed. United Kingdom: Blackwell.
- Fatta, D., Papadopoulos, A., Avramikos, E., Sgourou, E., Moustakas, K., Kourmoussis, F., Mentzis, A. and Loizidou, M. (2003). “Generation and management of construction and demolition waste in Greece - an existing challenge.” *Resources, Conservation and Recycling*, 40(1), 81-91.

- Ferguson J, Kermode N, Nash CL, Sketch WAJ, Huxford RP (1995) *Managing and minimizing construction waste, A Practical Guide*, Institution of Civil Engineers, London.
- Fernandez, J., Porwal, V., Lavy, S., Shafaat, A., Rybkowski, Z., Son, K. and Lagoo, N. (2013) Survey of motivations, benefits, and implementation challenges of last planner system users, *Journal of Construction Engineering and Management* 139 (4) 354–360.
- Fewings, P. (2013) *Construction Project Management: An Integrated Approach*, 2nd ed., London: Spon Press.
- Fiallo, C. M., and Revelo, P. V. H. (2002). “Applying the Last Planner System to a construction project- Case study in Quito Ecuador.” *Proceedings of 10th Annual Conference. of the Int. Group for Lean Construction (IGLC-10)*, 6–8th August 2002; Granmado, Brazil
- Fink A (1998) *Conducting research literature reviews: from paper to the internet*. London: Sage.
- FISCA (2006) An Analysis of the Significant Causes of Fatal and Major Injuries in Construction in Scotland; factors Influencing Scottish Construction Accidents (FISCA), *Health and Safety Executive Research Report 443*.
- Flick, U. (2009) *An Introduction to Qualitative Research*. 4th ed. London: SAGE Publications
- Forbes, L., Ahmed, S, and Barcala, M. (2002). Adapting Lean Construction theory for Practical Application in Developing Countries. *Proceedings of the first CIBW*, 107.
- Forbes, L. H., and Ahmed, S. M. (2011). *Modern Construction Lean Project Delivery and Integrated Practice*. CRC Press: Taylor and Francis Group.
- Forbes, S. H. and Ahmed, S. M. (2004) Adapting Lean Construction Methods for Developing Nations: 2nd International Latin American and Caribbean Conference for Engineering and Technology (LACCEI’2004). Miami Florida, USA 2-4 June 2004.

- Formoso, C. T., Isatto, E. L. and Hirota, E. H., (1999) Method of Waste Control in the Building Industry. Proceedings IGLC 7 University of California, Berkely, CA, USA.
- Formoso, C., Lucio S., Claudia, D. C., and Issato E. L. (2002). "Material waste in building industry: Main causes and prevention." J. Constr. Eng. and Manage., ASCE, Vol. 128, No. 4, pp. 316-325.
- Forsberg, A. and Saukkoriipi, L. (2007) Measurement of Waste and Productivity in Relation to Lean Thinking 15th Annual Conference of the International Group for Lean Construction Michigan, USA
- Fucini, J. and Fucini, S. (1990) Working for the Japanese, New York: Free Press.
- Gabriel, E. (1997). The Lean Approach to Management. *International Journal of Project Management*, 15(4), 205-209.
- Garas, G. L., Anis, A. R. Adel E. I. and Gammal, A. E. (2001) Materials Waste in The Egyptian Construction Industry *Proceedings, IGLC-9, Ninth Conference of the International Group for Lean Construction: Singapore, August 2001*
- Garnett, N., Jones, D.T and Murray, S. (1998). Strategic Application of Lean Thinking. In *Proceedings of the fifth Annual Conference of the International Group for Lean Construction*, Guaruja, Brazi
- Garrahan, P. and Stewart, P. (1992) *The Nissan Enigma: Flexibility at Work in a Local Economy*. London: Manse
- Gehbauer, F. (2008). Lean Organisation: Exploring Extended Potentials of the Last Planner System *Proceedings of 16th Annual Conference of International Group for Lean Construction. Manchester, England.*
- Gibb, A.G., Haslam, R.A., Gyi, D.E., Hide, S., Hastings, S. and Duff, R. (2002) ConCA-Preliminary results from a study of accident causality. In: Rowlinson, S. (ed.) Proceeding of Triennial Conference CIB W099, May 2002. University of Hong Kong, Hong Kong.
- Gibb, A.G.F. (1999) Principles in Off-site Fabrication. Caithness: Whittles.
- Gibb, A.G.F. (2001) Standardization and Pre-assembly – distinguishing Myth from Reality using Case Study Research. *Construction Management and Economics*, 19(3), pp.307–315.

- Gibbs, G. (2007) *Analysing Qualitative Data* In: Flick, U. (ed.) Sage qualitative research kit. London: Sage.
- Gilbreth, F. B. and Gilbreth, L. M. (1922) Process Charts and Their Place in Management. *Mechanical Engineering*, January, pp. 38 - 41, 70
- Golafshani, N. (2003). *Understanding reliability and validity in qualitative research*. The Qualitative Report, 8(4), 597–607. <http://www.nova.edu/ssss/QR/QR8-4/golafshani.Pdf>
- Gomm, R. (2008) *Social Research Methodology: A Critical Introduction*. 2nd ed. Basingstoke: Palgrave Macmillan
- Gonzalez, V., Alarcon, L. F., Maturana, S., Mundaca, F, and Bustamante, J. (2010). Improving Planning Reliability and Project Performance using the reliable commitment model. *Journal of Construction Engineering and Mangement*, 136, 1129.
- Graham, P. and Smithers, G. (1996), Construction Waste Minimization for Australian Residential Development, *Asia Pacific Building and Construction Management Journal*, 2(1), 14-19.
- Green, D. Stuart (1999) The Dark Side of Lean Construction: Exploitation and Ideology: the *Proceedings of 7th International Group for Lean Construction Annual Conference*. Berkeley, USA July 1999.
- Guba, E.G. (1990) *The Alternative Paradigm dialog*. In: Guba, E. G. (ed.) The Paradigm Dialog. Newbury Park: CA: Sage Publications Inc.
- Guba, E. G. and Lincoln, Y. S (1989) Fourth geration evaluation. Newbury Park, CA: Sage
- Hammond, F. N. (2006) *The Economic Impacts of Sub-Saharan Africa urban Real Estate Policies*, PhD thesis, School of Engineering and the Built Environment, University of Wolverhampton, Wolverhampton.
- Hao, J. L., Hills, M. J. and Tam, V. W. Y. (2008). “The effectiveness of Hong Kong's construction waste disposal charging scheme.” *Waste Management and Research*, 26(6), 553-558.
- Haque B. (2003) Lean Engineering in the Aerospace Industry. *Journal of Engineering Manufacture* 217, pp. 1409-1420

- Hayes, R. H, Pisano, G. P. (1994). Beyond world-class: the new manufacturing strategy, *Harvard Business Review*, 77-86.
- Health and Safety Executive (2013). *Construction Industry*. Available at <http://www.hse.gov.uk/statistics/industry/construction/>, accessed 14/12/2013
- Healy, M., & Perry, C. (2000). Comprehensive criteria to judge validity and reliability of qualitative research within the realism paradigm. *Qualitative Market Research*, 3(3), 118-126.
- Hines, P., Esain, A., Francis, M. and Jones, O. (2000). *Managing new product introduction and new product development*, In Hines, P., Lamming, R., Jones, D., Cousins, P. and Rich, N. (Eds), Value Stream Management, FT Prentice Hall, Harlow.
- Hines, P., Holweg, M., and Rich, N. (2004). Learning to evolve: a review of contemporary lean thinking. *International Journal of Operations & Production Management*, 24(10), 994-1011.
- Hines, P., Francis, M., and Found, P. (2006). Towards lean product lifecycle management: a framework for new product development. *Journal of Manufacturing Technology Management*, 17(7), 866-887.
- Hirano, H. (1996). 5S Operators; 5 Pillars of Visual Work Place. *Productivity Press, Portland, OR*.
- Hofacker, A., B. Fernandes D. O., M. D. Caarmo, D. F., R. Mendes, Jr., Santos, A., & Kirsch, J. (2008). Rapid Lean Construction Quality Rating Model (LCR). *Proceedings of 16th Annual Conference of International Group for Lean Construction*. .
- Holloway, I., & Todres, L. (2003) The status of method: flexibility, consistency and coherence. *Qualitative Research*, 3(3), 345-357.
- Holweg M. (2006) The Genealogy of Lean Production. *Journal of Operations Management*, 25 pp. 420-437.
- Hopp, W., & Spearman, M. (1996). *Factory Physics*. *Mc Graw Hill Boston*.
- Howell, G. A. (1999). What is Lean Construction? *Proceedings of 7th Annual Conference of International Group for Lean Construction*. Berkeley, USA July 1999. University of California, Berkely, CA, USA.

- Howell, G. A. (2000). White Paper for Berkeley/Stanford CE & M Workshop. Paper presented at the *Proceedings of construction engineering and management workshop, Palo Alto CA Stanford University*.
- Howell, G. A., and Ballard, G.. (1999). Bringing light to the dark side of Lean Construction; a response to Stuart Green. *Proceedings of 7th Annual Conference of International Group for Lean Construction.*, 33-37.
- Howell G. A., Ballard G., Abdelhamid T. S. and Mitropoulos P. (2002) Working Near The Edge: A New Approach To Construction Safety, in *Proceedings of the 10th International Group for Lean Construction Annual Conference, Brazil July 2002*.
- Howell, G., Ballard, G., and Tommelein, I. (2010). Construction Engineering: Reinvigorating the Discipline *Journal of Construction Engineering and Management. ASCE*.
- Huang, R. Y., Yeh, L.H., Chen, H. H. Lin, J. D., Chen, P. F. Sung, P. H. and Yau, J. T (2011) Estimation of construction waste generation and management in Taiwan, *Advanced Materials Research* 243–249 (2011) 6292–6295.
- Hudson, M. (2007) *Managing Without Profit : The Art of Managing Third-sector Organizations*. 2nd ed. London: Directory of Social Change.
- Hughes P. and Ferrett E. (2008) *Introduction to Health and Safety in Construction*. 3rd ed. Oxford: Elsevier Butterworth Heinemann.
- Huovila, P. and Koskela, L (1998) Contribution of the Principles of Lean Construction to Meet the Challenges of Sustainable Development, In Formoso, C.T., ed. *Proceedings of IGLC-6. Guaruja, Brazil*,
- Huovila, P., Koskela, L., and Lautanala, M. (1997). Fast or concurrent: the art of getting construction improved. *Lean construction*, 143-159.
- Ibem, M.O., Anosike, M.N., and Azuh, D.E. (2011). Challenges of public housing provision in the post independence era in Nigeria. *International Journal of Human Science*, 8(3).
- Ibenholt, K. (2003). “Material accounting in a macroeconomic framework: Forecast of waste generated in manufacturing industries in Norway.” *Environmental and Resource Economics*, 26(2), 227-248.

- Ibironke, O. T. (2003). Construction Finance Birnin Kebbi. *Timlab Quanticost*.
- Ibn-Homaid (2002) A Comparative Evaluation of Construction and Manufacturing Materials Management. *International Journal of Project Management* 20 (1) 263±270
- Ibrahim, A. D. (2007). *The Development of a Procurement Strategy for Primary Health Care Facilities in Nigeria*. PhD Thesis, Loughborough University
- Idoro, G.I. (2012). Influence of Project Plan on the cost out come of construction Projects procured by Design and Build in Nigeria. *Journal of cConstruction in Developing Countries*, 17(2), 81-103.
- Idrus, A., and Sodangi, M. (2010). Framework For Evaluating Quality Performance of Contractors in Nigeria. *International Journal of Civil and Environmental Engineering* 10(1), 34-39.
- Institute, Lean Construction. (2002). *Introducing Lean Construction*. Dallas, Texas.
- Jamieson, S. (2004) Likert scales: How to (ab)use them, *Medical Education*, 38, pp. 1212-1218.
- Jang, Hyungshim; Reeve, Johnmarshall; and Deci, Edward L. (2010). Engaging students in learning activities: It is not autonomy support or structure but autonomy support and structure. *Journal of Educational Psychology*, 102(3), 588-600.
- Järvinen, P. (2007) *Action research is similar to design science*, *Quality and Quantity* 41(1): 37-54.
- Johansen, E., Glimmerveen, H., and Vrijhoef, R. (2002). Understnding Lean Construction and how it penetrated the industry: A comparison of the Dissemination of Lean within UK and The Netherlands. *Proceedings of 10th Annual Conference International Group for Lean Construction*.
- Johansen, E., and Walter, L. (2007). Lean Construction: Prospects for the German Construction Industry. *Lean Construction Journal*, 3.
- John W and Sons. S. (2010). *Qualitative Research: Studying How Things Work*. New York, NY: Guilford Press.
- Jorgensen, B. (2006). Integrating lean Design and Lean Construction; processes and methods. *Dissertation to the Tech. University of DK, Dept of Civil Eng.*

- Jorgensen, B. and Emmitt, S. (2008) Lost in Transition: The Transfer of Lean Manufacturing to Construction. *Engineering, Construction and Architectural Management*, 15 (4), 383-398.
- Jorgensen, F., Matthiesen, R., Nielsen, J., and Johansen, J. (2007). Lean maturity, lean sustainability. In *Advances in Production Management Systems*, 371-378.
- Josephson, P. E., Larsson, B. and Heng Li, H. (2002) Illustrative Benchmarking Rework and Rework Costs in Swedish Construction Industry; *Journal Of Management in Engineering* April 2002 18(2): 76-83 **DOI:** 10.1061/~ASCE!0742-597X~2002!18:2~76!
- Jung, Y. and Woo, S. (2004). "Flexible work breakdown structure for integrated cost and schedule control." *Journal of Construction Engineering and Management*, 130(5), 616-625.
- Kadiri, D. S., and Odusami, K. T. (2003). Comparative Study of Time and Cost Performance of Direct Labour and Labour only Procurement System. *Journal of Nigerian Institute of Quantity Surveyors*, 44(3).
- Katz, A. and Baum, H (2011) A Novel methodology to estimate the evolution of construction waste in construction sites, *Waste Management* 31, 353–358.
- Kenney, M. and Florida, R., (1993) *Beyond Mass Production: The Japanese System and its Transfer to the U.S.* Oxford University Press, New York.
- Kerlinger, F.N. and Lee, H.B. (2000) *Foundations of Behavioural Research*. London: Harcourt College Publishers.
- Kerr, A.W., Hall, H.K. and Kozub, S.A. (2002) *Doing statistics with SPSS*. London: Sage Publications.
- Khanh, H. D. and Kim, S. Y. (2014) Identifying Causes for Waste Factors in High-Rise Building Projects: A Survey in Vietnam KSCE *Journal of Civil Engineering* 18(4):865-874 Copyright 2014 Korean Society of Civil Engineers DOI 10.1007/s12205-014-1327-
- Khanh, H. D. and Kim, S. Y. (2014) "Practitioners" Perception on Relationship between Production Planning and Waste Occurrence in Construction Projects", *KICEM Journal of Construction Engineering and Project Management*, vol. 4, no. 3, pp. 1-12,

- Khanh, H.D. and Kim, S.Y., (2013). Barriers of Last Planner System: A Survey in Vietnam Construction Industry. *KICEM Journal of Construction Engineering and Project Management*, 1, pp. 5-11.
- Kim C. S., Spahlinger D. A. and Kin J. M. (2006) Lean Health Care: What can Hospitals Learn from a World-class Automaker? *Journal of Hospital Medicine*, **1**, pp.191-199.
- Kim, M. H. (2009). *National Report for 18th – 19th Session of the Commission on Sustainable Development*. Global Environment Division, Ministry of Environment, The Republic of Korea.
- Kim, S., Park, C., Lee, S. and Son, J. (2008). “Integrated cost and schedule control in the Korean construction industry based on a modified work-packaging model.” *Canadian Journal of Civil Engineering*, 35 (3), 225-235.
- Kim, Y. and Ballard, G. (2010) Management thinking in the earned value method system and the last planner system, *Journal of Management in Engineering* 26 (4), 223–228.
- Kim, Y., and Jang, J. (2005). Application of Last Planner to Heavy Civil Construction in Korea. *Proceedings of the 13 Annual Conference of the International Group for Lean Construction*.
- Kim, Y.W. and Jang, J.W., (2008). "The Relationship between the Make-ready Processes and Project Schedule Performance." Proceedings for the 16th annual conference of the International Group for Lean Construction, Manchester, UK, 16-18 July, pp. 647-656
- Kim, Y., Luu, T.-V., and Yong, K. S. (2008). Causes of Construction Delays of Apartment Construction Projects: Comparative Analysis between Vietnam and Korea. *Korean Journal of Construction Engineering and Management*, 9, 214–226. Retrieved from <Go to ISI>://KJD:ART001469450
- King D., Ben-Tovim D. I. and Bassham J. (2006) Redesigning Emergency Department Patient Flows: Application of Lean Thinking to Health Care. *Emergency Medicine Australas*, **18**, pp.391-397.
- Kletz T. (1993) *Lessons from Disaster: How Organizations Have No Memory and Accidents Recur*, 1st ed. Houston: Gulf Publishing.

- Kloek, W. and Blumenthal, K. (2009) Environment and energy; Eurostat, Statistics in Focus, 2009
- Kobayashi, I. (1995). *20 Keys to workplace improvement*. Prouctivity Press, Portland, OR.
- Kofoworola, O. F. and. Gheewala, S. H. (2009) Estimation of construction waste generation and management in Thailand, *Waste Management* 29 731–738
- Kolo, B.A. and Ibrahim, A.D. (2010) Value management: How adoptable is it in the Nigerian construction industry? *In: Laryea, S., Leiringer, R. and Hughes, W. (Eds) Procs West Africa Built Environment Research (WABER) Conference, 27-28 July 2010, Accra, Ghana, 653-663.*
- Kontogora, O.O. (1993). *Project Abondonment*. Nigerian Tribune.
- Koranda, C. Chong, W. Kim, C. Chou, J. and Kim, C. (2012) An Investigation of the Applicability of 344 Sustainability and Lean Concepts to Small Construction Projects,|| KSCE Journal of Civil Engineering, vol. 16(5), pp. 699-707,
- Korea Ministry of Environment (2012). *Current Status of Waste Generation*. Ministry of Environment, Government Complex Sejong, Doum6-Ro Sejong-City, Korea. Available at < <http://eng.me.go.kr/>>.
- Koskela L. (1992). Application of New Production Philosophy to Construction. *CIFC Tech. Report No. 72, Centre for Integrated Facility Engineering, Stanford University*, 4-50.
- Koskela (1993) Lean Production in Construction. *Proceedings of the first Annual Conference of the International Group for Lean Construction (IGLC-1)*, Espoo, Finland.
- Koskela, L. (1999) Management of Production in Construction: A theoretical view. *Proceedings 7th Annual Conference of the International Group for Lean Construction, University of California, Berkeley, U.S.A*, available at http://usir.salford.ac.uk/9429/1/1999_Management_of_production_in_construction_a_theoretical_view.pdf, accessed 15/12/2013
- Koskela, L. (2000). An Exploration towards production theory and its application to Construction. *VTT Technical Reseach center of Finland, Espoo.*

- Koskela, L. (2004). Moving on-beyond lean thinking. *Lean Construction Journal*, 1, 24-37
- Koskela, L. (2008) Which kind of science is construction management? Proceedings of the 16th International Group for Lean Construction (IGLC) Conference, July 2008, Manchester, UK.
- Koskela, L., Howell, G., Ballard, G., and Tommelein, I. (2002). “*The Foundations of Lean Construction.*” Design and Construction: Building in Value, R. Best, and G. de Valence, eds., Butterworth-Heinemann, Elsevier, Oxford, UK.
- Koskela, L, & Howell, G. A. (2002). The theory of project management-problem opportunity. *Working paper, VTT Technical Reseach Center of Finland and lean construction.*
- Koskenvesa, A., Koskela, L., Tolonen, T. and Sahlstedt, S. (2010) Waste and Labour Productivity in Production Planning Case Finnish Construction Industry *Proceedings IGLC 18*, July 2010, Technion, Haifa, Israel pg 477-486
- Kourmpanis, B., Papadopoulos, A., Moustakas, A., Stylianou, M., Haralambous, K. J., Loizidou, M. (2008) Preliminary study for the management of construction and demolition waste, *Waste Management & Research* 26 267–275.
- Krafcik, J. (1998). Triumph of the lean production system. *Sloan Management Review*, 31(1), 41-52.
- Kurt Lewin (1958). *Group Decision and Social Change*. New York: Holt, Rinehart and Winston. p. 201.
- Ladyman, J. (2002) *Understanding Philosophy of Science*, London: Routledge
- Lang, T. A. and Secic, M. (1997). *How to Report Statistics in Medicine*. Philadelphia: American College of Physician.
- Lean Construction Institute (2012). <http://www.leanconstruction.org.uk/what-is>, accessed 11/12/13
- Lee, S. H., Diekmann, J. E., Songer, A. D., & Brown, H. (1999). Identifying Waste: application of construction process analysis. *Proceedings of 7th Annual Conference of International Group for Lean Construction. , Brazil.*, 63-72.
- Leedy, P. and Ormrod, J.E. (2004). *Practical Research: Planning and Design* (8th ed.) Upper Saddle River, NJ: Prentice Hall.

- Lehman, T., & Reiser, P. (2004). Maximizing Value and Minimizing Waste: Value Engineering and Lean Construction. *SAVE Knowledge Bank data base*, Available at www.value-eng.org/knowledge-bank
- Leong, M. S., & Tilley, P. (2008). Lean Strategy to Performance Measurement; Reducing Waste by measuring next customer needs. *Proceedings of 16th Annual Conference of International Group for Lean Construction*. .
- Liker, J. K. (2004). *The Toyota way: 14 management principles from the world's greatest manufacturer*. New York: McGraw-Hill.
- Liker, J. K. (1998) *Introduction-Lean Returns to the U.S.* in: Liker J. K. (ed) *Becoming Lean: Inside Stories of U.S. Manufacturers*. Portland:Productivity Press.
- Lim, L.Y., & Law, S.p. (1992). *Just-in-time Productivity for Construction* SNP Publishers Singapore.
- Lisa A Guion, David C. Diehl and Debra McDonald (2011) *Triangulation: Establishing the Validity of Qualitative Studies* FCS6014, one of a series of the Department of Family, Youth and Community Sciences, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. website at <http://edis.ifas.ufl.edu>.
- Livock, C. (2009). *Alternative Schooling Programs for At Risk Youth- Three Case Studies*. A Thesis Submitted to the School of Cultural and Language Studies, Queensland University of Technology.
- Llatas, C. (2011) A model for quantifying construction waste in projects according to the European waste list, *Waste Management* 31 1261–1276.
- Luu, V. T., Kim, S.-Y., Tuan, N. Van, and Ogunlana, S. O. (2009). Quantifying schedule risk in construction projects using Bayesian belief networks. *International Journal of Project Management*, 27(1), 39–50. doi:10.1016/j.ijproman. 2008.03.003
- Malagon-Maldonado (2014). Qualitative Research in Health Design. Research Methods; *Health Environment and Health Research journal HERD* July, 2014 (7) 120-134 doi: 10.1177/19375867140070041

- Mansfield, N., Ugwu, O., and Doran, T. (1994). Causes of Delay and Cost overruns in Nigerian Construction Projects. *International Journal of Project Management*, 12(4), 254-260.
- Manu, P. A. (2012) *An Investigation into the Accident Causal influence of Construction Project Features*, PhD Thesis, School of Technology, University of Wolverhampton
- Manrodt, K.B, Vitasek, K., and Thompson, R.H (2008). *Lean practices in the supply chain*, Jones Laselle 2008 Report, <http://www.joneslanglasalle.com/Documents/JLL-LeanPracticesInSupplyChain.pdf>, accessed 4/4/13.
- Martínez Lage, I., Martínez Abella, F., Herrero, C.V. and Ordóñez, J. L. P. (2010). “Estimation of the annual production and composition of C&D debris in Galicia (Spain).” *WasteManagement*, 30(4), 636-645.
- Mastroianni, R., and Abdelhamid, T. (2003). The Challenge: The Impetus for Change to Lean Project Delivery. *Proceedings of the 11 Annual Conference of the International Group for Lean Construction*, 418-426.
- Mathaisel, D, F. X (2005). A lean architecture for transforming the aerospace maintenance, repair and overhaul (MRO) enterprise, *International Journal of Productivity and Performance Management*, 54 (8), 623 - 644
- Maxwell, J. A. (2012). *Qualitative Research Design: An Interactive Approach*. SAGE Publications
- McDonald, B. and Smithers, M. (1998) Implementing a waste management plan during the construction phase of a project: a case study, *Journal of Construction Management and Economics*, 16:1, 71-78, DOI: 10.1080/014461998372600
- McGill, M.E. and Slocum, J.W. (1993). Unlearning the organisation, *Organisational Dynamics*, 22 (2), 67-79.
- McNeill, P. (1989). *Research Methods* (2nd ed.). London: Routledge.
- Meiling, J., Fredrik, B., and Johnsson, H. (2012). Managing for continuous improvement in off-site construction. Evaluation of lean management principles. *Engineering, Construction and Architectural Management*, 19(2), 141-158. doi: DOI 10.1108/09699981211206089

- Memon A. H, Rahman I. A, Azis A. A. A (2013). Assessing Causal Relationships Between Construction Resources and Cost Overrun Using PLS Path Modelling Focusing in Southern and Central Region of Malaysia Material Resource. *Journal of Engineering and Technology*, 4(1):67–77.
- Merriam, S. B. (2009). *Qualitative Research: A Guide to Design and Implementation*. San Francisco, CA:
- Meyers, D (2008). *Construction Economics A new Approach*, 2nd edition, London: Taylor & Francis.
- Miles, M. B., Huberman, A. M., and Saldaña, J. (2013). *Qualitative Data Analysis: A Methods Sourcebook* (Third Edition edition). Thousand Oaks, California: SAGE Publications, Inc.
- Miles, M. B. and Huberman, A. M. (1994) *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: SAGE.
- Mills, G. E. (2011). *Action Research: A guide for the teacher researcher* (4th ed.). Upper Saddle River, NJ: Pearson/ Allyn and Bacon.
- Mirabella, J. (2006) *Hypothesis Testing with SPSS: A Non-statistician Guide and Tutorial*. Online: [http://www.drjimmirabella.com/ebook/excerpt%20from%20Hypothesis%20Testing%20with%20SPSS%20ebook%20\(Jim%20Mirabella\).pdf](http://www.drjimmirabella.com/ebook/excerpt%20from%20Hypothesis%20Testing%20with%20SPSS%20ebook%20(Jim%20Mirabella).pdf) [accessed Febuary, 2013].
- Mitropoulos P., Cupido G. and Namboodiri M. (2007) Safety as an Emergent Property of the Production System: How Lean Practices Reduce the Likelihood Of Accidents, in *Proceedings of the 15th International Group for Lean Construction Annual Conference*, Michigan, United States July 2007.
- Moody K. (1997) *Workers in a Lean World: Unions in the International Economy*. London: Verso.
- Moore, D. and McCabe, G. (2006) *Introduction to Practice of Statistics* 4th edition. New York: Freeman.
- Morton, R. (2002) *Construction UK: Introduction to the Industry*, Oxford: Blackwell Publishing.
- Morse, J. M. (2008). Approaches to Qualitative-Quantitative Methodological Triangulation. *Nursing Research*, 40(2), 120–123.

- Moser, L, & Dos Santos, A. (2003). Exploring the Role Visual Controls on Mobile cell Manufacturing: a case study on drywall technology. *Proceedings of 11th Annual Conference of International Group for Lean Construction*. Backsburg, VA, USA, 418-426.
- Mossman, A. (2005) *Last Planner Overview: Collaborative Production Planning, Collaborative Programme Coordination*, Lean Construction Institute, UK
- Mossman, A. (2008). *Last planner five crucial conversations for reliable flow and project delivery*, available at: [http://www.thechangebusiness.co.uk /TCB/LPS Benefits_files/Last_Planner_5_crucial_conversations.pdf](http://www.thechangebusiness.co.uk/TCB/LPS_Benefits_files/Last_Planner_5_crucial_conversations.pdf), accessed 12/11/2013
- Mossman, A. (2009). More than Materials: Managing What's needed to create value in construction. *2nd on European conference on Logistics*.
- Mossman, A., (2012) *Last Planner: Collaborative Conversations for Predictable Design and Construction* [online]. Available at: [http://www.academia.edu/1267793/ Last Planner collaborative conversations for predictable design and construction delivery](http://www.academia.edu/1267793/Last_Planner_collaborative_conversations_for_predictable_design_and_construction_delivery)
- Murdoch, J. and Hughes, W. (2008). *Construction contracts law and management*, London: Taylor & Francis.
- Mwesigye, P., Mbogoma, J., Nyakang'o, J., Idan, I. A., Kapindula, D., Hassan, S. and Berkel, R. V. (2009). *Integrated Assessment of Present Status of Environmentally-Sound Management of Wastes in Africa*.
- Myers, Nielson, Avison, and Lau. (1999). *Action Research. Communication of the ACM*. 4 (1), 94-97.
- Myers, D., (2008). A review of construction companies' attitudes to sustainability. *Construction Management and Economics*, 23, 781-785.
- Nagapan, S. Abdul Rahman, I. Asmi, A. Memon, A. H. and Mohammad Z. R. (2012) Identifying Causes of Construction Waste - Case of Central Region of Peninsula Malaysia; *International Journal of Integrated Engineering*, Vol. 4 No. 2 (2012) p. 22-28

- Nahmens, I. and Ikuma, L. H. (2009) An Empirical Examination of the Relationship between Lean Construction and Safety in the Industrialised Housing Industry in *Lean Construction Journal*, vol. 5(1), pp.1-12, 2009.
- Naoum, S. G. (2007) *Dissertation Research and Writing for Construction Students*. 2nd ed. London: Butterworth-Heinemann.
- Naoum, S. G. (2013) *Dissertation Research and Writing for Construction Students*. 3rd ed. London: Routledge.
- Nash D, Abi Akinsola, and Brian H. (2002). Development of automated communication of system for managing site information using internet technology. *Automation in Construction*, 11(5), 557-572.
- National Bureau of Statistics (NBS) (2011), *Economic Outlook: 2011 GDP Forecast for Nigeria*, Central Business District, Abuja
- National Bureau of Statistics (NBS) (2015), *Economic Outlook: 2011 GDP Forecast for Nigeria*, Central Business District, Abuja
- National Bureau of Statistics (NBS) (2012), *Economic Outlook: 2011 GDP Forecast for Nigeria*, Central Business District, Abuja
- National Planning Commission (2009) *Nigeria: Vision 20:2020, economic Transformation Blueprint*, Abuja: NPC
- National Planning Commission (2010), *The First NV20:2020 Medium Term Implementation Plan* (2010)
- Nayeri, N. D., Gholizadeh, L., Mohammadi, E., and Yazdi, K. (2013). Family Involvement in the Care of Hospitalized Elderly Patients. *Journal of Applied Gerontology*, 0733464813483211. <http://doi.org/10.1177/0733464813483211>
- Neo R. B. and Koh T. J. (1995). Accounting for waste in construction. in Yeo KT, editor 11, *Proceedings of the First International Conference on Construction Project Management*, Singapore, pp.399-406
- Neuman, W. L. (2006) *Social Research Methods: Qualitative and Quantitative Approaches*. 5th ed. London : Pearson.
- NHS (2009) *Institute for Innovation and Improvement: Quality and Safety Improvement Tools* [online]. [cited on 21st October 2009].

- Nicholas, J. M. (1998) *Competitive Manufacturing Management: Continuous Improvement, Lean production, Customer-focused Quality*. Boston: Irwin/McGraw-Hill.
- Nigeria, Federal Republic of. (1991). National Housing Policy, Lagos: Federal Government. *Federal Government Press Grigsby*, , 40, 973-997.
- Nunally, J. (1978). *Psychometric Theory*. New York, NY, USA: McGraw-Hill.
- Nunes, J.M.B. and McPherson, M.A. (2003) Research model for Management of change in continuing professional distance education. *Innovation in Teaching and Learning in Information and computer science* 2(1) ISSN 1473-7507
- Odediran, S.A., Adeyinka, B.F., Opatunji, O.A., & Morakinyo, K.O. (2012). Business Structure of Indigenous Firms in Nigerian Construction Industry *International Journal of Business Research and Management (IJBRM)*, 3(5).
- Odeh, A., & Battaineh, H. . (2002). Causes of Construction delay: traditional contracts. *International Journal of Project Management*, 20, 67–73.
- Odusami, K.T., 2001. *Project Team Leadership and Construction Project Performance in some selected states in Nigeria*. Unpublished Ph.D. Thesis, Department of Building, University of Lagos
- Odusami, K. T., Oladiran, O. J. and Ibrahim, S. A. (2014) Evaluation of Materials Wastage and Control in Some selected Building Sites In Nigeria: *Emirates Journal for Engineering Research*, 17 (2), 53-65
- Ograbe Ahiakwo , David Oloke , Subashini Suresh , and Jamal Khatib. (2012). Critical Review of Potentials for Implementing of Lean in the Nigerian Building Industry. *Proceedings of the 20 Annual Conference of the International Group for Lean Construction*.
- Ogunbiyi, O. (2014) *Implementation of the Lean Approach in Sustainable Construction: A Conceptual Framework*; A thesis submitted in partial fulfilment for the requirements for the degree of Doctor of Philosophy at the University of Central Lancashire
- Ohno, T. (1988) *The Toyota Production System: Beyond Large-Scale Production*. Portland: Productivity Press

- Okuwoga, A. A. (1998) Cost-time performance of public sector housing projects in Nigeria; *Habitat Int*, 22 (4) (1998), pp. 389–395
- Oke, A. E., and Ogunsemi, D.R. (2011). *Value Management in the Nigerian Construction Industry: . Militating Factors and the Percieved benefits.*
- Okpala, D.C. and Aniekwu, A.N. (1988) Cause of high cost of construction in Nigeria. *Journal of Construction Engineering and Management, ASCE*, **114** (2) 223± 34.
- Olapade, O. and Anthony, O. (2012). Abandonment of Building Projects in Nigeria- A Review of Causes and solutions. *International Conference on Chemical, Civil and Environment engineering (ICCEE'2012) , Dubai, 253-255.*
- Olatunji, J. O. (2008). Lean in Nigerian Construction: State, Barriers, Strategies and "Goto-Gemba" Appraach. *Proceedings of 16th Annual Conference of International Group for Lean Construction. .*
- Olomolaiye, P. O., Wahab, K., & Price, A. (1987). Problem Influencing craftsmen's Productivity in Nigeria. *Building and Environment*, 22(4), 317-323.
- Olsen, W. (2004). Triangulation in social research: Qualitative and quantitative methods can really be mixed. <http://www.ccsr.ac.uk/staff/Triangulation.pdf>
- Olubanwo, T., Adewuyi, T. O. and Odesola, I A (2016) Material Waste Minimisation Strategies among Construction Firms in South-South, Nigeria *International Journal of Sustainable Construction Engineering & Technology (ISSN: 2180-3242) Vol 7, No 1, Published by Universiti Tun Hussein Onn Malaysia (UTHM) and Concrete Society of Malaysia (CSM) 11*
- Olusegun, A. E., & Michael, A. O. (2011). Abandonment of Construction Project in Nigeria: Causes and Effects. *Journal of Emerging Trends in Economics and Management Sciencies (JETEMS)*, 2(2), 142-145.
- Olutuah, A.O., & Bobadoye, S.A. (2009). Sustainable Housing Provision for the Urban Poor: A Review of Public Sector Intervention in Nigeria. *The Built and the Human Environment Review*(2), 51-63.
- Omole, A.O. (1986). Causes of the High Cost of Building and Civil Engineering Construction in Nigeria. *The Nigerian Quantity Surveyor*, 6, 1-2.

- Oppenheim, A. N. (1992). *Questionnaire Design and Attitude Measurement*. New York: Basic Books, Inc.
- Osemenan, I. (1987). Project Abandonment. *News Watch Magazine*, 1(15).
- Ottosson, S.(2003) Participation action research—a key to improved knowledge of *management Technovation*, 23, (2), 87–94
- Oyewobi, L. O, O Ganiyu, B., A Oke, A., W Ola-awo, A., and Shittu, A. (2011). Determinants of Unethical Performance in Nigerian Construction Industry. *Journal of Sustainable Development*, 4(4), 175.
- Oyewobi, L. O, and Ogunsemi, D. R. (2010). Factors Influencing Reworks Occurrences in Construction: A study of selected Building Project in Nigeria *Journal of Building Performance*, 1(1), 1-20.
- Paez, O., Salem, S., Solomon, J., and Genaidy, A. (2005). Moving from Lean Manufacturing to Lean Construction: Toward a Common Sociotechnological Framework." *Human Factors and Ergonomics in Manufacturing*, 15(2), 233-245.
- Patton, M. Q. (2002). *Qualitative Research and Evaluation Methods* (3rd ed.). Thousand Oaks, CA: Sage.
- Patton, M.Q (1990). *Qualitative evaluation and re- search methods* (2nd ed). Newbury Park, CA: Sage
- Pheng L. S. & Hui, M. S, (1999) The application of JIT philosophy to construction: a case study in site layout, *Construction Management and Economics*, 17:5, 657-668, DOI: 10.1080/014461999371268
- Peng, C. L., Scorpio, D. E. and Kibert, C. J. (1997). “Strategies for successful construction and demolition waste recycling operations.” *Construction Management and Economics*, 15(1), 49-58.
- Pheng, L. S. and Tan, S. K. L (1998) How Just-In-Time Wastages Can Be Quantified: Case Study of A Private Condominium Project, *Construction Management and Economics*, 16:6, 621-635, DOI: 10.1080/014461998371926
- Pinto, T.P. and Agopyan, V., (1994). Construction waste as raw materials for low-cost construction products. In: Kibert, C.J. (Ed.), *Proceedings of the First*

- Conference of CIB TG 16 on Sustainable Construction*. Tampa, Florida, pp. 335–342.
- Polat, G. and Ballard, G. (2004), “Waste in Turkish Construction: Need for Lean Construction Techniques,” *Proceedings of the 12th Annual Conference of the IGLC*, Elsinore, pp. 3-5.
- Poon, C. S., Wu, A. T. W., Wong, S. W., and Cheung, E. (2004) Management of construction waste in public housing projects in Hong Kong, *Construction Management and Economics* 22, 675–689.
- Preston, C. C., and Colman, A. M. (2000). Optimal Number of Response Categories in Rating Scales: Reliability, validity, discriminating power, and respondent preferences. *Acta Psychologica*, 104(1), 1–15.
- Proverbs, Holt, and Cheok. (2002). Summary of J. Egans Report, Re-thinking Construction. Costruction Industry Cost Effectiveness Task Force 1983 *More Construction For the money*. USA: Summary of Report CICE project Bussiness Roundtable.
- Punch, K. (1998) *Introduction to Social Research: Quantitative and Qualitative Approaches*, London: Sage.
- Radnor, Z. Walley, P., Stephens, A and Bucci, G. (2006). *Evaluation of the lean Approach to Business Management and its use to Public sector*l. <http://www.scotland.gov.uk/Resource/Doc/129627/0030899.pdf> accessed 9/10/13
- Ramaswamy, K. P. and Kalidindi, S. N. (2009) Waste in Indian Building Construction Projects *Proceedings of 17th Annual Conf. of IGLC 2009*
- Refuse Transfer Station Development Group (2011). *Monitoring of Solid Waste in Hong Kong: Waste Statistics for 2010*. Waste Reduction and Eco Park Group, Environmental Protection Department, Hong Kong, China.
- Refuse Transfer Station Development Group (2012). *Monitoring of Solid Waste in Hong Kong: Waste Statistics for 2011*. Waste Reduction and Eco Park Group, Environmental Protection Department, Hong Kong, China.
- Remenyi, D., Williams, B., Money, A., and Swartz, E. (1998). *Doing Research in Business and Management*. London: Sage.

- Robinson, B. (1991) *Continues Improvement in Operations; A systematic Approach to Waste Reduction*, Productivity Press USA.
- Robson, C. (2002). *Real World Research* (2nd ed.). Oxford, UK: Blackwell Publishers Ltd.
- Sacks, R., and Goldin, M. (2007). Lean Management Model for construction of high rise apartment buildings. *Journal of Construction Engineering and Management*, 133-374.
- Sacks R., Rozenfeld O. and Rosenfeld Y. (2009) Spatial and Temporal Exposure to Safety Hazards in Construction. *Journal of Construction Engineering and Management*, 135, pp.726-736.
- Salem, O., Solomon, J., Genaidu, A., and Luegring, M. (2005). Site Implementation and Assessment of Lean Construction Techniques. *Lean Construction Journal*, 2.
- Salem, O., Solomon, J., Genaidy, A. and Minkarah, I. (2006). Lean construction: from theory to implementation, *Journal of Management in Engineering*, 22 (4), 168-75.
- Salem O., Lothlikar H., Genaidy A. and Abdelhamid T. (2007) A Behaviour-Based Safety Approach For Construction Projects: the *15th International Group for Lean Construction Annual Conference*. Michigan, United States July 2007.
- Salem, O. and Zimmer, E. (2004) Application of Lean Manufacturing Principles to Construction. *Lean Construction Journal*, 2(2), pp.51-54.
- Salem, O. and Zimmer, E (2005) Application of Lean Manufacturing Principles to Construction *Lean Construction Journal* www.Leanconstructionjournal .org Vol 2 #2 October, ISSN: 1555- 1369 pp 51-54
- Santos, J. R. A. (1999). Cronbach's Alpha: A Tool for Assessing the Reliability of Scales. *Journal of extension*. 37 (2).
- Santos, A., and Powel, J. (1999). Potential of Poka-Yoke device to reduce variability in construction. *Proceedings of 7th Annual Conference of International Group for Lean Construction*. , 51.

- Saurin, T., Formoso, C., Guimaraes, and Soares, A. (2002) Safety and production: an integrated planning and control model. *Proceedings of IGLC-10, 10th Conf. of Int. Group for Lean Construction*, Gramado, Brazil, 61-74.
- Saurin, T.A., Formoso, C.T., and Cambraia, F., (2005). Analysis of a safety planning and control model from the human error perspective. *Engineering, Construction and Architectural Management* 12 (3), 283–298.
- Sawacha, E., Naoum, S. and Fong D. (1999) Factors affecting Safety performance on Construction Sites. *International Journal of Project Management* 17 (5), pp. 309-315.
- Schafer D., Abdelhamid T. S., Mitropoulos P. and Howell G. A. (2008) Resilience Engineering: A New Paradigm for Safety in Lean Construction Systems: the 16th International Group for Lean Construction Annual Conference. Manchester, United Kingdom 16-18 July 2008.
- Scherrer-Rathje, M., Boyle, T.A., and Deflorin, P., (2009). Lean, take two! Reflections from the second attempt at lean implementation *Business Horizons* 52 (1), 79–88
- Schonberger R. J. (2006) Japanese Production Management: An Evolution- With Mixed Success. *Journal of Operations Management*, 25
- Schwaber, K. (1995). Scrum Development Process, *Workshop on Business Object Design and Implementation*, OOPSLA 1995 Springer-Verlag.
- Schwaber, K. (2002). *Agile Software Development with Scum*. Prentice Hall Upper Saddle River, NJ.
- Serpell A, and Labra M (2003). A study on construction waste in Chile. in Ofori G, Ling FY, editors. *Proceedings, Joint Symposium of CIB W55, W65 and W107 on Knowledge*. Construction 2. October, pp.102-111.
- Serpell, A., Venturi, A., and Contreras, J. (1995). “*Characterization Of Waste In Building Construction Projects.*” In *Lean Construction*, Alarcon (Ed.), A.A. Balkema, Rotterdam, the Netherlands, pp. 67-77
- Shah, R. and Ward, P. T. (2007). Defining and developing measures of lean production. *Journal of Operations Management*, 25(4), 785—805.

- Shi, J. and Xu, Y. (2006). "Estimation and forecasting of concrete debris amount in China." *Resource, Conservation and Recycling*, 49(2), 147-158.
- Shingo, S. (1984) *The Study of Toyota Production System*: (Cambridge, MA: Productivity Press).
- Shingo, S. (1986). *Zero Quality Control: source inspection and the poka-yoke system*. Productivity Press, Cambridge, MA., 57-69.
- Shingo, S. (1988) *Non-stock Production*; Cambridge, MA: Productivity Press.
- Shingo, S. (1992) *The Shingo Prize Production Management System: Improving Process Functions*; Cambridge, MA: Productivity Press.
- Shrier, J. (2004). Getting Lean: The Construction Revolution. *Construction and Real Estate Advisor Journal*(1), 1-5.
- Silverman, D. (2006) *Interpreting Qualitative data: Methods for Analysing talk, text, and interaction*. 2nd ed. London: Sage Publications
- Singapore Environment Protection Division (2003). *Environment Protection Division Annual Report 2003*. National Environmental Agency, Ministry of the Environment, Singapore.
- Singapore Environment Protection Division (2004). *Environment Protection Division Annual Report 2004*. National Environmental Agency, Ministry of the Environment, Singapore.
- Singapore Environment Protection Division (2005). *Environment Protection Division Annual Report 2005*. National Environmental Agency, Ministry of the Environment, Singapore.
- Singapore Environment Protection Division (2006). *Environment Protection Division Annual Report 2006*. National Environmental Agency, Ministry of the Environment, Singapore.
- Singapore Environment Protection Division (2007). *Environment Protection Division Annual Report 2007*. National Environmental Agency, Ministry of the Environment, Singapore.
- Singapore Environment Protection Division (2008). *Environment Protection Division Annual Report 2008*. National Environmental Agency, Ministry of the Environment, Singapore.

- Singapore Environment Protection Division (2009). *Environment Protection Division Annual Report 2009*. National Environmental Agency, Ministry of the Environment, Singapore.
- Singapore Environmental Protection Division (2010). *Environment Protection Division Annual Report 2010*. National Environmental Agency, Ministry of the Environment, Singapore.
- Skoyles, E.R. (1976) *Material wastage ± A Misuse of Resources*, Building Research Establishment, Garston, UK.
- Skoyles ER (2000). Materials Control to Avoid Waste; Building Research Establishment Digest, London, UK., 3 (259): 1-8.
- Society of American Value Engineers SAVE Proceedings, (1998) [Publishers Southfield, Mich.] *Society of American Value Engineers Journal, magazine : Conference publication*. <http://www.worldcat.org/search?q=su%3a%22Conference>
- Soetanto, R. (2002) *Modelling Satisfaction for Main Participants of the Construction Project Coalition: a study of Mutual Performance Assessment*. Ph.D. thesis, University of Wolverhampton.
- Solís-Guzmán, J., Marrero, M., Montes-Delgado, V. and, Ramírez-de-Arellano, A. (2009). A Spanish Model for Quantification and Management of Construction Waste, *Waste Management* 29; 2542–2548.
- Song L., Liang D. and Javkhedkar A. (2008) A Case Study on Applying Lean Construction to Concrete Construction Projects [online]. [cited on 2/5/2013] <http://ascpro0.ascweb.org/archives/cd/2008/paper/CPGT201002008.pdf>
- South Africa Department of Environmental Affairs (2012). *Waste Information Centre*. Available at < <http://www.sawic.org.za/index.php?menu=15>>
- Sowards, D. (2003). Spoecial to Contractor. *The New Magazine of Mechaniacal Contracting*.
- Soy, S. K. (1997). *The case study as a research method*. Unpublished paper, University of Texas at Austin.
- Spradley, J. P. (1979). *The Ethnographic Interview*, New York: Holt, Rinehart & Winston.

- Spoor, T. (2003). Five S (5S): "The key to Simplify Lean Manufacturing." *Manufacturing Resources Group of Companies (MRGC)*. 3 September
- Stangor, C. (1998). *Research methods for the behavioral sciences*. Boston: Houghton Mifflin
- Stake, R. E. (2000). *Case studies*. In Norman K. Denzin & Yvonna S. Lincoln (Eds.), *Handbook of qualitative research*. Thousand Oaks: Sage, 435-453
- Stokoe, M. J., Kwong, P. W., and Lau M. M. (1999). Waste reduction: A tool for sustainable waste Management for Hong Kong. In: Barrage A, Edelman Y, editors. *Proceedings of R'99 World Congress, Geneva: EMPA, 5*: 165-170.
- Sunusi, L.S. (2010). Growth Prospects for Nigerian Economy. *Convercation lecture delivered by Central Bank Governor at Igbinedian University Okada, 8th Convocation*.
- Suraji, A., Duff, R. and Peckitt S. J. (2001) Development of Causal Model of Construction Accident Causation. *Journal of Construction Engineering and Management*, 127(4), pp. 337-344.
- Suresh, S., Bashir, A. M., and Olomolaiye, P. O. (2012). A Protocol For Lean Construction In Developing Countries, *Contemporary Issues in Construction in Developing Countries*. G, Ofori Ed; Spon Press.
- Taiichi, O. 1988. *Toyota Production System: Beyond Large-Scale Production Productivity* press, Cambridge; MA.
- Tam, V. W. (2008). "On the effectiveness in implementing a waste-management-plan method in construction." *Waste Management*, 28(6), 1072-1080.
- Tam, V.W., Shen, L.Y., and Tam, C.M. (2007), Assessing the Levels of Material Wastage Affected by Sub-Contracting Relationships and Projects Types with their Correlations. *Building and Environment*, 42(3), 1471-1477.
- Tammemagi H (1999). *The Waste Crisis*. Oxford: Oxford University Press..
- Tan, W. L. (2004). *The application of lean construction to reduce wastes in construction process flow*, MSc Thesis, Sch. of Housing, Building and Planning, Univ. of Saints, Malaysia.
- Tanaka, T. (2002). *Efficient Creativity: JIT for Knowledge-Workers*, JMAC Consiel SpA, Milan.

- Teicholz, P. (2004.). Labor productivity declines in the construction industry: causes and remedies. . *AECbytes Viewpoint*, , 4(14), .
- Teicholz, E. (2004) Bridging the AEC Technology Gap, IFMA *Facility Management Journal* <http://www.bricsnet.com/content/Teicholz.pdf>
- Teo, S.P., Abdelnaser, O. and Abdul, H.K. (2009), Material Wastage in Malaysian Construction Industry. *International Conference on Economic and Administration*, Faculty of Administration, University of Bucharest, Romania, pp. 257-264
- Thomas, R., Riley, D., and Messner, J. (2005). “Fundamental principles of site material management.” *Journal of Construction Engineering and Management*, 131(7), 808-815.
- Thomason, H. R., Horman, M. J., Minchin Jr, R. E., & Cheng, D. (2003). Improving Labour Flow Reliability For Better Productivity as Lean Construction Principle. *Journal of Construction Engineering and Mangement*, 129, 251.
- Thurmond, V. (2001). The point of triangulation. *Journal of Nursing Scholarship*, 33(3), 254–256. Retrieved from <http://www.ruralhealth .utas.edu.au/gr/resources/docs/the-pointof- triangulation.pdf>.
- Tommelein, I.D. and Ballard, G. (1997). “*Look-ahead Planning: Screening and Pulling.*” Technical Report No. 97-9, Construction Engineering and Management Program, Civil and Environmental Engineering Department, University of California, Berkeley, CA, USA.
- Tommelein, I. D., and Weissenberger, M. (1999). More Just inTime: Location of buffers in structural steel supply and construction process. *proceedings of 7th Annual Conference of International Group for Lean Construction.* .
- Tosin, O. (2011). Construction Industry Report; A Haven of Opportunities. *VETIVA Capital Management Limited*. 27th May. t.oluwakiyesi@vetiva.com
- Transformation Agenda. (2011). *Summary of Federal Government Key priory policies, programmes and projects.*
- Tuckett, A. G. (2005) Applying thematic analysis theory to practice: A *researcher's experience*. *Contemporary Nurse*, 19(1-2), 75-87.
- Turner, A. (1997). *Building Procurement*: Palgrave Macmillian Ltd UK.

- Tuuli, M.M. (2009) *Empowerment and Control Dynamics in Project Teams: A Multi-level Examination of Antecedents, Job Performance, and Consequences*, PhD Thesis, Department of Real Estate and Construction, University of Hong Kong.
- Tyler M. and Lamont D. (2008) *Construction Health and Safety. Institution of Civil Engineers.*
- Tzortzopoulos, P., and Formoso, C. (1999). Considerations on application of lean construction principles to design management. *Proceedings of the Seventh Annual Conference of the International Group for Lean Construction*, Berkeley, CA, 335-344
- Vagias and Wade M. (2006). *Likert-type scale response anchors*. Clemson International Institute for Tourism & Research Development, Department of Parks, Recreation and Tourism Management. Clemson University.
- Villoria Sáez, P., Del Río Merino, M. and Porrás-Amores, C. (2012) Estimation of construction and demolition waste volume generation in new residential buildings in Spain, *Waste Management & Research* 30 (2012) 137–146.
- Voordijk, H. (2009). Construction management and economics: the epistemology of a multidisciplinary design science. *Construction Management and Economics*, 27(8), 713-720.
- Wahab A. B. and Lawal, A. F (2011) An evaluation of waste control measures in construction industry in Nigeria African. *Journal of Environmental Science and Technology* Vol. 5(3), pp. 246-254, March 2011 Available online at <http://www.academicjournals.org/AJEST> ISSN 1996-0786X ©2011 Academic Journals
- Walsh, K. D., Sawhney, A., & Bashford, A. A. (2003). Cycle- time Contribution to hyper-specialization and time gating strategies in U. S. residential construction. *Proceedings of 11th Annual Conference of International Group for Lean Construction*. Backsburg, VA, USA.
- Wendell L French; Cecil Bell (1973). *Organization development: behavioral science interventions for organization improvement*. Englewood Cliffs, N.J.: Prentice-Hall. p. 18. ISBN 978-0-13-641662-3. OCLC 314258.

- White, R.E. and Prybutok, V. (2001), *The relationship between JIT practices and type of production system*, *Omega*, 29 (2), 113-24.
- Windapo, A., & Martins, O. (2010). An Investigation into Nigerian Property Construction Companies; Perception of Critical Risk. *Insurance Market and Companies; Analysis and Acturial computations*, 1(1).
- Womack, J.P. (1999) Manufacturing Has Move to Lean; It is Time Construction does too: *Proceedings 10th Winter Conference in Archistruction*, Neeman Denver, Colorado USA
- Womack, J. and Jones, D. (1996). *Lean Thinking: Banish waste and create wealth in your corporation*,.New York: Simon & Schuster,
- Womack, J.P., Jones, D.T., & Ross, D. (1990). *The Machine that change the world, the story of lean production*. Rawson Associate New York.
- Wong E. T. T and Norman G. (1997) Economic Evaluation of Materials Planning Systems for Construction, *Construction Management and Economics*, 15:1, 39-47, DOI: 10.1080/014461997373097
- Wong, S. H. L., Tam, W. C. K., Yim, A. H. L. and Ip, N. H. Y. (2006). *Monitoring of solid waste in Hong Kong: Waste statistics for 2005*. Environmental Protection Department, Hong Kong, China
- Woodside, A. G. (2010). *Case Study Research: Theory, Methods and Practice* (First). Howard House, Wagon Lane, Bingley BD16 1WA, UK: Emerald Group Publishing Limited.
- WRAP, 2007 *Annual Report*: www.wrap.org.uk.
- Yashuai, LI, (2013) *Developing a Sustainable Construction Waste Estimation and Management System*; A Thesis Submitted to The Hong Kong University of Science and Technology in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in Civil Engineering
- Yashuai Li, Xueqing, Zhang (2013) Web-based construction waste estimation system for building construction projects *Automation in Construction* journal homepage: www.elsevier.com/locate/autcon Department of Civil and Environmental Engineering, The Hong Kong University of Science and Technology, Clear Water Bay, Kowloon, Hong Kong, China

- Yin, K.R., (1994). *Case study research: Design methods, Applied Social Research Methods Series, Volume 5*, London: Sage Publications.
- Yu, H., Tweed, T., Al Hussain, M., & Nasser, R. (2009). Development of Lean Model For House Construction using Value stream mapping. *Journal of Construction Engineering and Management*, 135, 782.
- Yin, R. K. (Ed.). (2009). *Case study research: Design and methods*. London: Sage Publications.
- Yu A. T. W, Poon, C. S., Wong, A., Yip, R, and Jaillon L (2013) Impact of Construction Waste Disposal Charging Scheme on work practices at construction sites in Hong Kong *Waste Management Journal*; Vol. 33 138–146
- Zhao, Y., and Chua, D. K. H. (2003) Relationship between productivity and non value-adding activities. *Proceeding of 11th annual conference of the international group for lean construction*, Blacksburg.