

Knowledge, Attitude, and Perception (KAP) of Construction Participants towards Resource Waste in the Construction Industry.

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ABSTRACT

The majority of waste of construction resources occurs not only due to bad workmanship, inadequate supervision, improper planning or poor organization of a site, but because of the pre-notions of the construction participants that wastage is normal part of the process. These beliefs often make construction participants exhibit a nonchalant attitude significantly to resources utilization. Human attitudes and perceptions considerably contribute to resource waste; which constrain the site manager's efficient resources utilization.

In this research, a KAP (Knowledge, Attitudes, and Perceptions) study approach was adopted in which quantitative and qualitative surveys were carried out on site operatives and project management team. This research was triangulated, where structured questionnaires were administered and interview surveys conducted. These surveys addressed the operatives attitude to work, belief in resources wastefulness and utilization, the motivation toward averting wastage, and best approaches to resources waste management on sites. This research identified the behavioral features of site participants on resources wastefulness and provided an incentive framework for achieving efficient utilization of construction resources; which include self-fulfillment, belongingness and regular appraisal. The issues concerning the management and the employees towards achieving efficient resources utilization were equally identified. The adequate implementation of the framework proposed on this research will assist building industry towards optimal resources utilization and lean construction.

(Keywords: building production, construction resources, motivation lean construction, optimal resource utilization)

INTRODUCTION

The majority of construction wastefulness stems not only from bad workmanship, inadequate supervision, improper planning or poor organization of a site, but usually because of the concept of pre-notion that wastage is normal. These beliefs often makes the construction participants exhibit nonchalant attitude to resources utilization. Therefore, the questions are: Is it possible and what are the requirements needed to change construction operatives' opinions on resource waste syndrome, and what are the operatives' attitudes and behaviors towards efficient resources utilization?

This research work evaluates Knowledge, Attitude and Perception (KAP) of the construction participants; the attitude of the participants toward wastage, conception, and behavioral perception of these participants on resources utilization in the industry were critically examined. Human attitudes and perceptions significantly contribute to the scenarios of resource waste and constrain the site manager's efficiency.

Douglas McGregor's human theory emphasizes that there is an inherent dislike of work by human beings, and on many occasion, there is need to either force, persuade, or threaten construction participants towards efficient performance of duty (Swinton, 2008). Also, Frederick Hertzberg's two-factor hygiene and motivation theories indicate the relationships between the work environment and what the people actually do when working.

Frederick Hertzberg's theories placed emphases on a work environment that acts as a "catalyst" and motivates human to work (Blair, 1993; Swinton, 2008). Notably, monetary reward, self-recognition, responsibility assessment, good appraisal, promotion and advancement are important drivers towards the workers industrious

attainment (Accel-Team, 2005; Fapohunda et al., 2007). Thus, for efficient performance; getting things done through employees and to achieve an enhanced workers' output, there is a need for the construction site managers to be conscious of individual worker's potentials, weaknesses, and interests.

Waste resources (either physical, solid or latent in nature) are non-value added resources (Howell 1999). That is, construction resource waste add no value to the overall outcome of a product and these wastes occur significantly through inefficient utilization of resources (materials, manpower, and machinery). However, the occurrences of these resource waste are either conscious or unconscious, which could be avoided significantly during construction production phase through adequate evaluation of KAP of the construction participants.

This research study addresses factors that are remotely associated with site manager's skills, traits and potentials, but which are essential towards the manager's efficient resources utilization. The issues evaluated are: the motivation and incentives required towards resources utilization and the KAP of site participants towards resources utilization and waste. This research was triangulated by exploration of questionnaires' survey, augmented with interview surveys to ensure valid and reliable findings, and conclusions were drawn based on the findings. Data and information was collected from experienced construction personnel in the UK construction industry.

RESEARCH METHODOLOGY

This research work was carried out using triangulation method for validity and reliability of the research findings. Information and data was gathered using facts from the literature and structured questionnaires, augmented with interview surveys. Questionnaires were distributed to construction project managers in the UK construction industry.

To enhance the quality of the responses, the questions are framed on open, closed, and attitude based. A majority of these questions were measured using the Likert scale rated from 1 - 5, that ranged from "strongly disagree" to "strongly agree" and "very low" to "very high"; some questions were to be responded with YES or NO,

while others are open and opinion seeking questions. One hundred and two questionnaires were collected and analyzed by using SPSS.

Oral interviews with structured questionnaires were administered. The respondents were solicited to comment on each question. Eight construction personnel were interviewed, while the comments were tape recorded, transcribed, and thereafter correlated together. The interview information and emergence themes and facts were collated by means of NVivo statistical tool. Data collection, analysis and interpretation were aided with the views of Silverman (2005), Field (2005), Bryman and Cramer (2005), Creswell (2008) and Tronchin (2009).

Nine (9) distinct construction managerial levels from different construction organization participated in the questionnaires survey (Table 1). As presented in Figure 1, the total respondents that had more than five years' managerial experience in the construction industry are 84%; of these, 57% have more than 15 years managerial work experience and 27% have between 5 - 15 years. Only 16% have less than 5 years' managerial experience, though this does not indicate their unawareness in the problems associated with resources utilization in the industry.

Table 1 and Figure 1, illustrate that, the percentage of project site managers /senior site managers in the respondents is 40%, the site managers and contract managers/senior contract managers are 29% and 10%, respectively. All the project directors, planning managers, design managers, and senior building managers in the survey have not less than 15 years' managerial experience in the construction industry.

These results indicate that the respondents are significantly experienced and rationally have wide knowledge in the construction industry.

Geographical Zones covered and the Number of Employees in the Respondents' Organizations

(i) Coverage: Table 2 indicates the geographical zones which the respondents' organizations operate in the UK. 84% of the organizations are in 8 or more geographical zones.

Table 1: Respondents "Site Management Positions" on the "Years of Experience of the Respondents as a Manager" in the Construction Industry.

		Years of Experience as a Manager in Construction Industry				Total	%	Cumulative %
		Less than 5	5 – 10	11 - 15	Above 15			
Site Management Position of the Respondents	1. Project Managers/ Senior Project Managers	0	6	8	27	41	40	40
	2. Site managers	12	2	7	9	30	29	69
	3. Contract Managers/ Senior Contract Managers	0	2	0	8	10	10	79
	4. Quantity Surveyors/ Senior Quantity Surveyors	2	2	0	2	6	6	85
	5. Project Directors	0	0	0	5	5	5	90
	6. Planning Managers	0	0	0	4	4	4	94
	7. Section Managers	2	0	0	0	2	2	96
	8. Design Managers	0	0	0	2	2	2	98
	9. Senior Building Managers	0	0	0	2	2	2	100
Total		16	12	15	59	102	100	
%		16	12	15	57	100		
Cumulative %		16	28	43	100			
		16%	84%					

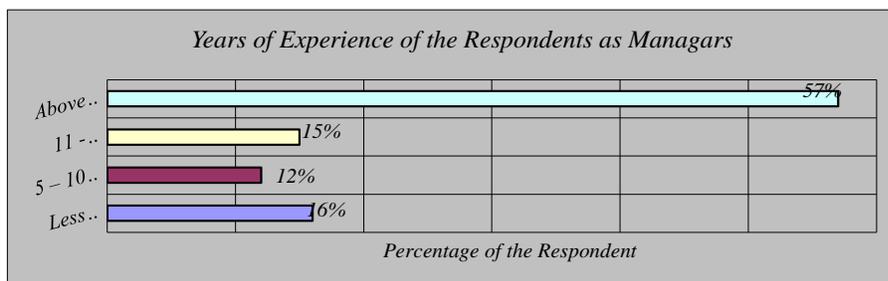


Figure 2: Years of Experience of the Respondents as Managers in the Construction Sector.

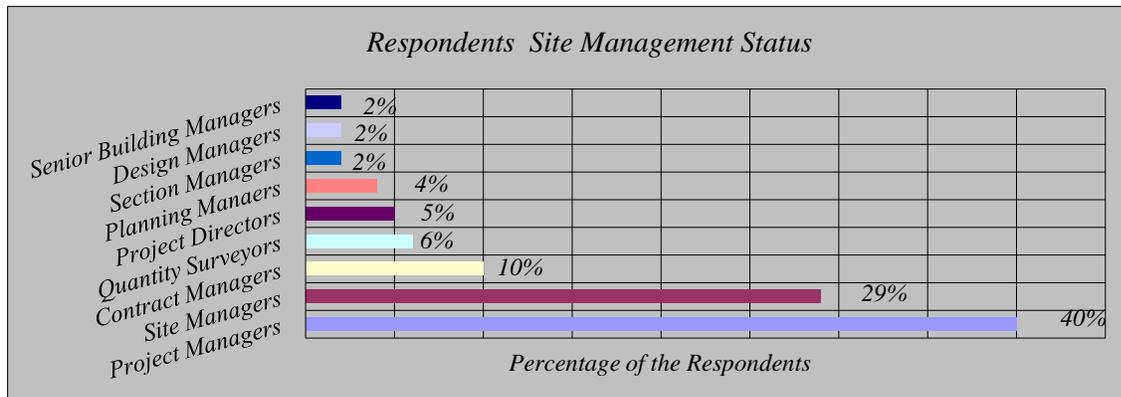


Figure 3: Respondents Site Management Status.

Table 2: Geographical Zones which the Respondents' Organizations Operate in the UK.

		Geographical Zones Of Which The Respondents Organisation are located In UK.										Total No.	%	Cum %
		Four	Five	Six	Seven	Eight	Nine	Ten	Eleven	Twelve	Thirteen			
No. Of Employees In The Organisation Presently In UK.	101-150	0	0	0	0	0	2	0	0	0	0	2	2	2
	151-200	0	0	0	0	2	0	0	0	0	0	2	2	4
	201-250	0	0	0	0	0	0	2	0	0	0	2	2	6
	251-300	0	0	0	3	2	2	0	0	0	0	7	7	13
	350-400	0	0	0	0	0	0	2	0	0	0	2	2	15
	Over 400	1	3	2	7	1	0	25	39	5	4	87	85	100
Total		1	3	2	10	5	4	29	39	5	4	102	100	
Percent		1	3	2	10	5	4	28	38	5	4	100		
Cumulative Percent		1	4	6	16	21	25	53	91	96	100			
		16%					84%							

The majority of the organizations are in 10 – 11 geographical zones, 66%, (28%, + 38%), while only 16% have construction sites in less than 8 geographical zones.

(ii) Numbers of Employees: Based on the results obtained as shown in Table 5.2, 85% of the respondents' organizations have more than 400 employees, while only 15% have below 400 employees.

These results in Table 2 show that the respondents are representation of several organizations in different geographical zones in UK, and the majority of the construction

organizations had above 400 permanent employees.

QUANTITATIVE RESEARCH SURVEY DATA ANALYSIS AND DISCUSSION OF FINDINGS

This study is technically divided into two main sub-headings:

- 1) Knowledge, Attitudes, and Perceptions, (KAP) of Construction Project Participants on Construction Resources Utilization and Waste.

2) Motivators and Incentives towards the Reduction of BWS.

1) Knowledge, Attitudes, and Perceptions, (KAP) of Construction Project Participants on Construction Resources

This part investigates and establishes the Knowledge, Attitudes, and Perceptions, (KAP) of construction project participants towards resource waste during the construction production process. The rationales for this section are:

- a) to rank these factors in order of significance;
- b) to evaluate the KAP of construction participants towards BWS;
- c) to ascertain the conformity of estimated construction resources to actual utilization; and
- d) to assist in establishing the measures towards minimization of budgeting for resource waste syndromes.

To gain better insight into the KAP of construction participants, this section was sub-divided into three main headings and the following issues were addressed:

- a) Beliefs of Site Participants on Construction Resources Procurement and Utilizations;
- b) Attitudes of Site Workers towards Resource Waste; and
- c) Behavior of Site Operatives towards Wastes

Beliefs of Construction Participants on Resources' Procurement and Utilizations

This section is based on agreement of respondents on "beliefs" of site workers. The respondents' chose from alternatives provided, ranging from 'Strongly Agree' (5) to 'Disagreed' (0). The summation of 'Strongly Agreed' and 'Agreed' percentages of "resources wastefulness is inevitable" is 74%; "resources wastage is normal" is 71% and "Resources have to be sufficient to accommodate wastage" is 67%. These are presented in Table 3 and Figure 3. These results indicate that, the agreement positions on all the factors and resource waste are viewed in diverse perspectives by construction participants. In comparison, the belief that "resources wastefulness is inevitable" is rated highest.

This fact also indicates that the construction participants view resources wastefulness as unavoidable.

These findings are further investigated in the interview survey to clarify and ascertain the rationales for these construction participants' beliefs and possible ways to reduce the beliefs towards resources efficient utilisations.

Attitudes of Site Workers towards Resources Wastage

This section evaluates the concerns and reactions of site participants towards resources utilization and wastefulness during the production process, and ascertains the construction workers' feelings towards resources inefficient utilization. From the survey, majorities of site participants are carefree in regard to resources minimization, 64% out the respondents agreed with this fact, followed by an ignorant and nonchalant attitudes with 52% each. Normal reaction is 46%, while the least are those workers whose will be displeased, 31%. The sum of "strongly agreed" and "agreed" percentages is tabulated in Table 4, while the detailed are presented in Figure 4 (a – e).

The results obtained in this section, the "Carefree attitude" of site participants buttress the fact established from the 'Beliefs of Construction Participants on Resources' Procurement and Utilizations, that construction participants view resources wastefulness as unavoidable and inevitable during construction production process. These findings are further investigated in the interview survey to clarify and ascertain the rationales.

Behavior of Site Operatives towards Resources Wastage

This section establishes the conduct of site workers towards efficient resources utilization and strengthens the facts obtained on beliefs of construction workers during construction process. The facts obtained are presented in Table 5 and Figure 5 (a - d). The findings indicate that the site operatives show less concern on resources utilization, wastage, or minimization.

Table 3: Beliefs of the Construction Participants on Resources Wastage.

		A) Resources wastefulness is inevitable, (%)		B) Wastefulness is normal, (%)		C) Resources have to be sufficient to accommodate wastage, (%)	
Valid	Strongly Agreed	11	74	04	71	14	67
	Agreed	63		67		53	

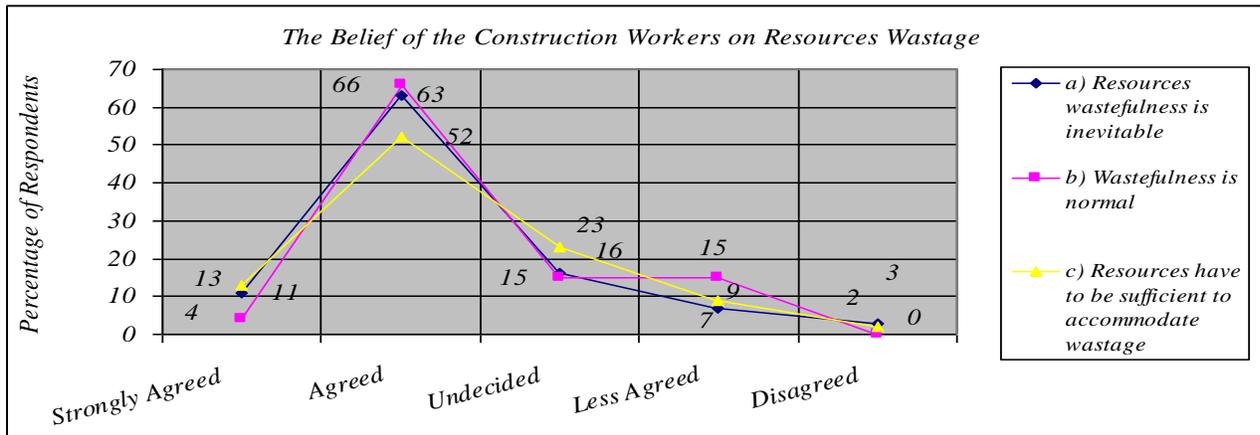


Figure 3: Beliefs of the Construction Participants on Resources Wastage.

Table 7: Site Participants' Attitudes towards Resources Wastage.

	a) Carefree		b) Ignorant		c) Nonchalant		d) Normal		e) Displeased	
Strongly Agreed	09	64	18	52	10	52	06	46	03	31
Agreed	55		34		42		40		28	

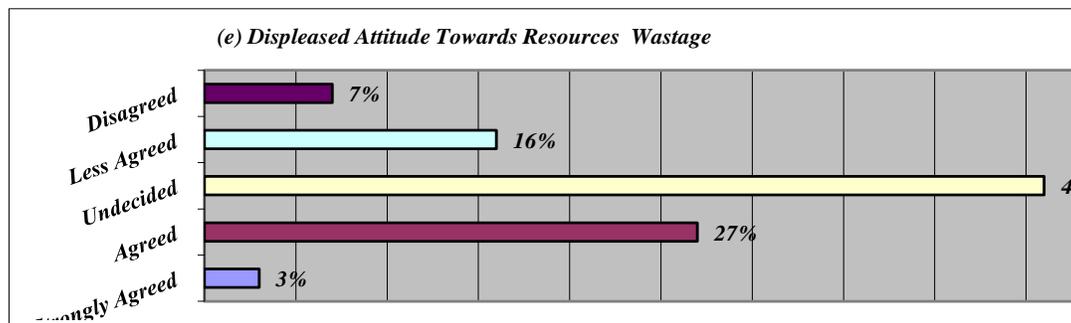
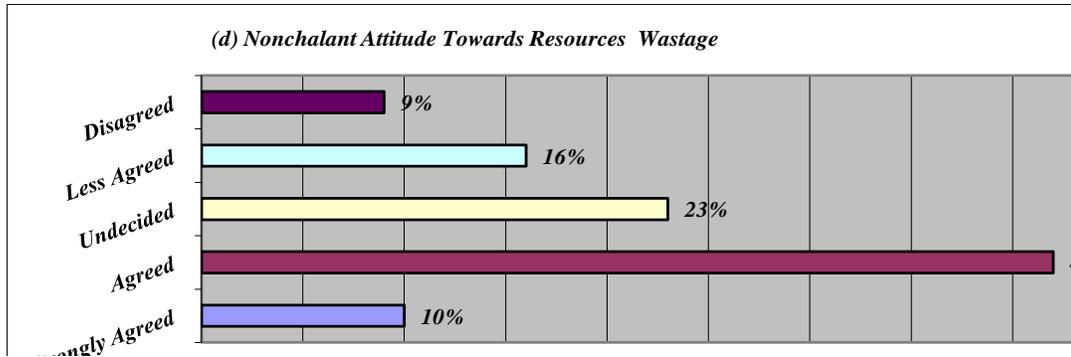
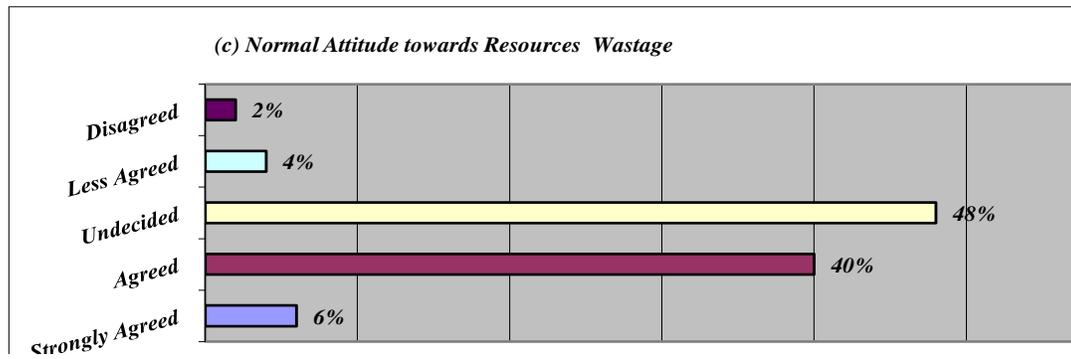
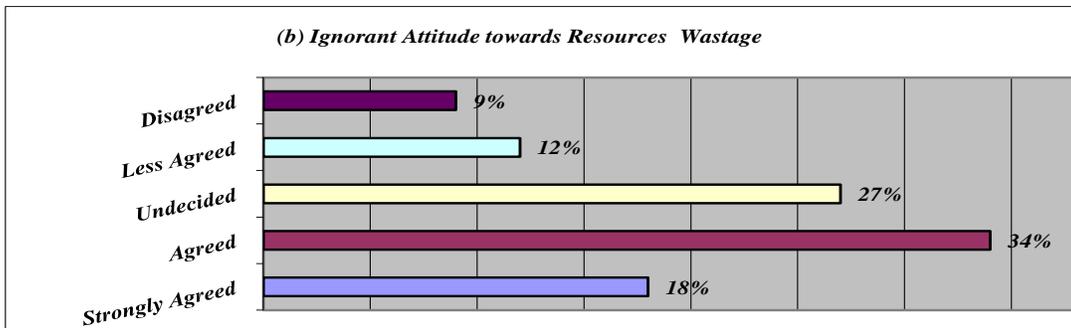
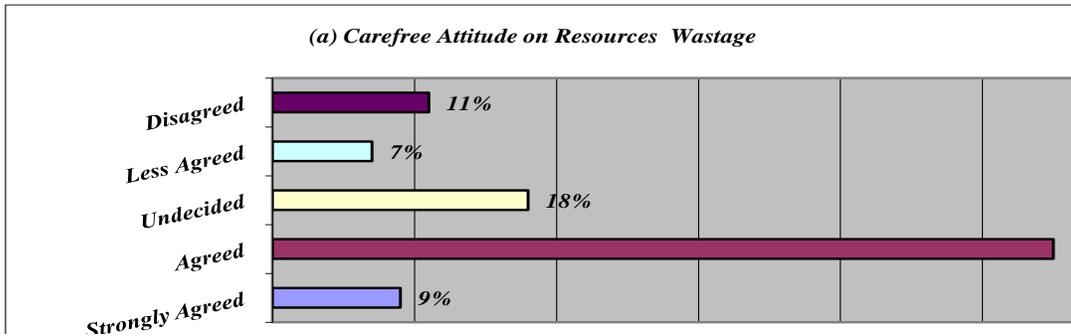
Based on these scenarios, further investigations were conducted through interview survey, to evaluate, and establish facts on this topical issue:

“Manpower is a resource that leads to wastefulness of other resources”.

2) Motivators and Incentives towards Reduction of Resources Wastefulness

Five factors were evaluated as incentives or means towards efficient resources utilization,

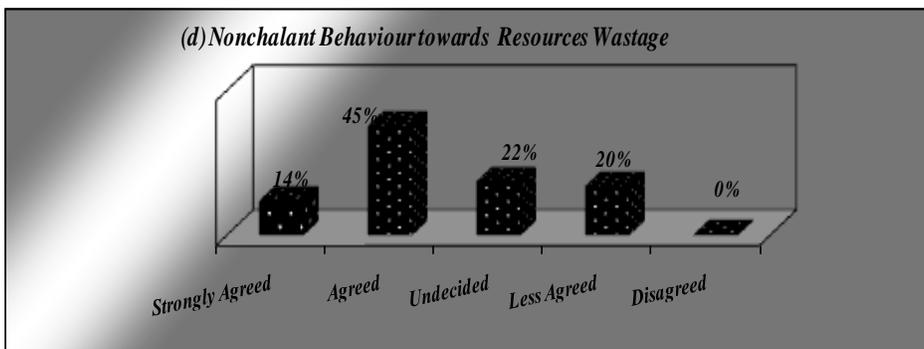
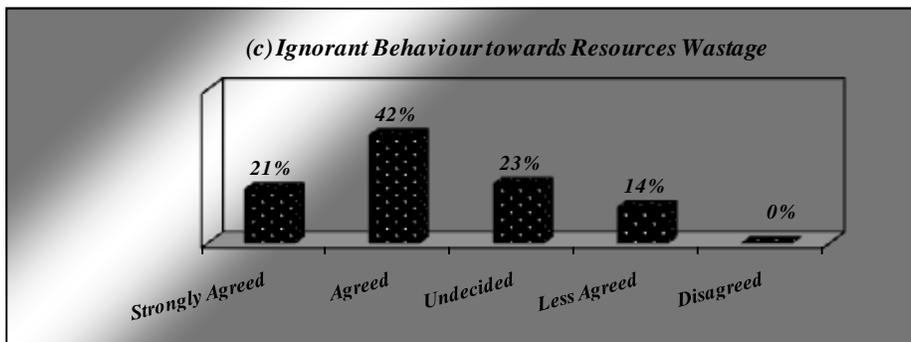
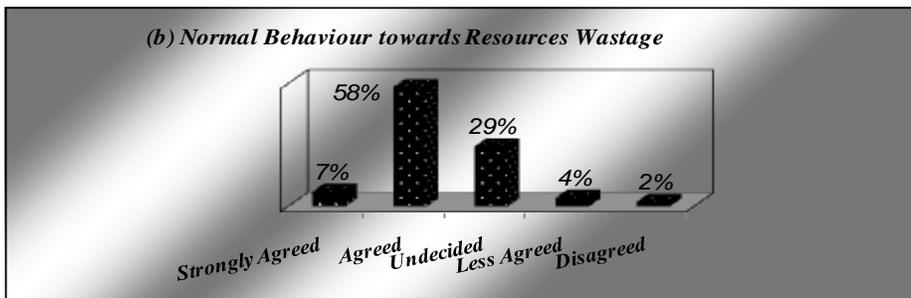
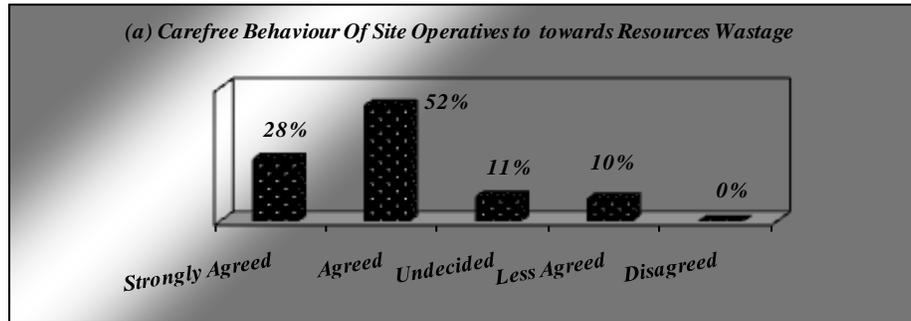
(wastes minimization). Respondents rated these factors on agreement, ranging from (0) to (5), where (0) indicates 'disagreed' and (5) represents 'strongly agreed'. The results obtained are: “Monetary Bonus for Waste Minimization”, 79%, “Target job and Resources Saving Scheme”, 74%, “Payment in Relation to Sensitivity of the Resources”, 71%, “Damage Free Incentive Package”, 67%, and “Wastes’ awareness awards”, 56%. Also, the agreement to “Carefulness Awards” is, 45%, which is the lowest, (Table 6).



Figures 4 (a - e): Site Participants' Attitudes towards Resource Wastage.

Table 8: Behavior of Site Operatives towards Resources Wastage.

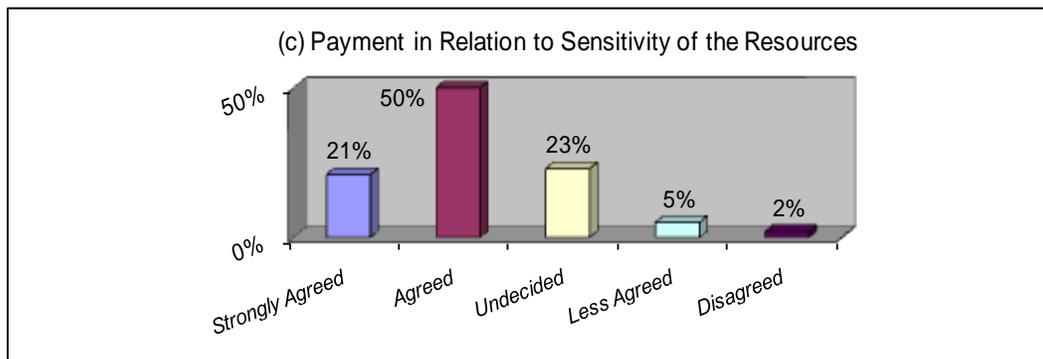
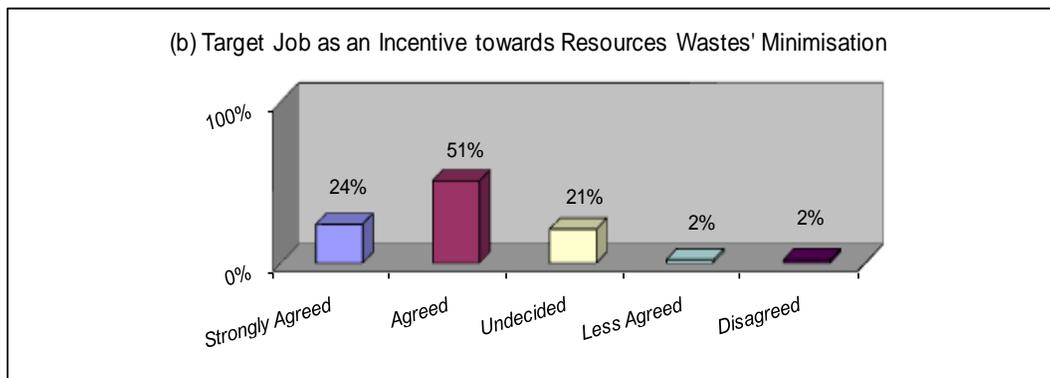
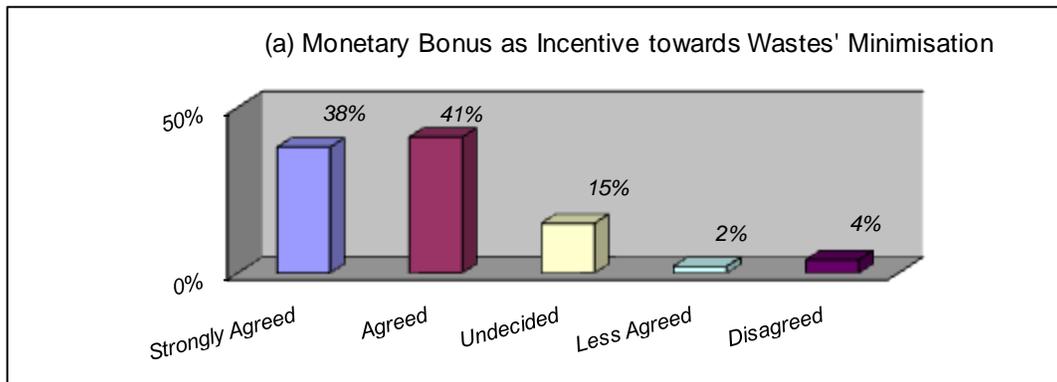
	a)	Carefree	b)	Normal	c)	Ignorant	d)	Nonchalant
Strongly Agreed	28	80	7	65	21	63	14	49
Agreed	52		58		42		45	



Figures 9 (a - d): Behavior of Site Operatives towards Resource Wastage.

Table 6: Possible Motivators and Incentives towards Reduction of Resource Wastefulness.

	a) Monetary Bonus towards waste minimization		b) Target job and resources saving scheme		c) Payment in relation to sensitivity of the resources		d) Damage free incentive package		e) Waste awareness awards		f) Carefulness awards	
Strongly Agreed	38	79	24	75	21	71	24	66	16	56	11	45
Agreed	41		51		50		42		40		34	



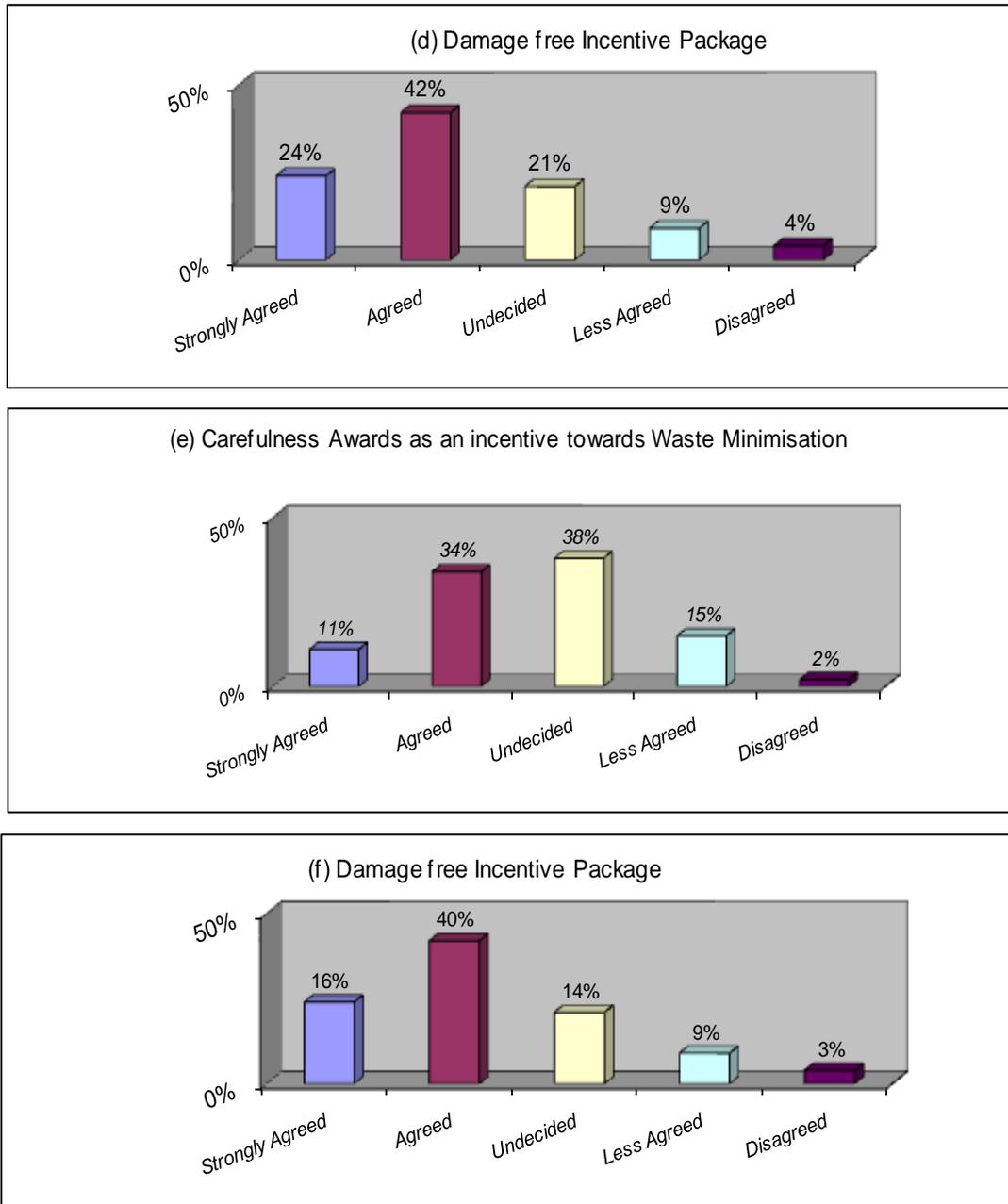


Figure 6 (a -f): Motivators or Incentives towards Reduction of Resources Wastefulness.

From the data obtained and presented in Table 6 and Figure 6, it is found that all the factors considered are significantly important towards the reduction of construction resources inefficiencies apart from “carefree awards” which is below average in percentage, (45%). In comparison, “Monetary Bonus” is the most acceptable factor to motivate workers towards efficiency, (79%),

followed by “Target Job” (75%). However, to validate and establish the rationales behind these motivates and modalities of providing significant incentives to the site operatives, further investigations were conducted on these deductions through exploration of interview research survey.

Summary of the Quantitative Survey Research Study

This research study evaluated the scenarios of resources wastefulness that perpetuate resources inefficiencies during construction production process. The study critically investigates the perspective of the construction participants' KAP based on the beliefs, attitudes, and the behavior of the construction workers towards construction resources utilization and wastes.

This study assessed the factors, grouped under five categories. These groups are materials, manpower, machinery, production information, design team, and site management. Several significant facts emerged which are presented in tables, figures and interactive charts that made possible the establishment of the "beliefs of site participants on construction resources"; "the attitudes of the site workers towards resource wastage"; and, "the behavior of the construction operatives towards resource waste". Among the facts deduced are: the site operatives believe that the construction resources wastage is normal and wastes have to be budgeted for during production information preparation. Thus, these facts influence the workers in showing a carefree attitude towards resources utilization.

Further findings confirmed that the majority of these wastes stem from the design team, and could be avoided by the provisions of adequate and explicit production information for construction works. Also the provisions of adequate motivators and incentives will enhance the reduction of waste resources. Several probable motivators and incentives that will be effective towards minimization of waste resources include: bonus for waste reduction, and wastes target achievement; and appraisal for a job well done. These factors will not only significantly enhance efficient resources utilization, but also reduce wastage during production process.

The data and results validity and reliability were confirmed with tests' statistics. In addition, further investigations were carried out through an interview research study, to establish the modalities of the avoidance or reduction of waste resources, before or during construction works.

DEMOGRAPHY OF THE INTERVIEW SURVEY PARTICIPANTS

From the questionnaires survey result obtained, fifteen (15) respondents indicated interest in participating in this research further investigation, (Figure 7). Every respondent had an equal opportunity of being interviewed, and unbiased interviews were conducted with eight construction site personnel, (Table 7). Also, the status and years of experience of the respondents are presented in Table 7. The rationales of selecting these participants is that, the respondents are significantly experienced and rationally have wide knowledge in the construction industry. The additional reasons are:

1. All the respondents are practicing professionals, directly involved in management of construction resources on construction sites.
2. The result of questionnaires survey demography indicates that none the personnel had less than ten years of experience as managers with requisite responsibilities on resources utilization in different multinational construction organizations.

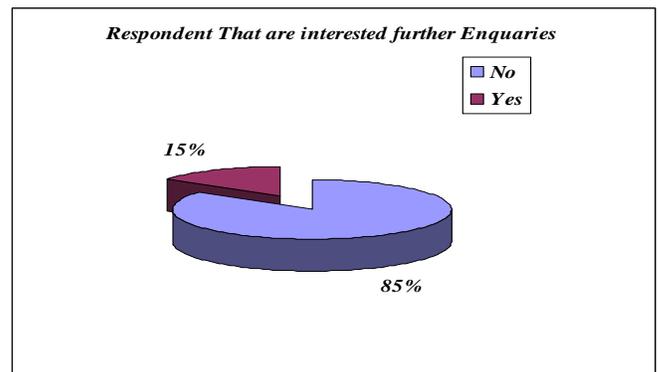


Figure 7: Respondents that Showed Interest in being Contacted for further Enquiries.

Table 10: Demography of Personnel that Indicated Interest to be Interviewed and those Interviewed.

Respondents. (Name Withheld)	Status	Years of Experience	Comments
1)	Contract Manager	Above 15	Interviewed
2)	Senior Bldg Manager	Above 15	Interviewed
3)	Project. Quantity Surveyor	Above 15	Interviewed
4)	Site manager	Between 11 -15	Interviewed
5)	Planning Manager	Above 15	Interviewed
6)	Project. Manager	Above 15	Interviewed
7)	Senior Project. Manager	Above 15	Interviewed
8)	Senior Contract Manager	Above 15	Interviewed
9)	Project. Manager	Above 15	Not interviewed
10)	Project. Manager	Between 11 - 15	Not interviewed
11)	Quantity Surveyor	Between 6 - 10	Not interviewed
12)	Project. Manager	Between 6 -10	Not interviewed
13)	Planning Manager	Above 15	Not interviewed
14)	Site Manager	Above 15	Not interviewed
15)	Project Manager	Above 15	Not interviewed

INTERVIEW RESEARCH SURVEY STUDY REPORT

Among the issues evaluated in this study are the scenarios of the construction resources utilizations and wastefulness based on the construction participants' KAP. Also in this research study, types and the significance of several motivators and incentives that will enhance the construction resources utilization were verified. The questions that were asked that generates this theme are:

- a) What are the probable beliefs of site participants on resource waste in the industry?
- b) How can the participants' beliefs, attitudes and perception towards waste be minimized?

Based on the interview conducted, in summarily, the rationales that make the site participants to perceive that the resource waste are inevitable are:

- a) The construction environment and due to environmental factors which cannot be predicted precisely.
- b) Waste occurrence due to unavoidable human errors.
- c) Most project sites are in congested or remote areas.

- d) Due to insufficient time to plan adequately at project inception, also, the urgency of the need of the project, and delivery time constraints.

- e) Lack of adequate experienced and skilled labor in the construction industry.

The factors that will significantly reduce construction participants' beliefs that resources' wastes are normal and unavoidable are:

- a) Motivation and Incentives towards waste reduction: The beliefs of site participants on construction resource waste cannot be easily changed and an incentive in the form of a financial bonus to construction participants could significantly enhance efficiencies, thus reducing the beliefs on resources wastefulness. The workers need to be aware that, there are rewards for saving construction resources wastefulness; this will significantly enable them to be careful in resources utilization.

- b) Setting and striving to achieve waste reduction targets: There is a need for organizations to set waste targets. A resource waste reduction target needs to be set and participants need to strive to achieve it. The construction participants should be aware that there are tolerable wastes; this will considerably enable the

workers to be more careful in resources utilization.

- c) Reliable record and information on similar previous project executed: There is need for adequate information retrieval database on construction projects; where reference can be made, checked, and related to current project; efficiency, mistakes, correction and measure is practically applicable to avoid problems or obstacles during the construction process. Construction participants being aware that there is such a reference document, their beliefs about waste(s) will be challenged and they will become mindful of resources utilization.
- d) Training towards executing project efficiently and be resourceful: Construction participants need to be trained towards how to execute project tasks confidently and resourcefully.

Awareness of resource waste implication and wastes reduction benefits: Participants need to know the implications of efficient and inefficient resources utilization. All construction participants need to be implicitly inducted towards wastes awareness, avoidance, and minimization. In addition, workers need to know the cost implication of resources wastefulness; the effect, and the benefits of waste reduction.

The obtained facts from interviewees towards minimization and/or avoidance of waste are:

- a) Adequate time for production information preparation: There is a need for adequate time to prepare production information. When a project commences based on an interim estimate and specifications, consciously wastes are been allowed for and these many times causes resources misuses. To avert these, apart from adequate production information, valuing engineering technique will significantly reduce unnecessary resources and can equally be employed to identify the best construction procurement system that could reduce alteration and modification during the construction phase.
- b) To value resources wasted: To make available the value of resources wasted during project construction. That is, to value wasted resources during production

process and enables the design team and client to know the value of the wastes.

- c) Adequate planning before and during the project execution: BWS can be minimized through effective management and adequate planning, re-planning and understanding the materials and other resources to be used for the project before commencement.
- d) Site manager(s) advice at the design stage: An option to reduce BWS is the involvement of site managers to criticize the design before they are finally presented for construction. Competent builders should vet and point out flaws in specifications, and advise on alternative methods that could save resources wastages to the client and/or the client's consultants. Acceptance of redesigning when drawings are criticized will facilitate reduction in resources wastefulness in the construction industry. More so, the involvement of a project manager or site manager who will execute the project during design stage will significantly enhance efficient control, monitoring and supervision of the resources during the project's execution
- e) Integration of design dimensions with manufacturers' standards: DT specifications to be in compliance to manufacturers' standards will significantly lead to minimization of resources wastefulness.
- f) Availability of complete production information at project inception: Adequate production information before construction production process commences will reduce WS.
- g) Availability of skilled and experienced workers: Engaging construction participants who are experienced or skilled in the project to be executed. That is, involving contractors who have pre-knowledge of the work or who have capability and adequate work force to execute or manage the project will significantly reduce WS, since fewer resources will likely be wasted during the construction process.

Ready availability of construction resources when needed: Readily available resources will make it unnecessary to order for excess that could lead to left-over. Thus, the design team needs to be cognizant of resources that can be:

- a) readily available in production information specifications, as far as possible.
- b) Self-confidence on efficient Operation: To provide specific quantity required for a task/job and build in confidence to the users that the resources given will be enough for the work or task without quality being jeopardized. That is, to vet the quantity specified and issued out the vetted quantity and to make clear that any additional request will need explanation.
- c) Adopting of an enhanced partnering and supply chain system: Engaging partnering and supply chain contractors for project executions where all partners will know their stake in the project, and be aware that profit achieved will be of benefit to all participants, the issue of BWS will be minimized, and this relatively will enhance the efficiencies of all stakeholders.
- d) Standing order and query on obvious resources wastefulness: Site managers should be made to utilize resources by budgeting for fewer or no excess. When excess occurs, the site manager needs to be questioned. In consequence of this, they will be more conscious not to over-order.
- e) Efficiency of the sub-contractors minimizes BWS.
- f) Adequate waste reduction training and awareness.
- g) Encouragement of prototype projects and uniqueness of resources.
- h) Reliable record and information on similar previous project executed: There is a need for adequate information retrieval database on construction projects, where reference can be made, checked, and related to current projects efficiencies, mistakes, correction and to be measured practically, (as applicable), to avoid

problems or obstacles during the construction process.

SUMMARY OF THE RESEARCH STUDY AND NEED FOR CULTURAL CHANGE

While the occurrence and extent of waste is acknowledged during construction processes, there is need for cultural change on waste syndromes in the construction industry. Egan (1998) reported that 40-60% of labor is effectively utilized, with not less than 10% of materials being wasted, and up to 30% of construction works being reworked or repeated during construction production process. Researches show that contractor profit in the industry is in geometric reduction yearly. The Egan (1998) proclaimed in the report titled 'Rethinking Construction' that there is a need for change in the way the industry deliver its product. Hitherto, dramatic competitive ordeals within the contractor are now extensive. Griffith and Watson (2004) emphasize that the principal contracting organization will only remain a profitable business if it maintains a sustainable competitive advantage over other contractors in undertaking its projects.

Thus, there are clear indications that only the companies that survive are those with good waste minimization strategy, either with technological or managerial advantage. Effective and efficient utilization of construction resources and reduction of either conscious or unconscious resources wastefulness scenario should be of major concern to the construction sector. Noteworthy, these resources are increasing in cost daily and also, becoming relatively scarce (Howell, (1999); EC-Harris Plc, 2003 - 2005).

Wastes are budgeted for in construction industry either for uncertainty or certainty rationale which could be avoided as assumed to be unavoidable. Also, some of this wastefulness occurred consciously while some unconsciously (Fapohunda, 2009).

There is clear indication that for construction industry to live up to expectation, as been concerned by Egan (1998) report. Thus, there is necessity for the industry to look into the following areas, grouped into management issues and workers issues towards: delivering better value of products for client (EC-Harris Plc, 2003 - 2005); an enhanced satisfaction, Constructing Excellence, (2006), and the

reduction of resources wastefulness, lean thinking, Howell (1999).

Management Issues:

- Management attitude and behavior to the work force
- Creation of motivation means and incentive scheme
- Recruitment of right personnel for the specific job
- Waste reduction benefit scheme
- Appraisal for fulfillment logistics
- Good line of communication and feedback
- Goal setting for efficient utilization of resources

Workers Issues:

- Training of workforce and reimbursement of workforce for self- finance training
- Compensation of worker for implementing resources mindfulness techniques.
- Workers self esteem and belongingness
- Treatment and appreciation of workers
- Knowledge Sharing and Transfers
- Team Working

CONCLUSION AND RECOMMENDATION

The research was carried out using triangulated method, incorporating both structured oral interviews and a structured questionnaire. The authors identified that there should be combination of different incentives to motivate the operatives, also wastefulness in the use of manpower leads to many inefficient use or application of other resources. This paper identified the behavioral features of site participants in resources wastefulness and provided an incentive framework for achieving efficient utilization of construction resources, which includes self-fulfillment, belongingness and appraisal for fulfillment among others.

The implementation of established facts presented in this study will significantly enhance the reduction of waste allowance and budgeting for waste syndromes in construction industry. In addition, the research findings will aid lean thinking, lean construction and construction sustainability.

REFERENCES

1. Accel-Team. 2005. *Employee Motivation, Motivation in the Work Place - Theory and Practice*. Accel-Team: London, UK. <http://www.accel-team.com/motivation/index.html>
2. Blair, G.M. 1993. *Basic Management Skill: The Human Factor*. *IEE Engineering Management Journal, Bimonthly*. Oct. 1991 to Apr. 1993. UK. <http://www.see.ed.ac.uk/~gerard/Management/art6.html>
3. Bryman, A. and Cramer, D. 2005. *Quantitative Analysis with SPSS 12 and 13: A Guide for Social Scientists*. Routledge: London, UK.
4. Constructing Excellence. 2006. "Lean Construction: Constructing Excellence in the Built Environment". (Online). Constructing Excellence: London, UK. <http://www.Constructingexcellence.Org.Uk/Resources/Az/View.Jsp?Id=412>. (Accessed 01 Sept, 2006)
5. Creswell, J.W. 2008. *Qualitative, Quantitative and Mixed Methods Approaches*. Sage Publishers: London, UK.
6. EC-Harris Plc. 2003 – 2005. "Delivering Better Value for Client, Economy Survey Research Report". London, UK. <http://www.echarris.com/research>.
7. Egan, J. 1998. "Rethinking Construction News Release". Department of Environment, Transport and Regions. London, UK. <http://www.dti.gov.uk/construction/rethink/report/>
8. Fapohunda, J., Stephenson, P., Griffith, A. and Chileshe, N. 2006b. "Budgeting for Waste Syndrome (BWS) within the Construction Industry" In: Baldwin, A., Hui, E., and Wong, F. (eds.) CD-ROM. *Conference Proceedings of the CIB W89-International Conference on Building Education and Research BEAR 2006*. Construction Sustainability and Innovation Conference.10-13 April 2006, Kowloon, Shangri-la, Hong Kong. 114 – 121.
9. Fapohunda J.A. 2009. "Operational Framework for Optimal Utilization of Construction Resources during the Production Process". Ph.D. Thesis Submitted to Sheffield Hallam University, UK.
10. Field, A. 2005. *Discovery Statistics using SPSS for Window*. Sage Publication: London, UK.
11. Griffith, A. and Watson, P. 2004. *Construction Management: Principles and Practice*. Palgrave Macmillan: Basingstoke, UK.
12. Howell G.A. 1999. "What is Lean Construction". *International Group for Lean Construction, 7th Annual Conference Proceedings*. California. USA

13. Silverman, D. 2005. *Doing Qualitative Research: A Practical Handbook*. 2nd ed. Sage Publications: London, UK.
14. Swinton, L. 2008. "Management Gurus - The Quick and Easy Guide. (Online).
<http://www.mftrou.com/management-gurus.html>. (Accessed 02 June 2008).
15. Trochim, W.M. 2006. *The Research Methods Knowledge Base*. 2nd ed. (e-book).
<http://www.socialresearchmethods.net/kb/contents.php>
(accessed May 2007).

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