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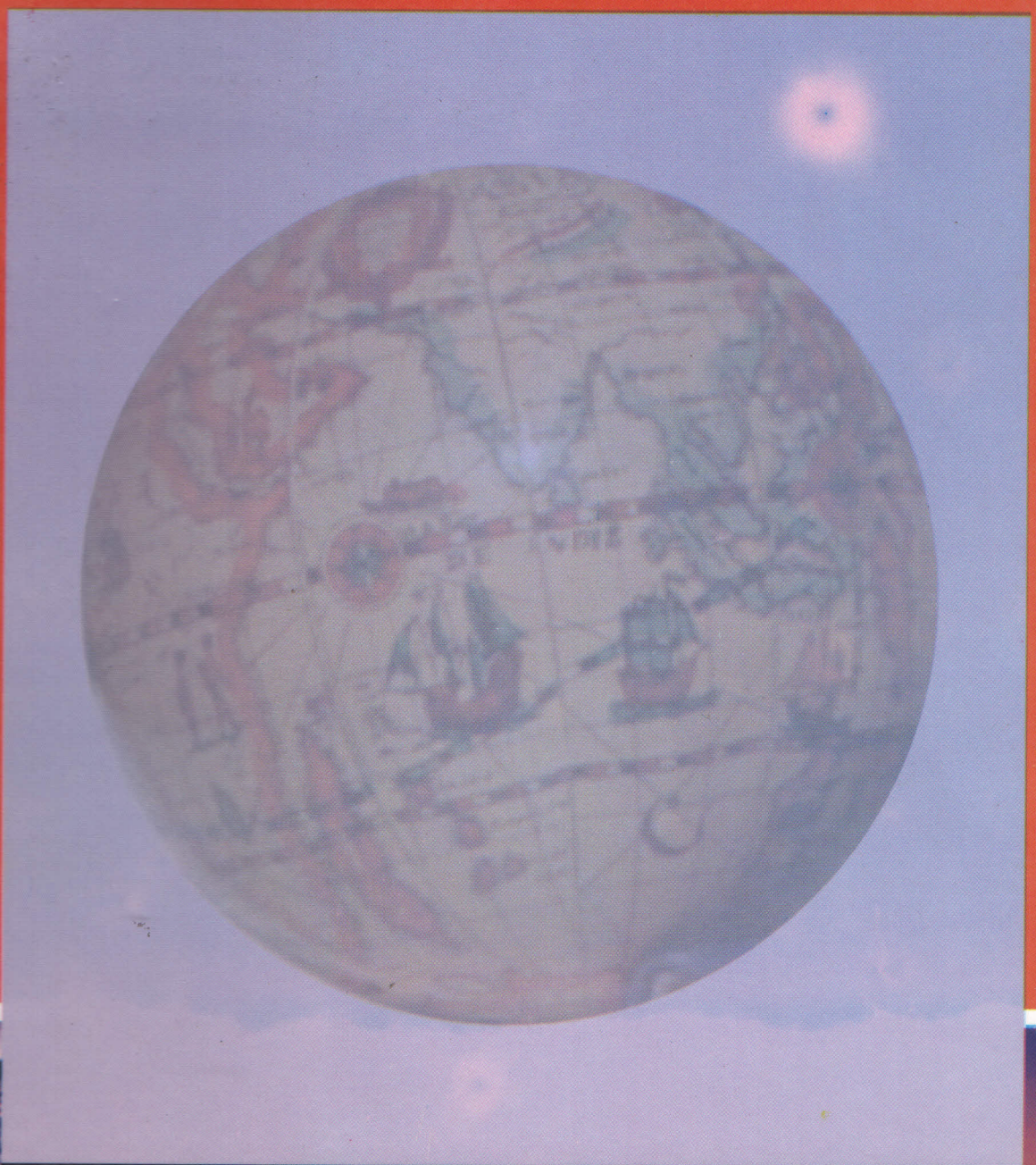

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EDITORIAL COMMENT

Welcome to the 2010 edition of JOES!

This is one edition that is well loaded with quality papers covering diverse environment related research themes too numerous to summarise here. It contains two issues (June and December) in one volume (2010). In our attempt to clear the backlog of accepted papers and those that were inadvertently omitted in previous editions, Volume 14 would go down in history as being the biggest so far with up to 30 papers. We appreciate our numerous contributors who shared with us the anxiety, pains and losses associated with the "Jos Crises" and assure you of our unflinching effort to stabilize the publication

As a result of the need to secure articles submitted to JOES and to substantially reduce time delays, all articles for publication would henceforth be electronically sent to: **joesunijos@yahoo.com** and entitled "**Submission of Paper for Assessment**" in the first instance and "**Final Submission**" for papers that have been accepted following necessary compliance with editorial requirements. Evidence of the payment of publication levies should accompany the final submission as per details in our "Notes for Contributors".

The Journal Management seizes this opportunity to congratulate Prof. Hayward Mafuyai for emerging as the new Vice Chancellor, University of Jos after a very keen selection process. Our congratulation also goes to Prof. A.C. Eziashi, a one-time editorial secretary of the Journal, who was recently unanimously elected as Dean of Environmental Science, University of Jos. We wish officers, God's grace and guidance in their new portfolios.

Dr. Y.D. Izam
Editorial Secretary

JOURNAL OF ENVIRONMENTAL SCIENCES (JOES)
NOTES FOR CONTRIBUTORS
JOES is Published twice a Year.

AIM AND SCOPE

The Journal of Environment Sciences (JOES) is devoted to the publication of papers, which advance knowledge on theoretical and practical aspects of the natural and built environment. The aims of the journal are to provide an avenue for the dissemination of academic research findings dealing with environmental problems, planning, and development, opportunity for increasing and making available relevant data and information on environmental conditions/problems and advancing effective management solutions to them with special reference to Nigeria; and to provide a forum for meaningful discussions and debates between academics and field practitioners of the natural and built environments.

The Journal will therefore accept for publication results of original research in all aspects of both the natural and built environment. It will also accept for publication book reviews, comment and letters, well-written research and practice notes, and short communications on any aspect of the environment.

REFEREEING:
All papers submitted for publication will be refereed by two or more specialists selected, as appropriate to the subject matter of the paper, from the journal's list of referees.

MANUSCRIPTS
Manuscripts should be written in clear and concise English within the range of 12 pages typed in double-line spacing, on one side only of A4 paper with wide margins. The manuscript for consideration is to be sent electronically to joesunijos@yahoo.com with a covering note entitled *Submission of Article for Assessment.*

Arrangement of papers
Paper should be arranged as follows:

1. Title, author(s), affiliation(s) and full address (es), including e-mail
2. 200-word abstract outlining the purpose, scope and conclusions of the paper. The abstract should also explain why the paper is important, particularly to those who may not necessarily be in that field.
3. The text, suitably divided into appropriate sections/headings
4. Acknowledgements (If any)
5. References
6. Tables and illustrations (each on a separate sheet containing no text)

Units, Symbols & Abbreviations
Only the SI units as defined by the ISO Standard will be accepted. If use is made of any symbol or unit that may not be generally recognized, an explanatory note is required in the margin the first time it is used. Abbreviations should be written in full at first mention.

Tables:
Tables should be numbered consecutively throughout the paper (with Arabic numerals) referring to them in the text as Table 1, Table 2, etc., with a caption at the top of each table. Tables should not duplicate results presented in graphs.

Illustrations:
Illustrations in the form of maps, diagrams and graphs/charts should be drawn on transparent sheets not larger than A4-size sheets with margins as for the text. They should also be sequentially numbered and given brief titles which should be written below the illustration.

References:
References should be made at the end of the paper and should adopt the following format:

Authors(s), year of publication, title paper, journal or book, volume and number or edition, town of publication, publisher, and page reference.

FINAL SUBMISSION:
Contributors will receive copies of their referred manuscripts for amendments (if any) as recommended by the assessors. Final submissions are to be returned to the Editorial Board via our electronic mail address: joesunijos@yaho.com. Only paper that fully comply with editorial requirements as per our letter of "information on reviewed manuscript" will be published.

Each author will receive a copy of the journal for each published paper, subject to the payment of N3000.00 handling fee and N8000.00 publication levy. All payments should be made either in cash or by bank draft payable to "Journal of Environmental Sciences". As an alternative, contributors can pay directly into the journals account which number will be included in our "Information on reviewed manuscript". Evidence of such payment should be included in the "Final Submission" to be sent to joesunijos@yahoo.com. Papers attract the payment of N500.00 for each page in excess of the 12 stipulated for the manuscript. All fees are subject to review.

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AN APPRAISAL OF WORKMEN COMPENSATION ACT (WCA) ON NIGERIAN CONSTRUCTION SITES

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Abstract *The paper seeks to promote safety standard and consciousness among workers on construction sites, by examining the implementation of Workmen Compensation Act, the relationship between the number of accidents, the amount spent on accident victims including compensations and the amount spent on preventive measures.The study revealed that the Act is not strictly applied in most construction sites and there is very strong relationship between the amount spent on accident victims and the amount spent on preventive measures. The correlation analysis between the total number of accidents and the amount spent on accident victims using Neyman Pearson Product Moment Method (PPMM) shows a very strong relationship r =0.93). Considering the contribution of the construction industry to the National Economy, the paper recommended that legislation in respect of Workman's Compensation be put in place and adequately obeyed in construction Industry. More money should also be spent on accident preventive measures.*

Keywords: Workmen, Construction site, Compensation, Legislation.

PREAMBLE

The Common Law Liabilities in Industrial Accidents

An Employee who is injured at work may recover damages as compensation in the ordinary court (under common law), if he can prove that is injury is as a result of a breach by his employer (or someone for whom the employer is responsible) of the common law duty of care. This duty of care under the common law is implied in all contract of employment. It is not an absolute duty that compensation must be paid in any event. However compensation is paid where the employer is in breach of the Common Law Duty of Reasonable Care, that is the employer will be liable, where he fails to take reasonable care for the safety of his workers.

This duty is different from the statutory duties imposed under Workmen Compensation Decree (W.C.D.) of 1987 (CAP 470 L.F.N. 1990). Under the WCA; an Employer may also incur penalties under the Criminal Law where he fails to discharge the statutory safety duty, imposed by WCA; and in addition may be liable to pay compensation, if some one is hurt in the course of his employment.

The following are the three general principles of the Common Law Duty of Reasonable Care:-

1) To provide safe premises.

This principle states that the employer is not expected to provide a perfect premises (i.e premises that are in fact safe); but only that the premises are as safe as reasonable care can make them. See the case of **Watt, V. Hertfordshire county council (1954)1** W.L.R.835 P.218; where Lord Denning, Lord Justice as then was; said,

"It is well settled that in measuring due care, you must balance the risk against the measure necessary to eliminate the risk. To that proposition there ought to be added this: you must balance
the risk against the end to be achieved"

Similar incident that took place in the case of Latimer. V. AEC Ltd.(1953) A.C. 643 P.219. It is note worthy that

"whether the servant is working on the premises of the master or on those of a stranger, that duty is still the same; but the court had to decide the question of fact".

2) To provide safe tools and Equipment

In the case of Davie. V. New Merton Board Mills Ltd (1959) a.c.604 p.220 the court held that "where an employer supplied a tool to his employee, he fulfilled his common law safety duty by obtaining it from a reputable manufacturer or dealer" However, where the employer did not know and could not reasonably be expected to have discovered that the tools/ equipments was defective, he was not liable to any employee injured in consequence of using the tool/equipment. Where injury or death is traced to the defects in the tool/equipment, (that is manufacturer's negligent); it is deemed to be attributable also to negligence on the employer's part towards the employee (but it is a matter of fact); because there can be no contracting out of liability. However the employer can invoke the Employee's Contributory Negligence as a partial or complete defence (depending on the facts) and he can recover damages against the Manufacturers/Suppliers under the Sale of Goods Act. See also the case of Wright. V. Dunlop Rubber Co Ltd. (1972) 13k1r311 C.A.P.220

3) To provide a reasonably safe system of work.

This is the most important principle of Common Law Duty of Reasonable Care, because it has far-reaching safety obligations placed on an employer, they include the following among others:-

i)-The employer must under the Common Law provide reasonably safe fellow workers. The employer does not need to guarantee that his workers he employed are safe; but if any of his staff may cause injuries to his colleagues, he is obliged to remove him. See Hudson. V. Ridge Manufacturing Co. Ltd. (1957)2QB348 P.221. *Where staff is negligent, he is liable for Contributory Negligence.*

ii) Where the works on which employees are employed is inherently dangerous, the employer must device a system which will reduce the danger to the absolute minimum. He must do this and not expect workmen to take care of themselves. See General Cleaning Contractors Ltd. V. Christmas (1953) A.C.180 P.221. The employer need not instruct a skilled man in the technique of his craft. See the case of Bux. V. Slough Metals Ltd (1973)1 W.L.R. 1858 P.222.

iii) A safe system of work also includes the making of arrangements so that employees choose the correct equipment for the particular task on which they are engaged. See Lovell. V. Blundells.

iv) The general condition in which the work is done must be suitable. See Bradford. V. Robinson Rentals Ltd. (1967)1WLR337 P.222.

v) Where the safety of employee depends on the effective co-ordination of the work of a number of departments, the employer must ensure that such coordination exists. See English. V. Wilson and Clydecolliery Company Ltd (1938) A.C.57 P223.

CONSTRUCTION SITE ACCIDENTS AND LEGISTLA TION

Accident is inherent on construction site. Its effect and impact on worker's physique and productivity especially the fatal ones have grave consequences on construction practice, increase the construction cost and project duration. Workmen's Compensation Act is the legislation that addresses the welfare and pecuniary interest of all employees by providing monetary compensation to injured person or the next of kin in case of death, partial or permanent disability. Construction industry is said to be the largest employer of labour in the private sector. Studies shows that approximately 95%of the companies that make up the industry are small and medium contractors (Mackenzie *et, al,* 2000). Also, A 10 years study of the construction industries revealed that over 1,880 people were killed and about 35 thousand sustained injuries enough to keep them away from work for 3 or more days. The picture may not be different, in Nigeria though, there is no record to buttress the point (Jibrin, 2008).

As the awareness of workers to claim increases so the trade unions in building are mounting pressure for statutory control, the employers on the other hand are jittery because they prefer to deal with the situation without external pressure. Deborah and Ofori, 2008 cited in (Jibrin, 2008).

WHO IS A WORKMAN?

Ordinarily, a workman is a man who is employed to do physical or manual work (Hornby; 1995). Save those categories of people that were clearly excluded as workmen under Section 2(I) of the Workman's Compensation Act (WCA), a Workman according to Martins (2003) includes practically every employee from the cleaner to the Chief Executive or the Director General in the civil service.

Specifically, going by the provision in Section 1(1) of the Workman's Compensation Act (WCA), a person:

Shall be deemed to be a workman if either before or after the commencement of this Act, he has entered
into or is working under a contract of service or apprenticeship with an employer by way of manual
labour or other wise and whether the contract is expressed or implied, oral or writing.

The categories of people that were excluded from being workmen includes:

a. a person employed under a contract of service or collective agreement approved for exemption by the Minister charged with responsibility for matters relating to labour; or

b. a person who is employed, otherwise than, for the purpose of his employer's trade business, not being a person employed for the purpose of any game or recreation and engaged or paid through a club; or

c. an outdoor worker; or

d. a member of the employer's family dwelling in his house, or

e. a person employed in agricultural or handicraft work by an employer

f. any class of person whom the Minister may publish in the Federal Gazettee, to declare not to be workmen for the purpose of this Act.

Apart from the above listed categories of workers, the public servant and the police were also listed as Workmen under the Act

Not only that, in the context of construction industry. A workman will have such a wide definition as to include all the employees of: The contractor, Sub – contractors,

the manufacturers and suppliers of construction materials and components, the Consultants, Architects, Engineers, Quantity Surveyors and Project Managers etc.

WHAT IS COMPENSATION?

A Pecuniary (Monetary) Payment made to an injured workman, due to the injury he has sustained in the course of his service while in employment of another, is a compensation. Invariably therefore, a compensation is a rightful reward due to an employee who in the course of employment sustained injury from an employer. Such compensation may be approved by the court or within the provision of the law (status and common law). A compensation is an amount of money given to compensate for injury (Hornby: 1995).

QUALIFICATION FOR COMPENSATION UNDER THE ACT

The Workman's Compensation Act which provides for the payment of compensation to workmen for injuries sustained in the course of their employment came into operation on 1st April, 1962. In Section 3(2) of the Workmen's Compensation Act, an employer is liable for compensation only if the injury incapacitated an employee for up to at least three consecutive days from earning full wages. The Act further provides:

"Not withstanding subsection (I) of this section-

a. an employer shall not be liable to pay compensation under this Act in respect of any injury which does not incapacitate the workman for a period of at least three consecutive days from earning full wages at the work at which he was employed;

b. if it is proved that the injury to a workman is attributable to a serious and willful misconduct of that workman, any compensation claimed in respect of that injury shall be disallowed".

However, in order to give room for the principle of equity which is a mitigating principle against the harshness of common law principle, the Act further on (b) above said

But where the injury results in death or serious and permanent incapacity, the Court on a consideration of all the circumstances may award the compensation provided by this Act or such part thereof as it shall think fit.

EFFECTIVENESS OF THE WORKMEN'S COMPENSATION ACT

Investigation revealed that most companies especially the small and medium sizes in Nigeria, do exploit the ignorance and low level of economy among the workers, and pay the affected workman the amount companies can afford; without necessarily paying the actual amount they suppose to pay the workers as compensation. Though it may be difficult to quantify the human suffering and sorrow in monetary terms when accident occurred, none the less the Workman Compensation Act seek to pay compensation to workers, where it is clearly established that the accident is not as a result of his own negligence.

METHODOLOGY

The perception of the construction industries to application of women's compensation Act is investigated through the questionnaires which were posted to 200 construction organizations in and around Abuja in 2007. These include small, medium and large scale organizations in categories A, B, C, D, of Federal Government Registration Board. Questions were asked on number of fatal and non-fatal accidents recorded within 2002 – 2007, level of enforcement of workmen compensation Act, the amount spent on accident victims including compensation paid to injured workers and the amount spent on preventive measures.

Sixty-Eight questionnaires out of the 200 administered representing 34% were fully filled and retuned. The response rate was considered high, compared with the norm of 20 – 30% for most postal questionnaire surveys of the construction industry (Akintoye and Fitserald, 2000). For homogeneity in the analysis, only 10 out of the 68 returned questionnaires with some similarities and all in category D, (Federal Government Contract Registration) were use in the analysis.

Method of analysis

The study used regression, correlation and descriptive methods.

Simple Linear Regression analysis

Regression analysis is a statistical method that is used to establish the existence of linear relationship between the dependent and independent variables. This method of analysis requires developing a mathematical equation known as model. This is used to describe the relationship between one variable and the other variable. A suitable form of the model, which includes the random component, is given below.

$$y_{ij} = \beta_0 + \beta_1 X_1 + e_{ij}$$

where: y_{ij} is the response, yield or dependent variable

X_1 is the repressor, independent variable

β_0 is the intercept on the y-axis

β_1 Is the coefficient of regression

e_{ij} is the random or residual error

The β_0 and β_1 are the unknown parameters of the population which can be estimated using the least square method. The estimates of these coefficients are unbiased.

Correlation Analysis is another statistical technique that is used to measure the strength of the relationship between two variables. It lies between 0 and ±1. It is zero if there exists no relationship and maximum at ±1 when there is a perfect relationship between two variables.

$$r = \frac{Cov(X, y)}{\delta_X . \delta_Y}, \qquad -1 \leq r \leq 1$$

r is the coefficient of correlation, whilst R^2 is defined as the proportion of explained variation.

The regression analyses were run on the *Statistical Packages for Social Sciences (SPSS) v13*, with the number of total accidents as the dependent variable. The outcome of the analyses was reported in Tables 1 and 2.

The results in Table 1 revealed that almost 90% of the variations in amount spent on accident victims were explained by the number of total accidents. This is indicative of a strong correlation between the variables.

For every 100 accidents the amount spent on the victims would be (777,645 – 418,441) which equals 359,204. This meant only N3,592.04 was spent per accident victim. The relationship was however positive, implying the amount spent on accident victims increased as the number of accidents increased.

The results in Table 2 revealed that about 60% of the variations in amount spent on accident prevention measures were explained by the number of total accidents. This is indicative of a fairly strong correlation between the variables.

For every 100 accidents the amount spent on the victims would be (848,258 – 511,749) which equals 336,509. This meant only N3,365.09 was spent on accident prevention per accident victim. The relationship was however positive, implying the amount spent on accident victims increased as the number of accidents increased.

Multiple Regression analysis

When two or more independents variable are involved, a multiple regression analysis should be used under the same assumptions as stated above. The least square methods can be used to determine the unknown population parameters. The model for a multiple regression is as follows:

$$y_{ij} = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \ldots\ldots\ldots + \beta_p X_{ip} + e_{ij} \rightarrow$$

Table 1: Result for regression of Number Of Total Accidents on Amount Spent On Accident Victim

Y	X1	Regression Equation	R^2	Sig	Remarks
Amount spent on accident victim	number of total accidents	Y = -418,441 + 7,776.45X1	89.9%	0.000	Strong positive and significant relationship

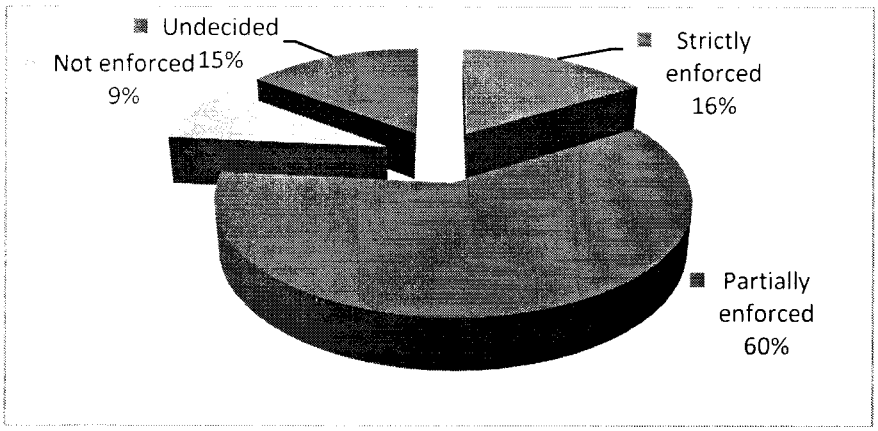
Table 2: Result for regression of Number Of Total Accidents on Amount Spent On Accident Prevention Measures

Y	X2	Regression Equation	R^2	Sig	Remarks
Amount spent on accident prevention measures	number of total accidents	Y = -511,749 + 8,482.58X2	60.5%	0.008	Fairly strong positive and significant relationship

Table 3: Result for regression of Number Of Total Accidents on Amount Spent On Accident Victim and Amount Spent On Accident Prevention Measures

Y	X1	X2	Regression Equation	R^2	Sig	Remarks
number of total accidents	Amount spent on accident victim	Amount spent on accident prevention measures	$Y = 57.635 + 0.000X1 - 1.1X10^{5}X2$	90.2%	0.000	Strong and significant relationship

Fig. 1 level of enforcement of Workman Compensation Act on construction sit



From Table 3 above the coefficients of determination R^2 is 0.902. This implies that about 90% of the variation is explained by the regression while the remaining 10% is unexplained. The Significance value of the regression also proved that the model fits the data well; it will be observed that the Significance value of 0.00 is greatly less than the level of significance, which is 0.05. The model equation can be used to forecast the total number of accidents that will occur knowing the amount to be spent on the accident victims and preventive measures.

Descriptive method of analysis

The response of the contractors on level of enforcement of workman compensation Act on their sites is shown in (Fig.1). Sixteen percent of the contractors claimed to enforced the Act strictly, 60% claimed enforcement partially, 9% claimed not enforced, while the remaining 12 contractors were undecided (table 6)

CONCLUSION

From the analysis above, it was observed that the amount spent on accident victims is grossly inadequate. This was because for every [illegible] spent on accident victim regardless of the fatalities. Similarly, it was also observed that the amount spent on accident preventive measures was only about ₦3,365.09.

Correlation analysis between the total number of accidents and the amount spent on accident victims revealed that there is a strong relationship between them (R^2 = 89.9%). As the number of accidents increase, so also is the amount spent on the accident victims or vice versa. Similarly there was a fairly strong relationship between the number of accidents and the amount spend on the preventive measures (R^2 = 60.5%). A strong relationship also existed between the amounts spent on accident victims and preventive measures (R^2 = 72.9%).

The study also revealed that about 78% of the contractors surveyed claimed that the Workman Compensation Act is applied on their construction sites.

RECOMMENDATION

1. For the security of workers contractors should endeavour to invest more money in accident prevention measures so as to reduce the occurrence of accidents to the barest minimum. Contractors should also

cater adequately for the welfare of the accidents victims so that other workers would be more committed to their jobs.

2. There is a need for enlightenment on the application of subsisting legislation on Workman's Compensation for the building industry. The promulgation of legislation that will deter employers from underpaying workers' compensation is also required.

Table 1: data on construction site accidents in selected construction organization in Abuja

Constr. Org.	No of fatal acc.	No non-fatal acc.	No of total accidents **Y**	Total contract sum	Amt spt on acc. Vic. X_1	Amt spt on prv, maes X_2	Tot. cost inc. on accidents
A	28	96	124	9,080,000,000.00	624,000.00	869,000.00	1,493,000.00
B	37	96	133	7,340,000,000.00	637,000.00	485,650.00	1,122,650.00
C	31	84	115	5,600,000,000.00	426,200.00	342,600.00	765,800.00
D	23	80	103	4,320,000,000.00	322,000,00	293,400.00	615,700.00
E	26	63	99	3,780,000,000.00	302,000.00	337,000.00	639,000.00
F	20	68	88	3,400,000,000.00	260,800.00	211,600.00	472,400.00
G	22	70	92	2,980,000,000.00	306,250.00	260,000.00	566,950.00
H	18	67	85	2,670,000,000.00	190,000.00	158,100.00	348,100.00
I	12	58	70	2,600,000,000.00	169,000.00	205,400.00	374,700.00
J	20	62	82	2,410,000,000.00	284,800.00	126,000.00	410,800.00

Sources: Authors Field Work

Table 6: Level of enforcement of workman compensation Act

	No	%
Strictly enforced	11	18
Partially enforced	41	60
Not enforced	6	10
Undecided	10	12
Total	68	100

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