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RELATIONSHIP BETWEEN COST OF FIRE INCIDENCE AND CAPITAL EXPENDITURE IN KWARA STATE

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ABSTRACT

The incidence of fire outbreak has been identified as a threat to both citizens and the Government which makes it a threat to national development. This study addressed the problem of incidence of fire outbreak, resulting to losses amounting to a sizeable proportion of capital expenditure in Kwara State. To solve this problem, this study set out to determine the relationship between cost resulting from fire incidences and annual capital expenditure in Kwara State. The study's background revealed that the incidence of fire outbreak increases annually, resulting to loss of lives and property worth huge amount of money. Data were collected from secondary source, which is from records of Kwara State Fire Service and National Bureau of Statistics. Bar and line graph was employed to carry out trend comparison of the variables studied, while regression and correlation analyses were used to determine the relationship between the variables studied. Major findings from the study showed that fire occurs due to electrical faults than gas faults; the amount of financial loss (=N=6,533,988,401.50) was about 4% of the capital expenditure (=N=178,347,461.00); and number of fire cases recorded correlated significantly with the amount of capital expenditure. It was concluded that there is no improvement in the trend of fire incidents in Kwara State over the study period.

Keywords: *Capital Expenditure, Electrical/Gas fault, Financial Loss/Salvage, Fire, Public/ Residential building.*

1. INTRODUCTION

In Nigeria, there has been a serious disaster confronting the homes, lives and property of people. The most common ones are flood, building collapse and fire. A lot has been written on flood and building collapse, but the incidence of fire is still lax in literature. Fire is the result of flammable materials being combusted and the essential ingredient for the propagation of fire is air, which is sufficient to start ignition or means of ignition and oxidation (Oyeyode, 2003; University of Gulph, 2003).

For longer than recorded history, fire has been a source of comfort and catastrophe for the human race. Fire is rapid, self-sustaining oxidation process accompanied by the evolution of heat and light in varying intensities. Fire is believed to be based on three elements being present, fuel, heat and oxidizer. Fire disasters can occur above the ground (in tall buildings and on planes), on the ground, and below the ground (in mines). Sometimes they occur in circumstances that are unexpected or unpredictable. All fire incidents can be divided in many ways depending on the cause of fire outbreak, but broadly there are two types

of fires: one is natural and the other is man-made. Fires can be either due to natural or man-made reasons. All residential and non-residential structural fires are largely man-made. Similarly, all industrial and chemical fires are due to explosions or fires made by humans or due to machine failures.

Firestorms can also be natural or human generated. Fires which are considered as natural are basically earthquake, volcanic eruption and lightning - generated fires. Fire caused by human/machine errors are considered as man-made fires, e.g. industrial or chemical fire disasters, fires at social gatherings due to Electrical short circuit fires, incendiary bombing, accidental fire and kitchen-fires. Rural and urban residential and non-residential structural fires are also largely man-made fires.

The slightest contact of highly inflammable liquid contents, such as gasoline (petrol), paraffin (kerosene), or gas with fire brings explosive services of destruction, inferno and loss of lives and property (Adeleke, 1993). It was in these light that the Aqua group (1984) reported that there must be presence of three basic elements or



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ingredients of fire, which is referred to as fire's own eternal triangle before fire can break out (see Appendix 1). According to Oludare (2000), there has been emphasis on the provision of fire fighting equipment for the fire service offices in the country. Millions of Naira have been spent to train fire-men in fire-men combat, but little has been done to look at fire safety practices in the buildings where there is likely to be occurrence of fire. In most times, fire-fighters are been blamed for fire incidents in public building, and all their possible loopholes seriously explored. But little has been said or explored about the activity of the other stakeholders in the construction and uses of public buildings, which are mostly responsible for the causes of fire outbreak (Makanjuola et al, 2009).

Some instances of fire outbreak in Nigeria included the one that occurred where two students loss their lives in University of Ilorin, Kwara State in 2009 as a result of electrical fault. Another serious and memorable incidence of fire outbreak in Nigeria was the fire which struck the six - storey building of the Nigerian Port Authority (NPA) in Marina on Thursday the 19th day of June, 2008 (Oduemec and Ebumomi, 2008). The Nigerian Telecommunications Limited (NITEL) headquarters in the same Marina was gutted by mysterious fire in the early 80s during the Second Republic. Also not too long Ibadan branch of the Central Bank of Nigeria (CBN) was up in flame leading to loss of several vital documents. In the same vein, it was reported in www.leadership.ng (2011) that fire outbreaks in Nigeria records 1,000 deaths and 7,000 fire accidents annually. One of such cases is shown in the Appendix.

The findings by many researchers, among which are Mogbo (1998), Anyawata (2000), Shittu (2001), Shittu (2007), Shittu (2009) and Shittu et al (2013a & b), confirmed the fact that fire incidences affect buildings of individuals, corporate organizations, government and government parastatals. The major causes of fire outbreak are electrical and gas faults, resulting in to financial and



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non financial losses. The incidences of fire outbreak and losses resulting from them increase annually as reported by these authors. In view of this background, the incidence of fire outbreak in Nigeria has become a threat not only to the citizens but also to the Government and this makes it a threat to national development.

In the light of the above, Shittu (2001) studied the incidence of fire outbreak in residential and public building of Kwara State and discovered that the amount of financial loss due to fire on the average was about 4% of the capital expenditure (i.e. ₦14,548,694.00). In the same vein, Shittu et al (2013b) discovered that the incidence of fire outbreak increases annually and a greater frequency of fire incidents occur in domestic rather than public buildings and that fire outbreak occurs more as a result of electrical faults rather than other causes of fire. These studies however did not look at the effect of incidence of fire outbreak on the capital expenditure budget which is of a major concern to the construction sector as a whole.

It is a known fact that incidence of fire leads to damage to lives and property and eventually financial loss. In an attempt to offer assistance to victims, Government gives compensation to victims of domestic building fire incidences and carry out rehabilitation/reconstruction during public building fire incidences. The money used for these compensation and reconstruction comes directly or indirectly from the capital expenditure budget. In the light of this, capital expenditure depends on frequency of fire incidence. It is against this background that this study set out to study the relationship between cost resulting from the incidences of fire outbreak and the amount of capital expenditure in Kwara State in order to minimize or halt the trend and save the government cost that can be diverted to capital projects, to enhance growth and development in the construction sector. To achieve this aim, the study set out to:

- i) present a trend analysis of the amount of financial loss due to the incidence of fire outbreak in comparison



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with the amount of financial salvage from fire outbreak incidence; ii. compare trends of fire incidences between residential and public buildings/causes of fire; iii. establish the relationship between amount of financial loss and annual capital expenditure of Kwara State from 1990-2013

The result of this study will assist the Government to understand how consequential the increase in the number of fire incidence can be to the national economy aside its effects on lives and property. Individuals will also be awakened to the need for putting a proactive fire prevention/precaution in place to prevent or discover incidence of fire in good time.

This research covered the total number of recorded fire cases; fire outbreak due to electrical and gas faults; amount of financial loss/salvage due to fire incidence; and the annual capital expenditure in Kwara State from 1990-2013. The limitation of the study was that cost resulting from fire incidence (financial loss) in public buildings was not separated from the amount of financial loss and as a result the study could not relate capital expenditure to financial loss from public building fires but only to total amount of financial loss

2. METHODOLOGY

The data collected for the study was from the secondary source. Data on recorded fire cases and causes of fire were obtained from the archive of Kwara State Fire Service, while data on annual capital expenditure were gathered from the record of National Bureau of Statistics.

The use of tables and bar charts were employed to present the collected data to make data more comprehensive and useable. The use of bar and line graph was employed to carry out trend comparison of the variables of the study.

The study also employed the use of regression and correlation analyses, with the aid of SPSS 15.0 software, to determine the relationship between the amount of financial



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loss/salvage due to fire outbreak and the annual capital expenditure of Kwara State from 1990-2013. The use of regression analysis has also been adopted in the studies of Anyawata (2000), Shittu (2001); Shittu (2007), Shittu (2009) and Shittu et al (2013a & b). These studies used regression analysis to establish the relationship between frequency of fire incidence and financial and non – financial losses resulting from fire incidence. This study therefore adopts this technique in order to achieve the objectives stated in the introductory section of this paper. The Correlation and Regression analyses carried out for the study were based on the following decision rules:

I. Coefficient of Correlation (R)

If $R \geq 50\%$ (50-100%), there is strong correlation.

If $R < 50\%$, there is weak correlation.

II. Coefficient of Determination (R^2)

If R^2 is from 50-100%, there is strong relationship.

If R^2 is less than 50%, there is weak relationship.

III. Level of Significance

(a) Probability (P) Test of Significance:

If P value < 0.05 , relationship is significant.

If P value > 0.05 , relationship is not significant.

(b) F -Test of Significance:

If F calculated $> F$ tabulated; relationship is significant.

If F calculated $< F$ tabulated; relationship is not significant.

It is important to note that F calculated is the F value obtained from analysis while F tabulated is the F value obtained from statistics table by checking Degree of Freedom 1 under Degree of Freedom 2 (DF_1 and DF_2).

The regression analysis was carried out to test the following hypotheses.

- There is no significant relationship between the number of fire cases and the amount of financial loss/salvage.
- There is no significant relationship between the number of fire cases and the amount of capital expenditure of Kwara State.



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- iii. There is no significant relationship between the amount of financial loss and the amount of capital expenditure of Kwara State.

3. RESULTS AND DISCUSSIONS

3.1 Data Presentation

The data collected on the recorded cases of fire incidence, causes of fire, types of fire, the amount of financial loss/salvage due to incidence of fire outbreak and the capital expenditure of Kwara State from 1990 to 2013 are presented in Tables 1 and 2.

Table 1: Data on Recorded Fire Cases

Year	No. of fire incidence	Electrical Faults Fire	Gas Faults Fire	Residential Building Fire	Public Buildings Fire
1990	107	10	2	34	11
1991	142	43	4	53	7
1992	160	73	4	70	11
1993	128	24	1	38	1
1994	77	17	1	25	4
1995	45	8	1	9	1
1996	67	21	1	33	7
1997	84	21	3	32	5
1998	78	23	1	30	15
1999	73	26	1	44	8
2000	70	18	1	9	1
2001	71	14	3	12	8
2002	60	12	1	13	2
2003	67	15	3	10	1
2004	30	20	1	9	4
2005	54	10	1	15	3
2006	52	24	3	10	10
2007	53	21	1	9	1
2008	41	8	1	9	6
2009	32	11	1	11	4
2010	40	13	1	5	2
2011	29	8	2	7	3
2012	21	10	1	5	6
2013	27	12	2	6	4

Source: Kwara State Fire Service (2014)



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Table 2: Data on Losses, Salvages and Capital Expenditure

Year	Amount of Financial Loss (-N=million)	Amount of Financial Salvage (-N=million)	Capital Expenditures (-N=million)
1990	1,720,000.00	9,120,000.00	321,102,120.31
1991	2,830,000.00	8,760,000.00	432,108,231.22
1992	18,100,000.00	126,550,000.00	612,177,280.29
1993	6,070,000.00	108,070,000.00	523,278,291.29
1994	25,490,000.00	56,230,000.00	327,723,241.47
1995	9,600,000.00	10,790,000.00	223,418,210.23
1996	11,270,000.00	33,290,000.00	101,620,203.25
1997	14,240,000.00	770,030,000.00	963,339,308.36
1998	35,810,000.00	33,870,000.00	423,426,247.19
1999	5,990,000.00	4,440,000.00	2,038,288,368.20
2000	6,284,500.00	15,937,500.00	3,047,365,382.14
2001	8,478,540.00	64,763,540.00	4,021,403,369.14
2002	3,842,350.00	38,420,375.00	5,025,416,402.12
2003	68,808,700.00	612,632,989.00	6,022,424,405.32
2004	24,759,600.00	70,812,300.00	7,033,445,506.22
2005	78,450,145.00	240,353,876.00	8,044,356,607.11
2006	46,910,000.00	25,981,000.00	9,055,467,608.11
2007	4,260,000.00	18,605,000.00	12,799,736,679.72
2008	1,326,000.00	6,800,000.00	19,890,139,850.81
2009	600,000.00	900,000.00	29,597,761,556.54
2010	1,040,921,000.00	1,807,042,000.00	25,939,122,967.51
2011	241,115,747.50	4,490,786,960.00	21,158,136,926.51
2012	2,123,088,330.00	229,283,800.00	24,066,722,119.94
2013	2,754,113,489.00	245,117,885.00	20,746,608,697.94
TOTAL	6,513,988,401.50	9,028,587,425.00	178,347,867,461.00

Source: i Kwara State Fire Service (2014)
ii National Bureau of Statistics (2014)

3.2 Data Analysis and Discussion of Results

The subsections below give a detailed presentation and discussion of results of the analyses.

3.2.1 Discussion of Results of Descriptive Analysis of Data

The results of the bar and line graphs are presented and discussed in this section. Figure 1 shows the comparison of trend between the amount of financial



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loss and amount of financial salvage due to fire incidence in Kwara State from 1990 – 2013.

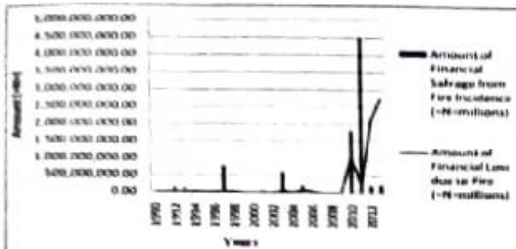


Fig. 1: Trend Comparison between Amount of Financial Loss & Financial Salvage due to Fire Incidence in Kwara State from 1990 – 2013

It was revealed from Figure 1 that over the period being reviewed the amount of financial salvage is usually greater than the amount of financial loss except in very few occasions which include the last two years. The two variables were also shown to have followed similar trend pattern on the average. It was also observed that the total amount of financial loss of $N=6,533,988,401.50$ over the period under review is about 4 % of the total capital expenditure of $N=178,347,867,461.00$ (see Table 1). This corresponds to the findings of Shittu (2001) cited in Shittu et al (2013a) indicating that there has not been improvement in the trend of fire outbreak till date.

Figure 2 shows the comparison of trend between the number of recorded fire cases in residential and public buildings of Kwara State from 1990 – 2013.

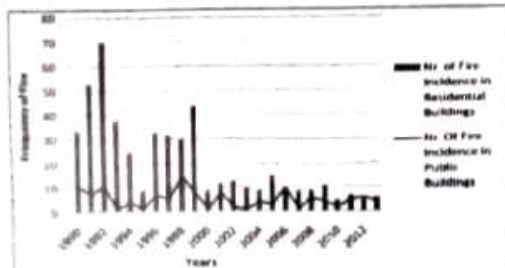


Fig. 2: Trend Comparison between Number of Fire Incidences in Domestic & Public Buildings in Kwara State from 1990 - 2013



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It was noticed from Figure 2 that the number of recorded fire cases in residential buildings and the number of fire cases in public buildings of Kwara State from 1990 – 2013 did not follow similar trend pattern. Number of fire cases recorded in residential buildings was higher than the recorded cases of fire outbreak in public buildings throughout the period of study as also revealed in Figure 2. This also corresponds to the findings of Shittu (2001) and Shittu et al (2013a) indicating that there has not been improvement in the trend of fire outbreak till date in Kwara State.

Figure 3 shows the comparison of trend between the number of recorded fire cases due to electrical faults and the number of fire cases as a result of gas faults in Kwara State from 1990 – 2013.

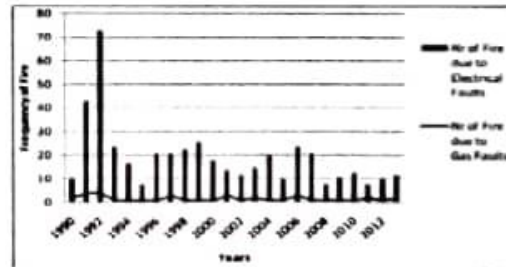


Fig. 3: Trend Comparison between Number of Fire Incidences due to Electrical & Gas Faults in Kwara State from 1990 - 2013

It was observed from Figure 3 that the number of recorded fire cases due to electrical faults and the number of fire cases as a result of gas faults also did not follow similar trend pattern. The number of fire cases due to electrical faults was higher than the recorded cases of fire outbreak as a result of gas faults in Kwara State throughout the period of study as also revealed in Figure 3. This is also in line with the findings of Shittu (2001), Shittu (2007) and Shittu et al (2013a) showing that there has not been improvement in the trend of fire outbreak till date.



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3.2.2 Discussion of Results of Regression/Correlation Analysis

The use of correlation and regression analyses were employed to determine the degree of association and the relationship between the variables tested in this study. The first analysis was carried out to determine the relationship between the number of fire cases and the amount of financial loss due to fire in Kwara State. It was observed that there exists a weak, negative and significant relationship between the variables. The coefficient of determination (R^2) value observed was 18% implying weak relationship and the correlation coefficient (R) observed was 43% indicating fairly strong degree of association between the variables. The negative correlation observed between the variables indicates a tendency that an increase in the number of fire cases will be followed by a decrease in the amount of financial loss due to fire in Kwara State and vice versa. The value of F calculated of 4.732 observed was greater than the value of F tabulated of 4.30 while the probability (P) value of 0.037 observed was less than 0.05. This led to the rejection of the null hypothesis which states that there is no significant relationship between the variables. This slightly differs from the findings of Shittu (2001) and Shittu et al (2013a) where it was revealed that a non-significant relationship existed between the number of fire cases and the amount of financial loss due to fire in Kwara State.

The second analysis showed a negative, weak and non-significant relationship between the number of fire cases and the amount of financial salvage from the incidence of fire outbreak in Kwara State. The R^2 value observed was 8% implying weak relationship and the R value observed was 28% indicating weak degree of association between the variables. The negative correlation observed between the variables indicates a tendency that an increase in the number of fire cases will be followed by a decrease in the amount of financial salvage due to fire in Kwara State and



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vice versa. The value of F calculated of 1.863 observed was less than the value of F tabulated of 4.30 while the P value of 0.186 observed was greater than 0.05. This led to the acceptance of the null hypothesis which states that there is no significant relationship between the variables. This corresponds to the findings of Shittu (2001) cited in Shittu et al (2013a) indicating that there has not been improvement in the trend of fire outbreak till date.

The third analysis also showed a negative, weak and significant relationship between the number of fire cases and the amount of capital expenditure in Kwara State. The R^2 value observed was 36% implying slightly weak relationship and the R value observed was 60% indicating a strong degree of association between the variables. The negative correlation observed between the variables indicates a tendency that an increase in the number of fire cases will be followed by a decrease in the amount of capital expenditure in Kwara State and vice versa. The value of F calculated of 12.504 observed was greater than the value of F tabulated of 4.30 while the P value of 0.002 observed was less than 0.05. This led to the rejection of the null hypothesis which states that there is no significant relationship between the variables.

On the other hand a positive, slightly weak and non-significant relationship was discovered between the amount of financial loss due to fire cases and the amount of capital expenditure in Kwara State in the fourth analysis. The R^2 value observed was 10% implying weak relationship and the R value observed was 32% indicating weak degree of association between the variables. The positive correlation observed between the variables indicates a tendency that an increase in the amount of financial loss due to fire cases will be followed by a corresponding increase in the amount of capital expenditure in Kwara State and vice versa. The value of F calculated of 2.455 observed was less than the value of F tabulated of 4.30 while P value of 0.131 observed was



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greater than 0.05. This led to the acceptance of the null hypothesis which states that there is no significant relationship between the variables.

The above discussed results of the analyses are summarized in Table 3.

Table 3: Results Summary for Inferential Analysis

No. of Hypothesis	Variable		Inferential				Strong to of Relationship	Result
	X	Y	K/S ² %	F _{cal}	F _{tab}	P _{val}		
1	No. Of Fire Cases	Financial Loss to Fire	4918	4.7	4.3	0.03	Weak	SS
2	No. Of Fire Cases	Financial Saving to Fire	288	1.8	4.3	0.08	Weak	NS
3	No. Of Fire Cases	Capital Expenditure	4076	12	4.3	0.08	Slight + Weak	SS
4	Financial Loss to Fire	Capital Expenditure	3210	2.4	4.3	0.31	Weak	NS

KEY: SS = Statistically Significant
NS = Not Significant

4. CONCLUSION

The research findings revealed that the total amount of financial loss of ₦46,573,988,401.50 over the period under review was about 4 % of the total capital expenditure of ₦1,178,347,867,461.00. The amount of financial savings from fire incidences was always higher than the amount of financial loss over the period under review. Fire incidences occur more in residential buildings than in public buildings over the period under review. Fire outbreaks were observed to be caused more as a result of electrical faults than gas faults. Significant relationship exists between number of fire cases and the amount of financial loss due to fire. Significant relationship also

exists between the number of fire cases and the amount of capital expenditure in Kwara State.

Finally, the research findings show that a positive correlation exists between the amount of financial loss due to fire cases and the amount of capital expenditure in Kwara State indicating a tendency that an increase in the amount of financial loss due to fire cases will be followed by a corresponding increase in the amount of capital expenditure in Kwara State and vice versa. This implies that more funds are being diverted for repairs and compensation by the Government yearly due to the incidence of fire outbreak. On this note, it can be concluded that there has not been improvement in the trend of fire outbreak recorded over the study period.

In view of the conclusions made from this study, it was recommended that the Kwara State Fire Service should strengthen their officers more in the area of rescue operations and fire fighting so that more lives and property can be saved because it was discovered that amount of financial savings was more than the amount of financial

loss and positive correlation exists between the amount of financial loss and the capital expenditure.

Kwara State Government should focus more on enlightenment programmes for the people on how to fight fire before the arrival of fire fighters.

In view of the limitation of the study, it was suggested that Kwara State Fire Service should improve their record keeping by separating amount of losses/savings from fire incidences into the different building types (i.e. whether residential or public).

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APPENDIX



Appendix 1: Fire Triangle



Appendix 2: Fire burning in a building during an outbreak of fire in Ilorin, Kwara State



Appendix 3: Fire fighting in a building during an outbreak of fire in Ilorin, Kwara State, Nigeria