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An Analysis for Reduction in Economic Loss from Damage Accident in Use of Transport Modes: A Comparative Study

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ABSTRACT
One way in which the use of mechanized transport has negatively affected the economy of nations is the devaluation and destruction of properties and investment worth through damage accident. Damage accident in this case refers to accidents that caused economic losses through destruction of properties and investments involved. The study analyzed the economic loss due to damage accident and the trend in maritime and road transport modes. The aim of the study was to determine the effect of damage accident on the Nigeria economy and to compare the trend of the economic cost of damage accident between the two modes. The insurance award approach used by Hopkins et al. (1991) was used to determine the economic loss of damage accident in both modes while regression analysis was used to analyze the impact of damage accident cost in both modes of transport from 2001 to 2010 on the Gross Domestic Product of the transport sector (GDP transport) over the same period. Descriptive statistics was also employed and the difference of means of damage accident economic cost in both modes, determined. The null hypotheses were tested using T-test. It was found that while the economic cost of damage accident of the road transport mode has a significant impact on the Gross domestic Product of the transport sector (GDP transport), that of the maritime transport mode has no significant impact on the GDP transport. The quantitative relationships between damage accident economic losses of both modes of transport were also established. The researcher recommended that funding of transport safety and accident reduction programmes should be treated as investment by stakeholders, and not as an expenditure in which case stakeholders try to avoid the expenditure, leading to increase in damage accident cases. Also such funding for transport safety and accident reduction programmes should be target based.
Key words: Analysis, Reduction , Economic, Loss, Damage Accident, Use, Transport, Modes.

INTRODUCTION

History reveal that man from the beginning of ages has been pre-occupied by quest for effective means of economic transaction and communication (transport) between diverse geographical locations to add value to goods and services and fulfill social and other needs. Ogwude, (1998) observed that the shift from the use of primitive transportation means-beast of burden to development and use of efficient mechanized transportation means namely: air, rail, sea (maritime) and road modes has created serious risks of accidental injury, damage and economic loss, arising from transport behavior. Ogwude, (1998) further stated that the advent of mechanized transport means has both increased human mobility and enriched the economy by widened economic activities, but it has also multiplied the cost of transport usage in terms of property damages, human life's and injuries, and economic losses due to accidents as ¼ of a million people are killed annually all over the World due to road traffic accident alone.

Damage accidents are accidents which cause damage and destruction of the properties (Vehicles, finished goods, raw materials, etc) involved in the accident without loss of life or injury. Damage accidents therefore causes devaluation or total loss of the economic value of the properties involved. The United Nations organization rule applies one percent of the Gross Domestic Product (GDP) of developing countries to represent the economic loss due to road traffic accident alone in the countries (Ogwude, 1998). Nwokedi, (2005) estimated that from 1996 to 2001, Nigerian economy lost an average of twelve billion seven-hundred and ninety two

million, two hundred and thirty three thousand (₦12, 792, 233,000) naira per annum to damage and injury accident in the road transport mode. The study put the economic cost of death and injury accident in road transport over the period at an average of two billion, six hundred and sixty-nine million twenty thousand, six hundred and fifty seven naira (₦2, 669, 026, 657) and five hundred and seventy five million, one hundred and ninety thousand, five hundred and ten naira (₦575, 119, 510) respectively (Nwokedi, 2005). The implication is that damage accident costs an average of 8 billion naira representing about 66% of total economic loss due to road accident per annum from 1996 to 2001 (Nwokedi, 2005).

Orime, (2010) in a study posited that in Rivers State Nigeria, an average of 56 accidents occurred in the Inland waterways of rivers state per annum from 1999 to 2004. An average of 44 deaths and 33 injuries cases per annum were recorded over the same period. Statistical report by Nigeria Insurers Digest (2008) put accident economic loss in Maritime transport mode from 1990 to 2006 at Nine-billion, six hundred and forty-four million, four hundred and twenty one thousand naira (₦964421000) approximately. This represents an average of about five-hundred and thirty million naira economic losses per annum over the period. Owuallah, (2012) revealed that maritime accident leading to economic losses showed a steady rise between 2007 to 2010 with reported total accidents in Lagos Anchorage, Bayelsa coastal waters, Rivers waterways, Bonny waters and Akwa-Ibom coastal waters of 54 cases, 33 cases, 62 cases, 63 cases and 23 cases respectively, with varying degrees of economic losses arising from damages to properties.In Air transport, ASN (2013) statistics revealed that from 1944 to 2012, a total of one hundred and ten (110) aircraft accidents have occurred, all involving varying degrees of property damages of enormous economic cost. Over the years however, Government policies have been centered more on how to achieve a reduction in road and air traffic accidents, leading to the establishment of multiple safety and regulatory agencies in both, with little or unequal attention paid to safety of maritime transport and reduction in economic loses involving marine transport damage accidents.

In Nigeria, huge financial budget allocations have over the years been made to the different agencies of government for regulating and maintaining safety in use of various modes of transport to reduce accidental damages to goods and properties, injuries and deaths. However, the increasing frequency of accident in all transit modes and astronomical economic loss to the economy poses a serious question, on the competency of the agencies and effectiveness of their accident reduction programmes in all modes (Owullah, 2012). It is important to state that a loss of investment due to damage accident, brings with it both a loss of job and source of livelihood, which goes to have a negative multiplier effect on both the job losers and the dependent population who depends on them for economic sustenance. The economy suffers a setback in all sectors at the end of the day.

OBJECTIVES

The objectives of the research include;

A. To ascertain the quantitative relationship between transport sector contribution to the Gross Domestic Product (GDP transport) over the years and the economic cost of damage accident involving the use of road and water transport modes.

B. TO compare the economic cost of damage accident involving road and water transport modes with a view to determining the appropriate volume of investment in safety needed to achieve substantial reduction in damage accident economic loss in both modes.

HYPOTHESES

H_{oA}: There is no significant impact of the damage accident economic loss involving the use of road transport mode on Gross Domestic Product of the transport sector (GDP transport) over the years.

H_{oB}: There is no significant impact of the economic cost of damage accident marine transport mode on Gross Domestic Product of the transport sector (GDP transport) over the years covered by the study.

H_{oC}: There is no significant difference between the damage accident economic cost of road and maritime transport modes.

METHODOLOGY

Ogwude (1998) posited that among the various approaches to accident costing is the court award approach, which is similar in practice to the insurance award approach. While the court award approach accepts the value awarded by the court, to accident victims for the accidental properties as the economic value of the properties damaged, the insurance award approach accepts the value awarded by insurance firms (insured values) as claims (indemnity) to accidental properties as its economic cost/ value. The research adopted the insurance award approach in which the claims/indemnity paid to owners of marine transport accidental properties (Marine Claims) and road transport accidental properties (Motor Vehicle/Accident Claims) for each year from 2001 to

2010 were adopted as the damage accident economic loss, for each mode of transport. Since we are concerned with damage accident, the economic losses due to injury and death associated with each mode of transport which are covered under life assurance and employed compensation/liability insurance were excluded.

The above data on economic cost/loss involving both modes of transport were analyzed using regression analysis and descriptive statistics. The regression analysis used damage accident economic cost involving maritime transport as X_M and road transport mode economic loss as X_R, and regressed each on the Gross Domestic Product of the transport sector (GDP transport) over the same period 2001-2010.T-test was used to test the hypotheses

We assume that there is a linearity of relationship between the dependent and independent variables and propose that:

$$Y = a_1 + b_1X_m + \quad +e$$

Also $Y = a_2 + b_2X_r + e$

Where Y = GDP transport

a_1 a_2 = intercepts

b_1b_2 = Coefficients

X_m = economic loss/ cost of damage accident marine transport

X_R = economic loss/ cost of damage accident road transport

e = error term

DATA PRESENTATION

TABLE 1: ECONOMIC LOSS/COST OF DAMAGE ACCIDENT MARINE AND ROAD TRANSPORT MODES AND GROSS DOMESTIC PRODUCT OF TRANSPORT SECTOR (GDP TRANSPORT) 2001-2010

Year	Marine Transport Damage Accident Cost X_M ₦000	Road Transport Damage Accident Cost X_R ₦000	GDP Transport Y ₦000
2001	790, 650	3 273 760	148 114 680
2002	900 880	2 927 935	182 799 370
2003	1 240 570	5 306 960	229 713 010
2004	1 361 420	6 329 160	365 730 560
2005	1 266 220	6 871 550	396 430 600
2006	10, 493 410	35 974 730	441 822 300
2007	1 904 230	10 025 180	473 445 360

2008	3 185 000	14 403 00	479 126 690
2009	4 556 600	19 607 740	506 720 970
2010	2 965 170	19 663 470	528 986 380
Total	276 64, 150	124 383 495	

Source: (1) Central Bank Annual Statistical Bulletin, 2013 edition

(2) Nigeria Insurer's Digest, 2011 edition

TABLE 2.1: OUTPUT OF RESULT OF ANALYSIS BY REGRESSION OF DAMAGE ACCIDENT MARITIME TRANSPORT ON GDP TRANSPORTUSING EXCEL

Regression Statistics

Multiple R	0.473182737
R Square	0.223901903
Adjusted R	0.126889641
Standard E	130717093.5
Observation	10

ANOVA

	df	SS	MS	F	Significance F
Regression	1	3.94363E+16	3.94363E÷16	2.307975	0.167196
Residual	8	1.36696E+17	1.7087E-i-16		
Total	9	1.76132E+17			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	31071465 1.4	59290862. 17	5.2405149 81	0.0007 83	1.74E+ 08	44743962 4.8	1.74E+ 08	4.47E+ 08
X Variable:	22.527904 21	14.828772 91	1.5192021 85	0.1671 96	- 11.667 31	56.723115 87	- 11.667 31	56.723 12

TABLE 2.2: OUTPUT OF RESULT OF ANALYSIS BY REGRESSION OF DAMAGE ACCIDENT FOR ROAD TRANSPORT ON GDP TRANSPORT

Regression Statistics

Multiple R	0.651646289
R Square	0.424642886
Adjusted R	0.352723247
Standard E	112549304.9
Observation	10

ANOVA

	df	SS	MS	F	Significance F
Regression	1	7.47932E+ 16	7.47932E+ 16	5.9044079	0.041208753
Residual	8	1.01339E+17	1.26673E+16		
Total	9	1.76132E+17			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2655488 92	5750111 1.58	4.61815 2322	0.001714 327	1329510 90.9	3981466 93.1	1329510 90.9	3981466 93.1
X Variable:	8.822720 573	3.630900 505	2.42989 8743	0.041208 753	0.449848 993	17.1955 9215	0.449848 993	17.1955 9215

TABLE 2.3: OUTPUT OF RESULT OF ANALYSIS USING DESCRIPTIVE STATISTICS

Damage accident economic loss road transport

	Column 1
Mean	12438349.5
Standard Error	3267436.934
Median	8448365
Mode	#N/A
Standard Deviation	10332542.82
Sample Variance	1.06761E-i-14
Kurtosis	2.026873986
Skewness	1.43335266
Range	33046795
Minimum	2927935
Maximum	3Z473O
Sum	124383495
Count	10
Confidence Level (95.0%)	7391455.864

DISCRIPTIVE STATISTICS DAMAGE ACCIDENT ECONOMIC LOSS MARITIME TRANSPORT

	Column 2
Mean	2866415
Standard Error	929192.9659
Median	1632825
Mode	#N/A

Standard Deviation	2938366.158
Sample Variance	8.634E-i-12
Kurtosis	5.747108849
Skewness	2.29548384
Range	9702760
Minimum	790650
Maximum	10493410
Sum	28664150
Count	10
Confidence Level (95.0%)	2101980.524

DISCUSSION OF RESULT AND FINDINGS

Tables 2.1 result output showed the quantitative relationship and impact of damage accident cost (maritime transport mode) on transport sector Gross Domestic Product (GDP transport) and the economy of Nigeria. Thus damage accident economic loss due to marine transport is related to transport sector GDP by the equation

$Y = 310714651.4 + 22.53X_m + e$.

The multiple R indicating the degree of association between transport sector Gross Domestic Product and maritime transport damage accident cost to the economy is 0.4732 while the R square is 0.2240. The R square result indicates that only about 22% variation in transport sector Gross Domestic Product (GDP transport) over the years covered by the study is explained by damage accident economic cost, of maritime transport. The t-test showed a t-stat of 1.519 and t critical value of 1.860. Since t-stat (1.519) < t critical (1.860), we accept the null hypothesis H_{OB} and conclude that that economic loss due damage accident of maritime transport mode has no significant impact on the Gross Domestic Product of the transport sector (GDP transport) over the 10years covered by the study.

Result of table 2.2 regression analysis showed that the quantitative relationship between economic losses due to damage accident of the road transport mode and transport sector Gross Domestic Product over the years covered by the study is $Y = 265548892 + 8.823X_R + e$. The multiple R measuring the degree of association between the two variables is 0.652 while the R square value is 0.426. The R square value indicates that 43 percent of variation in transport sector Gross Domestic Product is explained by damage accident economic cost of the road transport mode. Also the testing of H_{oA} by t-test showed a t-stat of 2.429 and t-critical of 1.860. Since t-stat (2.429) > t-critical (1.860), We reject null hypothesis H_{OA} and conclude that there is a significant impact of road transport mode damage accident economic cost, on the Gross Domestic Product of the transport sector (GDP transport) over the period covered by the study.

Comparing the result of the analysis on the two modes of transport showed that the road transport has recorded greater damage accident losses than the maritime mode of transport as the difference of means analysis showed a difference of 9571934.5 naira. The test of hypothesis also showed that the road transport mode has had greater significant reduction effect, on the Gross Domestic Product of the transport sector than the maritime mode.

Table 2.3 gives the descriptive statistics for each of the two groups which in the study represent 10 years for damage accident economic cost maritime transport and 10 years for damage accident economic cost road transport. The table shows an average (mean) of 124 38349.5 naira and 2866415 naira damage accident economic cost for road and maritime transport modes respectively, over the 10 years period from 2001 to 2010. The standard deviation of both groups (road and maritime damage accident costs) are 2938366.158 for marine

transport and 10332542.82 for road transport with means standard errors of 929192.966 and 326743934 for maritime and road transport modes respectively.

The difference between the two means (damage accident economic cost for road and damage accident economic cost for maritime modes), that is, damage accident cost of the two modes of transport is 957193.5 naira. The t-test for difference of means showed a t-stat of 1588491.2 and a t-table at 0.05 significance level and 9 degrees of freedom of 1.83. Thus, we reject the null hypothesis Hoc and conclude that there is significant difference between damage accident economic cost maritime transport and road transport modes.

CONCLUSION

It is evident from the analysis that the damage accident economic losses of the road mode of transport had more significant negative impact on the Gross Domestic Product of the transport sector (GDP transport) in particular, and the economy of Nigeria in general while that of maritime transport mode showed no significant impact on the GDP transport. The mean difference (damage accident cost for road modes - damage accident cost of maritime mode) between the economic cost of damage accident in both modes of transport over the period is 9571934.5 naira.

RECOMMENDATION

There is need for change of attitude by public and private agencies who view funding of safety and accident reduction programmes in various modes of transport as expenditure, as a result they most times seek to avoid or unnecessarily limit such funding. Funding of transport safety and accident reduction programmes should be treated or viewed as an investment that will yield returns. Thus, the rate of returns (profit/benefits) expected from such safety investments over a period should determine the level of investment fund and other capitals to commit to it for achievement of desired level of reduction in damage accident cost.

It is also recommended that funding for safety and damage accident reduction programmes should be target based, such that a quantitative relationship be established between the present value of damage accident cost of the transport modes, the targeted reduction, and the funding required to achieved it. This will help to ensure that fund meant for transport safety programmes are adequate and the basis for its commitment and utilization established for easy achievement of target.

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