International Journal of Advances in Engineering and Management (IJAEM)
Volume 6, Issue 04 Apr. 2024, pp: 1217-1228 www.ijaem.net ISSN: 2395-5252

Evaluation of Cost Difference in Construction of Asphalt and Concrete Roads Inebonyi State, Nigeria

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Date of Submission: 25-04-2024 Date of Acceptance: 04-05-2024

ABSTRACT
Road infrastructure in any economy act like a baseline to ensure continues smooth flow of movability of public and goods as input and output from all economic sectors. Cost of road construction consists of design expenses, material extraction, construction equipment, maintenance and rehabilitation strategies, contractors' profit and overheads, and operations over the entire service life. Lack ofevaluation of construction costs difference of asphalt and concrete roads in Ebonyi state has been a problem. These research works evaluate the construction costs difference of asphalt and concrete roads in Ebonyi state. The objective of the study is to establish the construction costs of one kilometer of asphalt and concrete roads and evaluation of construction costs difference of asphalt and concrete roads in Ebonyi state using a priced bill of quantities which was prepared for each of the roadways. The prepared bill of quantities of fifty -two kilometer (52 km) road by Consultant Quantity Surveyor was the population while one kilometer was the sample size. An economic analysis process known as Life-Cycle Cost Analysis and SSPS computer software were used to evaluate the construction costs difference of the estimated costs of concrete and asphalt roadways. The research findings show that the average rate of return for the Concrete road project is 89% whilst that for the asphalt road project is 30%,The result further indicates that the magnitude of impact asphalt has on the cost efficiency of road construction inEbonyi state is greater than the rate of impact concrete has on the cost effectiveness of road construction inEbonyi state as the their coefficient of impact is 8.532305 and 2.281109 respectively. The R^2 value which measures the rate the independent variables (concrete and asphalt) explains the cost efficiency of road construction inEbonyi state is 44% which is relatively low. Concrete roadway is cheaper than asphalt roadway in terms of present worth. Asphalt roadway appear to increase efficiency but reduce cost – effectiveness. In addition, alternatively using an asphalt overlays and preventive treatments showed a high cost – effectiveness and is recommended.

Keywords: Concrete and Asphalt roadway Systems, Road Construction cost,**Cost** efficiency.

IINTRODUCTION

In any economy transport infrastructure act like a baseline to ensure continues smooth flow of movability of public and goods as input and output from all economic sectors.Road network construction occupies a focal position in the construction industry economy of any nation because it is an important contributor to the process of development [9]. [2]further noted that the Socio-economic growth of a country highly depends on the construction industry as it provides necessary infrastructure such as roads, hospitals, schools and other necessary facilities. [8]observed that the construction industry contributed between 3% and 6% from independence to the 80's but has increased to about over 25% in the last decades. Therefore, considering the significant position of the industry in the nation's economy,evaluating cost effectiveness being a process of determining the economic performance of a structure over its entire life becomes paramount. Cost effectiveness evaluation is especially useful when project alternatives that fulfill the same performance requirements, but differ with respect to initial costs and operating costs, have to be compared in order to select the one that maximizes net savings. Life cycle cost evaluation for road is a need for improved efficiency, productivity, administration and management of construction activities with adequate solutions to the setbacks and problems confronting the industry [10]. [12], most roads are built to facilitate the transport of people and goods, and so as to promote development. Road forms an

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important part of the social safety net facilitating the distribution of wealth through trade and employment opportunities in both rural and urban setup .This imposes a heavy burden on the economy: as passenger and freight services are curtailed, there is a consequent loss of economic and social development opportunities.

Road is also defined as a specially designed hard surface for cars, buses, bicycles, etc to travel on. The Wikipedia[19], defined the term street, road and highway as those travelled ways on which people, animals and wheeled vehicles have moved throughout recorded history. Road transport remains one of the strategic sectors of Nigeria's economy [6]. Actively implementing asphalt and ridged concrete roads pavements both government and business actors i.e. contractors and consultants are oncourse, but still encounter some obstacles in such a limited budget; lack of regulation; no government incentives for construction industry actors; expensive initial investment in technology; lack of technical specifications and implementation guidelines; lack of real cost estimates of road construction and cost - in - use assessment system; lack of expertise in government, contractors and consultants; lack of understanding and willingness; no request; lack of tools that use in evaluating cost efficacy of pavements of road construction and at the beginning of the project, when the scope and definition are in the early stages of development, no or little information is available, yet there is often a need for evaluating probable cost effectiveness of the projects. The owner needs to have a probable value for the project's cost for purposes of determining the economic appeal of continuing with design and construction. In solving the above mentioned problems, we conduct comparative studies of some road pavements .This research aim at evaluating the construction cost difference of asphalt and concreteroads construction in Ebonyistate,Nigeria[6].

1.2 STATEMENT OF THE PROBLEM

Road construction is a capital intensive project and due to its provisional quantities nature which causes cost uncertainties. These uncertainties make it difficult to establish realistic initial baseline cost and assessment of cost efficiency of roadways in Nigeria. However, some road roadway designed for 40 years with relative construction cost only last for three to five years due to poor construction methods and choice ofroadways [10]. Federal and States government who are the main stakeholders of road construction projects, find it difficult to evaluate the cost effectiveness between asphalt and Reinforced concrete road construction in Nigeria and consequently road construction as a result of the following problems;

1) Difficulties in making choice between Asphalt and Reinforced concrete road construction base on cost efficiency and sustainability.
2) Problem of establishing actualKilometer cost rate of Asphalt and Reinforced concrete roadways in Ebonyi state.

Problem of evaluating construction cost difference of reinforced concrete roadway and asphaltic roadway.

1.3 OBJECTIVES OF THE STUDY

The objectives of the study are as follows;

i. To appraise factors affecting the constructionof reinforced concrete roadway and asphalt road.

ii. To assess the costs difference of the use of reinforced concrete and asphaltic roadways.

1.4 REVIEW OFLITERATURES

1.4.1 THE ROLE OF TRANSPORTATION IN THE ECONOMY OF THE NATION

A number of researchers [11],[7] agreed that a good means of transportation serves as a 'lifeline' of any economy[9]. By lifeline, this means that transportation is extremely important for the survival of the economy. Indeed, the provision of a high-quality transport system at an appropriate cost has been identified as a pre-condition for the full participation of remote communities in the benefits of national development[11]. Transportation therefore, has an important role to play not only in serving the productive sectors such as agriculture and industries but also in bringing about economic growth. Although there exits other means of transportation in Nigeria, road transport has become the dominant means of transportation in Nigeria due to its large coverage and ability to provide a door-to-door service with an estimated percentage of 95% of the national passenger and freight services and provide the only access to most rural communities where majority of the economically active population lives [8]. Road construction in Nigeria received a major boost in the 1970's during the 'oil boom' era and had since then become a major component of annual capital budgets at both the states and national levels [8]. The national road network grew from its total length of 6,500 KM in 1960 to 10,000 KM in 1970 to 29, 000 KM in 1980 and it is presently estimated at over 37,000 km Federal road network and 1,671 bridges with a total length of 177km [7]. [8]noted that building roads in Nigeria is very expensive,

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costing multiples per kilometre on average compared to our sub-Saharan neighbours. [15]noted that road projects in Nigeria habitually suffer cost overruns, delayed completion and poor quality. Nigeria has the largest road network in West Africa, 17.6% of which is owned by the Federal Government, while the various state governments own 15.7% of the network and the rest 66.7% are local and rural roads [15].

1.4.2 COST-EFFICIENCY

Cost-effectiveness evaluation may be considered more appropriate for long-term studies, and not for the short-term: because of the typical multiplicity of alternatives in the long-term (each alterative having different costs and benefits)[6]. In the short-term, however, cost-effectiveness may be appropriate in only a few cases, e.g., where it is sought to compare two alternative treatments to address a given pavement distress, such as crack sealing with traditional sealant or with crumb rubber. Outcomes of each strategy could be benefits, returns, satisfaction, or progress towards stated objectives. Some cost-effectiveness analyses proceed on the basis that, although the cost can be presented in naira, the effectiveness of these costs in producingdesirable goals and results can be described only in qualitative terms because not all the benefits and adverse consequences can be presented on naira basis [14]. The cost-effectiveness of a maintenance treatment depends on the following [14]:

- How the treatment changes the existing condition: i.e., how effectively it corrects
- existing distress,
- How well the treatment effectively delays the distress deterioration process, thereby extending pavement life,
- Whether there is a particular condition or time during the progression of the cracking distress when appropriate maintenance can be most effective.

The first consideration is suggestive of short-term effectiveness, where it is sought to determine the level of reduction of deterioration or increase in condition either instantaneously or after a 1-year gap, and is generally considered more appropriate for maintenance effectiveness evaluation in the short-term.

The second consideration is in line with long-term effectiveness, where it is sought to determine the extension in service life due to a treatment. Because there are several treatments a pavement can have over its life, it is difficult to isolate the extension in service life offered by any one treatment, even though pavement managers, in providing their perceptions on roadway maintenance effectiveness, have made earnest attempts to do so through the questionnaire survey. Rather, the second consideration is more appropriate if thought in terms in maintenance strategy (a series of treatments spaced out over a period of time) rather than just treatments. It is useful to note that roadway managers in Ebonyi, indicated both short-term effectiveness (change in condition) and long-term effectiveness (extension in service life) of their maintenance practices. In line with the philosophy of this approach, [8] argued that information needed to establish cost-effectiveness must quantify the effectiveness of treatment, extension of road service life, and the influence of treatment time.

1.4.3 DIFFERENCE BETWEEN ASPHALT (FELIXIBLE) AND REINFORCED CONCRETE (RIGID) ROADWAY

1.4.3.1RIGID ROADWAYS

Rigid pavements are named so because of the high flexural rigidity of the concrete slab and hence the pavement structure deflects very little under loading due to the high modulus of elasticity of their surface course. The concrete slab is capable of distributing the traffic load into a large area with small depth which minimizes the need for a number of layers to help reduce the stress[7]. The most common type of rigid pavement consists of dowel bars and tie bars. Dowel bars are short steel bars that provide a mechanical connection between slabs without restricting horizontal joint movement. Tie bars on the other hand, are either deformed steel bars or connectors used to hold the faces of abutting slabs in contact. Although they may provide some minimal amount of load transfer, they are not designed to act as load transfer devices and are simply used to ‘tie’ the two concrete slabs together.

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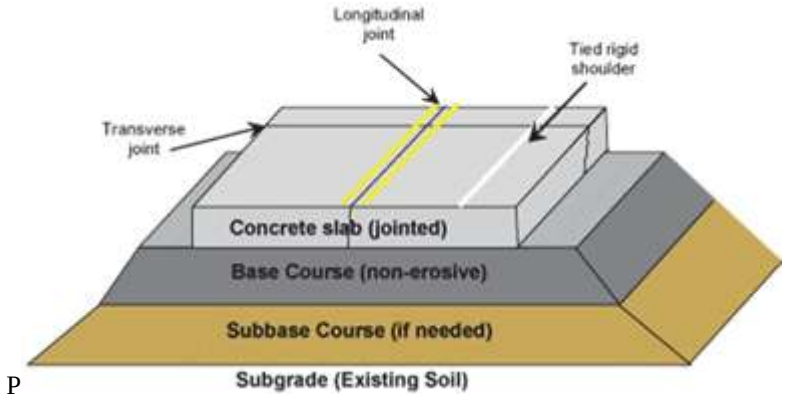

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Fig. 1: Rigid(Reinforced concrete road)

Source: www.theconstructor.org

1.4.3.2 FLEXIBLE(ASPHALT ROADWAY)

A typical flexible roadway consists of a bituminous surface course over base course and sub-base course. The surface course may consist of one or more bituminous or Hot Mix Asphalt (HMA) layers. These roadways have negligible flexure strength and hence undergo deformation under the action of loads. The structural capacity of flexible roadways is attained by the combined action of the different layers of the roadway. The load from trucks is directly applied on the wearing course, and it gets dispersed (in the form of a truncated cone) with depth in the base, sub base, and subgrade courses, and then ultimately to the ground. Since the stress induced by traffic loading is highest at the top, the surface layer has maximum stiffness (measured by resilient modulus) and contributes the most to roadway strength. The layers below have lesser stiffness but are equally important in the roadway composition. The subgrade layer is responsible for transferring the load from the above layers to the ground. Flexible pavements are designed in such a way that the load that reaches the subgrade does not exceed the bearing capacity of the subgrade soil. Consequently, the thicknesses of the layers above the subgrade vary depending upon strength of soil affecting the cost of a roadway to be constructed [7].

Fig. 2: Flexible(Asphalt Road Cross-section)
source: www.theconstructor.org

1.4.3.3 TABLE SHOWING DIFFERENCE BETWEEN FLEXIBLE AND RIGID ROADWAY

Table 1: Difference between flexible and rigid roads

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Difference between Flexible Pavements and Rigid Pavements:

	Flexible Pavement	Rigid Pavement
1.	It consists of a series of layers with the highest quality materials at or near the surface of pavement.	It consists of one layer Portland cement concrete slab or relatively high flexural strength.
2.	It reflects the deformations of subgrade and subsequent layers on the surface.	It is able to bridge over localized failures and area of inadequate support.
3.	Its stability depends upon the aggregate interlock, particle friction and cohesion.	Its structural strength is provided by the pavement slab itself by its beam action.
4.	Pavement design is greatly influenced by the subgrade strength.	Flexural strength of concrete is a major factor for design.
5.	It functions by a way of load distribution through the component layers	It distributes load over a wide area of subgrade because of its rigidity and high modulus of elasticity.
6.	Temperature variations due to change in atmospheric conditions do not produce stresses in flexible pavements.	Temperature changes induce heavy stresses in rigid pavements.
7.	Flexible pavements have self healing properties due to heavier wheel loads are recoverable due to some extent.	Any excessive deformations occurring due to heavier wheel loads are not recoverable, i.e. settlements are permanent

Source:www.theconstructor.org

II.METHODOLOGY

This study adopted the quantitative research approach. The research is based on draft of bill of quantities and comparative analytical procedure for one kilometer road out of 52 kilometer network of Abakalikiin Ebonyi State.This research also adopted the method of preparation of cost estimates with quantities generated from designed roadways and comparative analysis to identify the constructional cost difference and costs efficiencyroadways using Fifty– two kilometers (52 km) road network of Abakalikitown inEbonyiState in order to evaluate the costs benefits that encourage Ebonyi state to be using concrete roadway. Primary and secondary sources of data were employed. Measurement of the road was done and priced bill of quantities produced by Cobecon consultant Limited. The cost of the road project is then determined from the Bill of Quantities. A similar exercise was done for the road constructed with asphalt and a Bill of quantities prepared for the asphalt road.

Cost efficacy of asphalt and concrete in roadways construction in Abakaliki were identified using rank order. The costs of construction of concrete and asphalt pavements were established from the bill of quantities prepared by professional Quantity surveyor (Qs). The construction was also use to do the life cost benefit analysis, investment appraisal, and Net present value the roadways. Statistical Package for Social Sciences (SPSS) version 22 was used to compute the (MRS) used to decide the ranks and to collect data in line with the study objective.

III. MODELING AND ANALYSIS

3.1 CONSTRUCTION OF CONCRETE ROADWAY

Length of road = 52km = 52,000m, `Width of road = 10m
TotalCost: = ₦3,077,442,926.57

$$\text{Cost per kilometer} = \frac{\text{Total Cost}}{\text{Total length}} = \frac{₦3,077,442,926.57}{52\text{km}}$$

(i) Cost per kilometer = ₦59,181,594.74/km

$$\text{(ii) Cost per metre} = \frac{\text{Total Cost}}{\text{Total length in metres}} = \frac{₦59,181,594.74}{1000\text{m}}$$

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Cost per metre = ₦59,181.59m

(i) Cost per square metre = $\frac{\text{Total cost}}{\text{Total area in metres square}}$

Cost per square metre = $\frac{₦3,077,442,926.57}{10m \times l000m} = \frac{₦3,077,442,926.57}{10,000m^2}$

Cost per square metre = ₦307,744.29/m^2

3.2 CONSTRUCTION OF ASPHALT ROADWAY

Length of road = 52km = 52,000m ,`Width of road = 10m
TotalCost: = ₦2,587,874,779.37

(ii) Cost per kilometre = $\frac{\text{Total Cost}}{\text{Total length}} = \frac{₦2,587,874,779.37}{52km}$

Cost per kilometer = ₦49,766,822.68/km

(ii) Cost per meter = $\frac{\text{Total Cost}}{\text{Total length in metres}} = \frac{₦49,766,822.68/km}{1000m}$

Cost per metre = ₦49,766.82m

(iii) Cost per square metre = $\frac{\text{Total cost}}{\text{Total area in metres square}}$

\

Cost per square metre = $\frac{₦2,587,874,779.37}{10m \times l000m} = \frac{₦2,587,874,779.37}{10,000m^2}$

Cost per square metre =₦258,787.48/m^2

IV RESULTS AND DISCUSSION

To establish the cost of constructing one kilometer concrete and asphalt pavements road construction in Abakaliki ,Ebonyi state .

4.1 Cost of Constructing the Highway (Motorway) Using Concrete and Asphalt

The highway is 52km in Abakaliki, Ebonyistate , single carriageway

S/N	Name of project	Total Life-cycle cost	Interest Rate (per annum)	Present Value	Return on investment
1	Life cycle cost of Asphalt pavement	₦ 74,892,811.26 (per kilometre)	₦ 7,465,023.30	₦ 6,530,053,345.63	₦ 2,737,500,000

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2	Life cycle cost of using concrete	₦ 69,037,549.49 (per kilometre)	₦ 189,413.099	- ₦6,158,848,390	₦ 2,737,500,000

Chart presentation of the life cycle cost of using Asphalt in the construction of a kilometre road in Ebonyi state

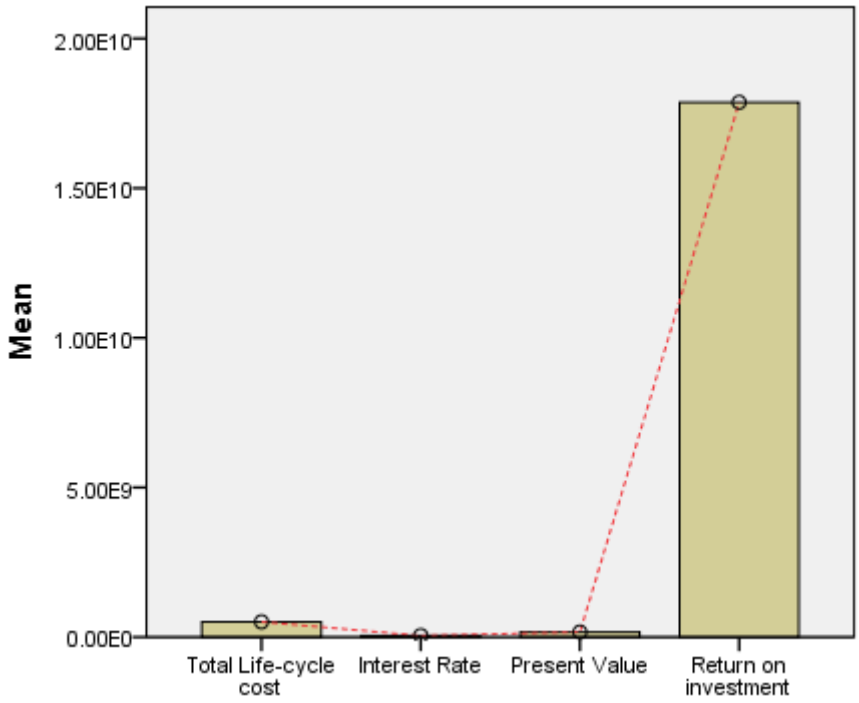

Fig. 3: Life cycle cost using Asphalt

The chart presentation in fig. 3 above shows that the total life cost of using asphalt in road construction in Abakaliki, Ebonyi state is relatively low, the interest bearing is considerably on the lower margin, the present value is equally low whereas the return on investment is seen to be very high. This is an indication that it is more profitable to use asphalt in the road construction in Abakaliki, Ebonyi state since the return on investment is high whereas total cost and interest rate is very low.

Chart presentation of the life cycle cost of using concrete in the construction of a kilometre road inAbakaliki, Ebonyi state

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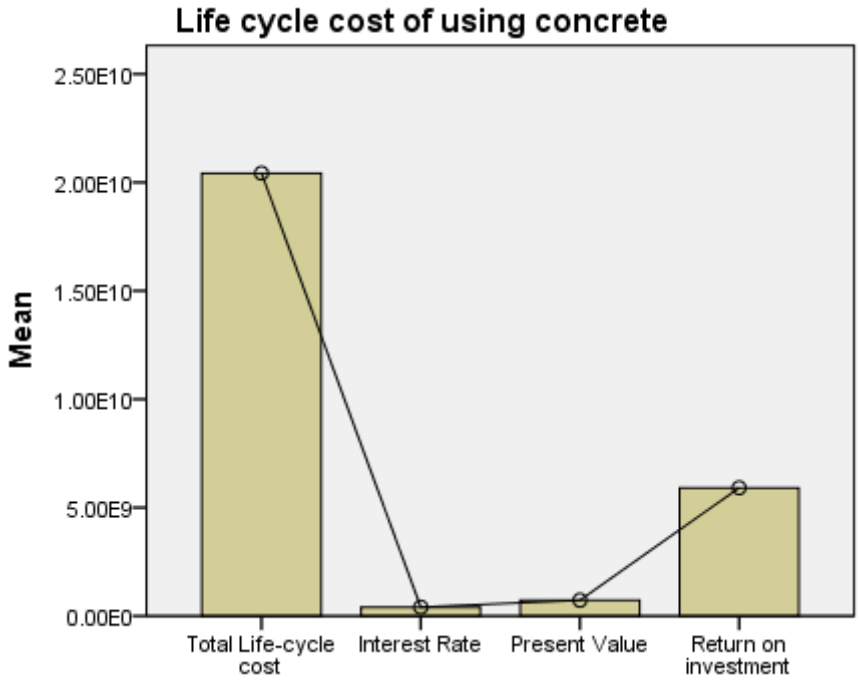

Fig.4: life cycle cost of using concrete.

The above chart presentation in fig.4 above shows that the total life cycle cost of using concrete in the construction of a kilometer road in Abakaliki, Ebonyi state is very high, though the interest rate and the present value is relatively low. The return on investment is seen to be low, even lower than the total life cycle cost. This implies that it is more cost intensive to concrete in the construction of a kilometer road in Abakakliki,Ebonyi state as when compared to asphalt. More so, the return on investment when concrete is used for road construction is considerably very low as when compared to the use of asphalt.

4.2. Analyses of the second objectives

To examine the construction costs difference of reinforced concrete and asphaltic roadways in Abakaliki, Ebonyi state using bill of quantities or regression function linking cost and effectiveness.

Table 2: The cost effectiveness of concrete and asphalt roadways construction in Abakaliki, Ebonyistate using bill of quantities or regression function linking cost and effectiveness.

Dependent Variable: D(CE)

Method: Least Squares

Date: 04/16/23 Time: 10:09

Sample (adjusted): 2014 2023

Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.443744	0.010063	4.347096	0.0001
Concrete	2.281109	3.55E-06	0.000641	0.0095

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Asphalt	8.532305	0.000230	0.370754	0.0132

R-squared	0.290706	Mean dependent var	0.042191
Adjusted R-squared	-0.226224	S.D. dependent var	0.041292
S.E. of regression	0.036322	Akaike info criterion	-3.690965
Sum squared resid	0.043537	Schwarz criterion	-3.516812
Log likelihood	72.28286	Hannan-Quinn criter.	-3.629568
F-statistic	4.508374	Durbin-Watson stat	1.987886
Prob(F-statistic)	0.009309		

Source: Eviews computation 2023

Where
CE = Cost Effectiveness (DEPENDENT VARIABLE)
Concrete = (independent variable)
Asphalt = (independent Variable)

The result of the study indicates that concrete and asphalt have positive relationship on the cost effectiveness of road construction inAbakaliki, Ebonyi state. The implication of the result is that a unit increase in the use of concrete and asphalt will lead to a corresponding increase in the cost effectiveness of road construction in Abakaliki, Ebonyi state metropolis on the average.

The result further indicates that the magnitude of impact asphalt has on the cost effectiveness of road construction in Abakaliki, Ebonyi state is greater than the rate of impact concrete has on the cost effectiveness of road construction in Abakaliki, Ebonyi state as the their coefficient of influence is 8.532305 and 2.281109 respectively.

More so, the findings of the study further indicates that concrete and asphalt has significant influence on the cost effectiveness of road construction in Abakaliki, Ebonyi state as the probability value of is less than 0.05 level of significance on the average.

Finally, the R-square value which measures the rate the independent variables (concrete and asphalt) explains the cost effectiveness of road construction in Abakaliki, Ebonyi state is 44% which is relatively low.

1) The study identifies several factors that necessitate the cost difference on concrete and asphalt roadway construction in Abakaliki, Ebonyi state such as the environmental factor, drainage system, mixture composition, moisture, weather condition, surface subsurface, binder properties, segregation, compaction, gradation and volumetric properties. These identified factors are ranked according to their level of impact.(ii) Using concrete, the initial cost of one kilometre length of road is ₦59,181,594.70 per Kilometre while that of asphalt road is ₦ 49,766,822.68 per Kilometre. Hence in term of initial cost, asphalt roadway is less than concrete roadway. Hence asphalt roadway is cheaper by ₦9,414,772.02 per Kilometre. (iii) The lifecycle costs of concrete roadwayis ₦69,037,549.49 whereas that of asphalt is ₦74,892,811.26/km. Hence in terms of lifecycle costs, Concrete cheaper than asphalt roadway. Hence concrete is a cheaper roadway material. Using Concrete as a roadway material will result in savings over the lifespan of the road.(iv) The investment appraisal for the road project gave the following results:

(a) Using the simple payback method, the payback period for Concrete roadway is 1.12 years while that of aspha1t pavement is 2 years 5 months.

(b) Using the Discounted payback method, the payback period for Concrete roadway is 2years 9months while that of asphalt pavement is 4 years 11 months.

(c) The total Net Present value for the Concrete road project is - ₦ 6,158,848,390 billion while that for the asphalt road project is +₦ 6530,053,345.63 billion.

(d) Using the average rate of return, the average rate of return for the Concrete road project is 89% whilst that for the asphalt road project is 30%,

(e) The Present worth (PW) for the Concrete road project is ₦3,146,480,476.10 billion while that of the asphalt road project is ₦2,759,492,283.26 billion. Hence Concrete pavement is cheaper than asphalt pavement in terms of present worth. (f) The result of the study further indicates that concrete and asphalt have positive and significant impact on

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the cost effectiveness of road construction in Abakaliki such that an increase in the use of concrete and asphalt will lead to increase in the cost effectiveness of road construction in Ebonyi state.

V. CONCLUSION

In view of the findings, concrete roadway can be used as an in place ofasphalt roadway material since it is better than asphalt in terms of Present Worth.

In cost effectiveness and cost -in - analyses the life the road construction is the expected economic life i.e the life span beyond which it is uneconomic to continue to use the road.In theory cost effectiveness and cost-in –use evaluation can be used to make alternative design and funding selection, but in practice there are many problems or factors which make its application difficult, these include;

(1) Difficulty in assessing the life of the road components.
(2) Difficulty in accurately assessing the interest rate to use in discounting.
(3) The variability of interest rate over a time period.
(4) The effect of inflation which is unpredictable and which renders the projected assessment of running and maintenance cost questionable.

Life – cycle cost analysis was conducted to compare the cost effectiveness of two roads construction over twenty years analysis time frame. Two different roads constructions were investigated. The data of asphalt and concrete where collected in Ebonyi state metropolis were adopted with contribute to higher cost – effectiveness. Asphalt road appear to increase effectiveness but reduce cost – effectiveness. Road sections with a big curvature, long, and steep slopes tends to have lower effectiveness. In addition, alternatively using an asphalt overlays and preventive treatments showed a high cost – effectiveness and is recommended.

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to the Tertiary Education Trust Fund (TETFUND) for their unwavering support and provision of resources throughout the course of this research. The research facilities and infrastructure provided by Dr. Atta F.E,the **rector**,AkanuIbiam Federal Polytechnic, Unwana,Afikpo, EbonyiState,Nigeriahave played a significant role in the successful completion of this study.

Appendix

Appendix Table 1 Bill of quantities .

PROPOSED FIFTY TWO KILOMETERS ASPHALT ROADWAYROADCONSTRUCTIONATABAKILIKI, EBONYI STATE (BILL OF QUANTITIES)		
Summary		**ASPHALTPAVEMENT**
GENERALITEMS		**₦350,500,000.00**
GROUNDINVESTIGATION		**₦149,169,973.88**
GEOTECHNICAL&OTHERSPECIALIST		**₦187,340,000.00**
DEMOLITION&SITECLEARANCE		**₦114,460,000.00**
ROADSANDPAVINGS		**₦1,376,875,800.00**
ASPHALTPAVEMENTSUBTOTAL		**₦2,178,345,773.88**
GENERALSUMMARY		
FIFTY-TWOKILOMETERSASPHALTPAVEMENTROAD		
SubTotal		**2,178,345,773.88**
AddVAT(8%)	**0.075**	**174,267,661.91**
SubTotal		**2,352,613,435.79**
Add CONTIGENCIES(10%)	**0.1**	**235,261,343.58**
ASPHALT PAVEMENTROAD		
Carried to Form of Tender		**₦2,587,874,779.37**

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Appendix Table 2 Bill of quantities.

REINFORCED CONCRETEROADCONSTRUCTION		WORKS
Summary		
GENERALITEMS		**₦350,500,000.00**
GROUNDINVESTIGATION		**₦149,169,973.88**
GEOTECHNICAL&OTHERSPECIALIST		**₦187,340,000.00**
DEMOLITION&SITECLEARANCE		**₦109,780,000.00**
CONCRETEANDPAVINGS		**₦1,793,650,200.00**
REINFORCED CONCRETEPAVEMENTROADCONSTRUCTIONWORKS		**2,590,440,173.88**
TOTAL FOR BILL FIFTYTWOKILOMETERS REINFORCED CONCRETEPAVEMENTROAD		
SubTotal		**₦2,590,440,173.88**
AddVAT(8%)	**0.075**	**207,235,213.91**
SubTotal		**2,797,675,387.79**
AddCONTIGENCIES(10%)	**0.1**	**279,767,538.78**
REINFORCED CONCRETEPAVEMENTROAD CarriedtoFormofTender		**3,077,442,926.57**

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