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A MATHEMATICAL MODELLING FOR ROAD PASSENGER TRANSPORTATION PROFIT ANALYSIS

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Abstract

In this paper, we proposed a mathematical model for transportation profits analysis with a view of assisting long distance road transportation companies to monitor their daily, weekly, monthly or annual profits and also to predict or forecast their profits. This paper is concerned on the formulation of mathematical model on transportation using the principle of proportionality and linear algebraic equations. Data were gotten from two different transports company that was used to formulate values for the model constants. The approach use in solving this linear model equation is least square method. In the work, two different mathematical models were formulated for the two difference transportation company. The results proved that due to differences in organization and management of the company, the model constants can be calculated only for a particular company and recalculated for other company To validate the results, statistical analysis was carried out and it was show that, there is significant correction between actual profit and model profit of the same company but there is no significant correction between actual profit and different company model profit. In view of above results, profit model equation can predict profit for a particular company.

Keywords: Road passenger, transporting expenses, transportation profit,

1.0 Introduction

The public transportation systems in many countries on the continent are inadequate, unreliable and poorly maintained. To address this shortfall, many countries license and allow private bus companies, taxi operators and ferry services (entrepreneurs) to help meet the huge demand. Prominent passenger transport service business in Nigeria is the most competitive, most vulnerable and most volatile of all sectors in the Nigerian economy [1]. Challenges in Nigeria's economy, which was part of the global depression of the 1980's, affected all sectors in which transport system was one of them[2].

Mathematical model and scientific algorithms (i.e. transportation and assignment model) in the scheduling and assignment of organizational resources (vehicles) for the purpose of optimizing the use of organizational resources in a transportation company was considered i.e. in his paper work, the aim is to minimize cost of transporting passengers from several sources to different destinations [1]. Evaluates the variables that tend to determine the level of performance of Public (Government – owned) transport companies in Niger state of Nigeria was put into consideration. It identifies the variables that are influencing and/or determining the performance of public transport company in the study area [3].The operations of Public Transport in Nigeria using the Kwara State Transport Service as a case study through questionnaire administration, to determine users' views on the services provided by the Kwara State Transport Service [4]. Investigations on travels of public transport passengers' (road) from Ayangburen Taxi Park, Ikorodu, Lagos, Nigeria was carried out with a view toward identifying its challenges and contributions to travel demand using structured questionnaire [2]. An Advanced Public Transportation System (APTS) software package that serves as an intelligent movement system for captive commuters was developed [5]. Their research work focus on examining how the transport situation in Osun State has affected the market patronage of farm products in the State. The use of sample technique, observation method and road inventory survey were employed [6]. The origins of modern Nigerian transportation, problems in its transportation infrastructure and system were enumerated intensively. And emphasizes were on the role of entrepreneurship as the strategic instrument for creating an effective transportation system conducive to business and then makes policy suggestions, after considering the potentials [7]. Road transport situation in rural areas of Kwara State, Nigeria were presented. The work adopted an integrated approach whereby rural road transport is viewed as a whole complex of the available roads, transport services and Intermediate Means of Transport (IMT) [8]. A mathematical model that optimizes transportation or utility of commuters within the Federal Capital Territory, Abuja was the focus [9].

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This paper is concerned on the formulation of mathematical model on transportation using the principle of proportionality and linear algebraic equations. This formulated model comprises of factors that influences the profits of any transportation company such as passengers, luggage, vehicles and expenses or expenditure. The approach use in solving this linear model equation is the use of least square method which is a procedure that determines the best fit line to data. A graphical analysis and comparison of each factor with the profit is been carried out so as to know the effect of the model,

2.0 MATERIALS AND METHODS

The formulation of the model follows an algebraic equations model and proportionality principles. We assumed that; each vehicle has equal carrying capacity of 14 passengers, the waybill luggage is entirely different from passenger luggage, waybill luggages are recorded as passengers if the luggage is bulky and not recorded if it is small in size, cost of transporting passenger's luggages are not recorded but can be recorded if the passenger decides to pay for an extra seat for his/her luggages, since we are considering transport companies that embark on long distance journey, we assume that each vehicle embark on only one trip per day, transporting expenses for each vehicle varies, in the case of accident, company insurance policy will take care of damage vehicle, damage waybill luggage and passenger's luggage, injury cases and death cases so as not to affect the company total profit for the given period. Also, we assume that number of passengers determine the number of vehnicle.

We define the variables and parameters used in the model equations as;

Tp = Profits of a transportation company for a particular duration form park i to destination j,

V =Total numbers of vehicles transporting passengers from park i to destination j in a given period t,

P = Total numbers of passengers travelling from park i to destination j in a given period t,

Q = The transporting expenditure/expenses of each vehicle (e.g. money spent on fuelling the vehicle) from park i to destination j in a given period t,

C = Unit costs of passengers (i.e. money paid by each passenger) making a trip from park i to destination j in a given period t,

V = number of vehicle making a trip,

α = rate of inflow of passengers and Waybill luggages,

β = rate of cost charge by company on passengers,

δ = rate of inflow of vehicles, γ = rate of transport expenditure on vehicles,

λ = equation constant of proportionality.

Hence, we present the model equation mathematically,

$$T_P = \alpha P + \beta C + \delta V + \gamma \frac{1}{Q} + \lambda \quad (1)$$

We shall analyze the model by using least square method.

Hence from equation (1) we let;

$$Z_{min} = \sum_{i=1}^{n}\left(Tp_i - \alpha P_i - \beta C_i - \delta V - \gamma \frac{1}{Q_i} - \lambda\right)^2 \; i = 1, 2, 3... \text{ n} \quad (2)$$

Hence, differentiating equation (2) with respect to α gives,

$$\text{For } \frac{\partial Z}{\partial \alpha} = 0\text{'}\; \alpha\sum_{i=1}^{n}P_i^2 + \beta\sum_{i=1}^{n}C_iP_i + \delta\sum_{i=1}^{n}V_iP_i + \gamma\sum_{i=1}^{n}\frac{P_i}{Q_i} + \lambda\sum_{i=1}^{n}P_i = 0 + \delta\sum_{i=1}^{n}P_i = \sum_{i=1}^{n}Tp_iP_i \quad (3)$$

Also, differentiating equation (2) with respect to β gives,

$$\text{For } \frac{\partial Z}{\partial \beta} = 0,\; \alpha\sum_{i=1}^{n}P_iC_i + \beta\sum_{i=1}^{n}C_i^2 + \delta\sum_{i=1}^{n}V_iC_i + \gamma\sum_{i=1}^{n}\frac{C_i}{Q_i} + \lambda\sum_{i=1}^{n}C_i = \sum_{i=1}^{n}Tp_iC_i \quad (4)$$

Also, differentiating equation (2) with respect to δ gives,

$$\text{For } \frac{\partial Z}{\partial \delta} = 0,\; \alpha\sum_{i=1}^{n}P_iV_i + \beta\sum_{i=1}^{n}C_iV_i + \delta\sum_{i=1}^{n}V_i^2 + \gamma\sum_{i=1}^{n}\frac{}{Q_i} + \delta\sum_{i=1}^{n}V_i = \sum_{i=1}^{n}Tp_iV_i \quad (5)$$

Also, differentiating equation (2) with respect to γ gives,

$$\text{For } \frac{\partial Z}{\partial \gamma} = 0,\; \alpha\sum_{i=1}^{n}\frac{P_i}{Q_i} + \beta\sum_{i=1}^{n}\frac{C_i}{Q_i} + \delta\sum_{i=1}^{n}\frac{V_i}{Q_i} + \gamma\sum_{i=1}^{n}\frac{1}{Q_i^2} + \lambda\sum_{i=1}^{n}\frac{1}{Q_i} = \sum_{i=1}^{n}\frac{Tp_i}{Q_i} \quad (6)$$

Also, differentiating equation (2) with respect to λ gives,

$$\text{For } \frac{\partial Z}{\partial \lambda} = 0,\; \alpha\sum_{i=1}^{n}P_i + \beta\sum_{i=1}^{n}C_i + \delta\sum_{i=1}^{n}V_i + \gamma\sum_{i=1}^{n}\frac{1}{Q_i} = \sum_{i=1}^{n}Tp_i \quad (7)$$

i = 1, 2, 3...n. but for this research, n = 7 (i.e. 7 days in a week).

Meanwhile, equations (3), (4), (5), (6) and (7) are to be solved simultaneously for values of α , β , δ , γ λ for particular company respectively.

We evaluate the equation constants using data collected from two transportation companies in the study area which are Pleasure Mass transit Wukari Motor Park (P.M.T) and Nezam transport Nig. Ltd Wukari Motor Park (NEZAM). This to justify every transportation company has its mode of operations especially in the case of expenses.

Table 1. Data collected from P.M.T, Wukari motor park in Taraba State of Nigeria.

No. Of Passengers (P)	Transport Fair (C) in ₦	No. Of Vehicles (V)	Transport Daily Expenses (Q) in ₦	Profit (Tp) in ₦
21	1300	2	6700	20600
14	1300	1	4000	14200
24	1300	2	11600	19600
8	1300	1	3100	7300
29	1300	3	13700	24000
13	1300	2	6500	10400
36	1300	3	12600	34200

Source: Pleasure Mass Transit Wukari park, Taraba State, 2016.

Table 2. Data collected from NEZAM, Wukari motor park in Taraba State of Nigeria.

No. Of Passengers (P)	Transport Fair (C) in ₦	No. Of Vehicles (V)	Transport Daily Expenses (Q) in ₦	Profit (Tp) in ₦
10	6500	1	11000	54000
10	6500	1	11000	54000
11	6500	1	11500	66000
14	6500	1	22500	78500
9	6500	1	10500	48000
16	6500	2	27000	77000
16	6500	2	27000	77000

Source: Nezam Transport Nig. Ltd, Wukari Park, Taraba State, 2016.

We evaluate the equation constants using the collected data from P.M.T in table 1.
To solve equation (3), (4), (5), (6) and (7) simultaneously in this section, we use the data collected from table 1, we have;

$$\sum P^2 = 3583,\ \sum PC = 188500,\ \sum VP = 333,\ \sum \frac{P}{Q} = 0.02,\ \sum P = 145\ \sum TpP = 3222600,\ \sum C^2 = 11830000,\ \sum VC = 18200,\ \sum \frac{C}{Q} = 1.45,$$

$$\sum C = 9100\ \sum TpC = 169390000,\ \sum V^2 = 32,\ \sum \frac{V}{Q} = 0.003,\ \sum V = 14,\ \sum TpV = 297300\ \sum \frac{1}{Q} = 0.001,\ \sum \frac{1}{Q^2} = 0.0000002,$$

$$\sum \frac{Tp}{Q} = 16.74\ \sum Tp = 4130300$$

Substituting these summation values into (3)-(7), yields;

$$3583\alpha + 188500\beta + 333\delta + 0.1825787\gamma + 145\lambda = 3222600 \quad (8)$$

$$188500\alpha + 11830000\beta + 18200\delta + 1.448518769\gamma + 9100\lambda = 169390000 \quad (9)$$

$$333\alpha + 18200\beta + 32\delta + 0.001808268\gamma + 14\lambda = 297300 \quad (10)$$

$$0.01825787\alpha + 1.448518769\beta + 0.001808268\delta + 0.000000231562\gamma + 0.001114245\lambda = 16.73523128 \quad (11)$$

$$145\alpha + 9100\beta + 14\delta + 0.001114245\gamma + 7\lambda = 130300 \quad (12)$$

Hence, we solve equation (8), (9), (10), (11) and (12) simultaneously and it gives the following values as equation constants;

$\alpha = 1097.43935442$ $\beta = 688372.086231752$ $\delta = -2622.21223979089$

$\gamma = 2482.668848034$ $\lambda = -894882586.458607$

Also, putting the values in equation (1) yields;

$$Tp = 1097.43935442P + 688372.086231752C - 2622.212223979089V + \frac{2482.668848034}{Q} - 894882586.458607 \quad (13)$$

Thus, equation (13) is the developed model for optimizing and forecasting profit of Pleasure Mass Transit.
We evaluate the equation constants using the collected data from NEZAM in table 2.
Similarly, to solve equation (3), (4), (5), (6) and (7) simultaneously for NEZAM we use the data collected from table 1, we have;

$$\sum P^2 = 1110,\ \sum PC = 559000,\ \sum VP = 118,\ \sum \frac{P}{Q} = 0.0059,\ \sum P = 86,\ \sum TpP = 5735000,\ \sum C^2 = 295750000,\ \sum VC = 58500,\ \sum \frac{C}{Q} = 3.37,$$

$$\sum C = 45500,\ \sum TpC = 2915250000,\ \sum V^2 = 13,\ \sum \frac{V}{Q} = 0.000592161,\ \sum V = 9,$$

$\sum TpV = 602500,\ \sum \frac{1}{Q} = 0.00052\ \sum \frac{1}{Q^2} = 0.0000000423041,\ \sum \frac{Tp}{Q} = 31.5901054,\ \sum Tp = 448500$

Substituting these summation values into (3)-(7), yields;

$1110\alpha + 559000\beta + 118\delta + 0.005937032\gamma + 86\lambda = 210121800$ (14)

$559000\alpha + 295750000\beta + 58500\delta + 3.367564674\gamma + 45500\lambda = 2915250000$ (15)

$118\alpha + 58500\beta + 13\delta + 0.000592161\gamma + 9\lambda = 602500$ (16)

$0.005937032\alpha + 3.367564674\beta + 0.000592161\delta + 0.0000000423041\gamma + 0.000518087\lambda = 31.5901054$ (17)

$86\alpha + 45500\beta + 9\delta + 0.000518087\gamma + 7\lambda = 448500$ (18)

Hence, we solve equation (14), (15), (16), (17) and (18) above simultaneously gives the following values for the equation constants;

$\alpha = 6108.10813 \quad \beta = 0.00064000163356 \quad \delta = -13662.1618941313$

$\gamma = 7.3464086 \quad \lambda = 6590.43343041118$

Also, putting the values in equation (1) yields;

$$Tp = 6108.10813P + 0.00064000163356C - 13662.1618941313V + \frac{7.3464086}{Q} + 6590.4334304118 \quad (19)$$

Thus, equation (19) is the developed model for optimizing and forecasting profit of NEZAM transportation company.

RESULTS AND DISCUSSIONS

In the concluding part of the pervious section, data were collected in order to be able to evaluate our emerging model equation constants. Thus, model equations are (20) and (21);

$$Tp = 1097.43935442P + 688372.086231752C - 2622.212223979089V + \frac{2482.668848034}{Q} - 894882586.458607 \quad Tp \geq 0 \text{ (For P.M.T)} \quad (20)$$

$$Tp = 6108.10813P + 0.00064000163356C - 13662.1618941313V + \frac{7.3464086}{Q} + 6590.4334304118 \quad Tp \geq 0 \text{ (For NEZAM)} \quad (21)$$

We established the equilibrium of the model. This approach is a technique for programming/optimizing an objective function or a model in order to know whether a model conforms to reality or not. Thus, the first part of optimizing process is the determination of the model's critical values as below. We consider the equilibrium of the model for P.M.T.

$$\frac{\partial Tp}{\partial P} = \alpha,\ \frac{\partial Tp}{\partial C} = \beta,\ \frac{\partial Tp}{\partial V} = \delta,\ \frac{\partial Tp}{\partial Q} = -\frac{\gamma}{Q^2}$$

But at optimal level,

$$\frac{\partial Tp}{\partial P} = \frac{\partial Tp}{\partial L} = \frac{\partial Tp}{\partial C} = \frac{\partial Tp}{\partial V} = \frac{\partial Tp}{\partial Q} = 0$$

Hence at equilibrium point, P = 0, L = 0, C = 0,V = 0, $\frac{1}{Q} = 0$

Substituting the values above into equation (20) gives;

$Tp = -894882586.458607$ (22)

Thus, our critical values is;

$Tp = -894882586.458607$, at P = 0, L = 0, C = 0, V = 0, $\frac{1}{Q} = 0$

Hence, equation (22) is the equilibrium point of the modelled equation for P.M.T.

We consider equilibrium of the model for NEZAM

$$\frac{\partial Tp}{\partial P} = \alpha,\ \frac{\partial Tp}{\partial C} = \beta,\ \frac{\partial Tp}{\partial V} = \delta,\ \frac{\partial Tp}{\partial Q} = -\frac{\gamma}{Q^2}$$

But at optimal level, $\frac{\partial Tp}{\partial P} = \frac{\partial Tp}{\partial L} = \frac{\partial Tp}{\partial C} = \frac{\partial Tp}{\partial W} = \frac{\partial Tp}{\partial V} = \frac{\partial Tp}{\partial Q} = 0$

Hence at equilibrium point, P = 0, L = 0, C = 0,V = 0, $\frac{1}{Q} = 0$

Substituting the values above into equation (21), gives;

$Tp = 6590.43$ (23)

Thus, our critical values are;
$Tp = 6590.43$, at P = 0, L = 0, C = 0, W = 0, V = 0, $\frac{1}{Q}$ =0

Hence, equation (23) is the equilibrium point of the modeled equation for NEZAM.

HYPOTHESIS

H_{01}: Formulated model cannot predict actual profit

H_{I1}: Formulated model can predict actual profit

Table 3.Table for validation of P.M.T calculated profits using P.M.T and NEZAM model.

Actual profits (₦)	Model calculated profits using PMT model (₦)	Model calculated profits using NEZAM model (₦)
20600	18927.8151767253	107537.213470751
14200	13868.2020568847	78442.6191950057
19600	22219.9767150878	125861.537397583
7300	7283.74612534046	41793.9709482127
24000	25084.9284398555	142739.916056375
10400	10148.3117446899	58672.3484644889
34200	32767.019739747	185496.673013189

Table 4.Table for validation of NEZAM calculated profits using NEZAM and PMT model.

Actual profits (₦)	Model calculated profits using NEZAM model (₦)	Model calculated profits using PMT model (₦)
54000	54013.5135147533	3579544326.45478
60000	60121.6216157162	3579544326.45478
78500	78445.9459546107	3579545423.88432
48000	47905.405416556	3579548716.09684
77000	77000.0000048559	3579543229.02617
77000	77000.0000048559	3579548288.74492
77000	77000.0000048559	3579548288.74492

Table 5:Tests of Normality of PMT Actual profit and PMT predicted profit using PMT model

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
PMT ACTUAL PROFIT	.133	7	.200*	.965	7	.861
PMT PREDITED PROFIT USING PMT MODEL	.131	7	.200*	.975	7	.931

Table 6:Tests of Normality of PMT Actual profit and PMT predicted profit using NEZAM model

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
PMT ACTUAL PROFIT	.133	7	.200*	.965	7	.861
PMT PREDITED PROFIT USING NEZAM MODEL	.135	7	.200*	.975	7	.934

Table 7:Tests of Normality of NEZAM Actual profit and NEZAM predicted profit using NEZAM model

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
NEZAM ACTUAL PROFIT	.343	7	.013	.797	7	.038
NEZAM PREDITED PROFIT USING NEZAM MODEL	.343	7	.013	.797	7	.038

Table 8:Tests of Normality of NEZAM Actual profit and NEZAM predicted profit using PMT model

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
NEZAM ACTUAL PROFIT	.343	7	.013	.797	7	.038
NEZAM PREDITED PROFIT USING PMT MODEL	.261	7	.164	.854	7	.133

Table 9: Descriptive Statistics of PMT Actual profit and PMT predicted profit using PMT model

	Mean	Std. Deviation	N
PMT ACTUAL PROFIT	18614.2857	9053.62332	7
PMT PREDITED PROFIT USING PMT MODEL	18614.2857	8924.19519	7

Table 10: Descriptive Statistics of PMT Actual profit and PMT predicted profit using NEZAM model

	Mean	Std. Deviation	N
PMT ACTUAL PROFIT	18614.2857	9053.62332	7
PMT PREDITED PROFIT USING NEZAM MODEL	105792.0398	50312.04862	7

Table 11: Descriptive Statistics of NEZAM Actual profit and NEZAM predicted profit using NEZAM model

	Mean	Std. Deviation	N
NEZAM ACTUAL PROFIT	67357.1429	12976.62734	7
NEZAM PREDITED PROFIT USING NEZAM MODEL	67355.2124	12978.77056	7

Table 12: Descriptive Statistics of NEZAM Actual profit and NEZAM predicted profit using PMT model

	Mean	Std. Deviation	N
NEZAM ACTUAL PROFIT	67357.1429	12976.62734	7
NEZAM PREDITED PROFIT USING PMT MODEL	3579546085.6295	2288.16791	7

Table 13: Correlations of PMT Actual profit and PMT predicted profit using PMT model

		PMT ACTUAL PROFIT	PMT PREDITED PROFIT USING PMT MODEL
PMT ACTUAL PROFIT	Pearson Correlation	1	.987**
	Sig. (2-tailed)		.000
	N	7	7
PMT PREDITED PROFIT USING PMT MODEL	Pearson Correlation	.987**	1
	Sig. (2-tailed)	.000	
	N	7	7

**. Correlation is significant at the 0.01 level (2-tailed).

Table 14: Correlations of PMT Actual profit and PMT predicted profit using NEZAM model

		PMT ACTUAL PROFIT	PMT PREDITED PROFIT USING NEZAM MODEL
PMT ACTUAL PROFIT	Pearson Correlation	1	.987**
	Sig. (2-tailed)		.000
	N	7	7
PMT PREDITED PROFIT USING NEZAM MODEL	Pearson Correlation	.987**	1
	Sig. (2-tailed)	.000	
	N	7	7

**. Correlation is significant at the 0.01 level (2-tailed).

Table 15: Correlations of NEZAM Actual profit and NEZAM predicted profit using NEZAM model

			NEZAM ACTUAL PROFIT
Kendall's tau_b	NEZAM ACTUAL PROFIT	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	7
	NEZAM PREDITED PROFIT USING NEZAM MODEL	Correlation Coefficient	1.000**
		Sig. (2-tailed)	.
		N	7
Spearman's rho	NEZAM ACTUAL PROFIT	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	7
	NEZAM PREDITED PROFIT USING NEZAM MODEL	Correlation Coefficient	1.000**
		Sig. (2-tailed)	.
		N	7

Table 16: Correlations of NEZAM Actual profit and NEZAM predicted profit using PMT model

			NEZAM PREDITED PROFIT USING PMT MODEL
Kendall's tau_b	NEZAM ACTUAL PROFIT	Correlation Coefficient	-.162
		Sig. (2-tailed)	.631
		N	7
	NEZAM PREDITED PROFIT USING PMT MODEL	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	7
Spearman's rho	NEZAM ACTUAL PROFIT	Correlation Coefficient	-.170
		Sig. (2-tailed)	.716
		N	7
	NEZAM PREDITED PROFIT USING PMT MODEL	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	7

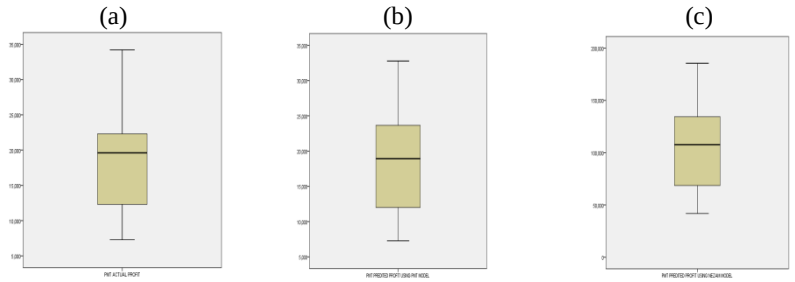

Figure 1: Outliers checking Box-plots (a) PMT actual profit (b) PMT predicted profit using PMT model (c) PMT predicted profit using NEZAM model

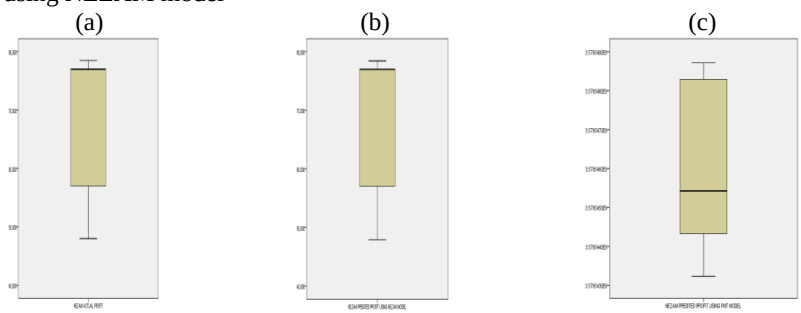

Figure 2: Outliers checking Box-plots (a) NEZAM actual profit (b) NEZAM predicted profit using NEZAM model (c) NEZAM predicted profit using PMT model

INTERPRETATION

The descriptive statistics of the variables used in examine this research are presented in Table 9,10,11,12. The box-plots showed no possible outliers in the variables used in the research as portrayed in Figure 1and 2. The normality analysis of the variables was carried-out using the Shapiro-Wilk test of normality. The results as presented in Table5,6,7,8 indicated that the PMT actual profit, PMT predicted profit using PMT model, PMT predicted profit using NEZAM and NEZAM predicted profit using PMT model model variables are normally distributed with w = 0.965,0.975,0.975,0.854 ($p>0.05$) respectively. NEZAM actual profit and NEZAM predicted profit using NEZAM model variables are not normally distributed with w = 0.797, ($p<0.05$).

The magnitude of the Kendall's tau and Spearman's correlation coefficient determines the strength of the correlation between the variables. The analysis results presented in Table 13,14,15, indicate a positive and strong correlation between PMT actual profit and PMT predicted profit using PMT model, PMT actual profit and PMT predicted profit using NEZAM, NEZAM actual profit and NEZAM predicted profit using NEZAM model, r(7) = 0.987,0.987,1,1 , ($p<0.05$). The proportion of variability in one variable explained by the other variable was found to be high, r^2 = 0.97,0.97,1, which means for PMT predicted profit using PMT model to predict PMT actual profit, PMT a PMT predicted profit using NEZAM to predict PMT actual profit, NEZAM predicted profit using NEZAM model to predict NEZAM actual profit explained statistically 97%,100% of profit prediction. We fail to reject $H_{I1.}$Implies that, we accept H_{1I}. Similarly, NEZAM actual profit and NEZAM predicted profit using PMT model, r(7) =-0.162 , ($p>0.05$) as in Table 16 and the result show negative and weak correction . The proportion of variability in one variable explained by the other variable was found to be low, r^2 = 0.026, which means for NEZA predicted profit using PMT model to predict NEZAM actual profit, explained statistically as 3% of profit prediction. We valid the model by conduct a correlation test using Karl Pearson Correlation Coefficient to see if the model profit correlates with the actual data collected from P.M.T and NEZAM using their models respectively. The test shows that the model is suitable since the relationship correlates (i.e. there is a strong relationship between the model values of profits with the actual data).

Also, we went ahead to conduct another correlation test using the same Kendall's tau and Spearman's correlation Correlation Coefficient to see if the model profit correlates with the actual data collected from P.M.T and NEZAM but in this case using P.M.T model for NEZAM data and vice-versa. The test shows that the model is not suitable if the model is use to calculate profit for another transport company. This reason may be due to difference in management of the company. For example, NEZAM Transport Nig. Ltd considers fuelling of vehicles making a trip, union due (₦500 X number of passengers in the vehicle) and loading as expenses, while P.M.T considers fuelling, Drivers allowance (if the vehicle is fully loaded), security due, repairs of faulty vehicles before take-off and expenses R/C dues as expenses. These expenses vary from vehicle to vehicle.PMT vehicles are strictly within their parks while NEZA are allowed to related with others park companies and this give them eagle over PMT to make little profit, if they do have vehicle on the road because they can sent waybill through other companies.

CONCLUSION

The models developed for P.M.T and NEXAM has been verified that it is only valid for their respective organizations due to the reason that both companies mode of operations and organizational rules and regulations are different from each other. For this reason, there is no unique mathematical model for all road passenger transportation company across the globe. It was clearly seen that there were little differences between variables derived from the same company's model and much differences between variables derived from a different company's model.

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