Factor analysis method for delay dynamics in Nigerian Tin Can Island Port for sustainable development

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Abstract. The effect of efficient and effective port system on the economy viability of any nation cannot be over emphasis. This study investigated factors that could be termed as delay causative factors in Nigerian ports industry using TIN CAN Island port complex as a case study. A well-structured questionnaire was developed for this research and 72 respondents, who are port users (custom officers, employees, and customers), were asked to rank the variables perceived to be causing delay at the port according to their respective perception of the effect of each factor on delay factors at the port. The validity of the research instrument was done using Cronbach Alpha. There are several factors that were thought to be working together in reducing efficiency in Nigerian ports and these factors were analyzed using factor analysis method. It was discovered from the analysis that Lack of Government Authority, Ullage Constraint, Inadequate Berthing, Logistics Delay, Financial Constraint and Equipment Breakdown are major factors that cause delay at Tin Can Island Port Lagos. These highlighted factors should be paid special attention in order to reduce delay in Tin Can Island port which will in turns lead to more revenue for the country.

Keywords: Transportation, Jetty, Maritime Industry, Economy, Berthing, Factor Analysis, Cargo.

1. Introduction

The prosperity of all countries depends to a very large extent on international trade [1]. It has been established that foreign trade is believed and perceived to be one of the principal generators of economic growth and development and also a catalyst to economic development that any nation can rely on. When trade balance increases in favour of a particular country then such country is said to have achieved economic growth and it has been established that economic growth bring about more foreign trade [2,3]. When considering a lower-income country like Nigeria, the stated argument could be sustained because most of the goods needed and consumed by her citizens are being imported from other countries because they are not manufactured within the country [4]. It is of importance to state that, raw materials that are being produced, mainly crude oil, are being exported to other higher-income countries countries in order to obtain foreign exchange /currency needed to pay for the import of finished product, raw materials, major equipment, and technological skills needed for economic development. Trade both local and foreign cannot take place without transport. Transport is said to close the

geographical gap between areas of surplus and areas of lack [5]. Shipping remains overwhelmingly the most important and reliable way or form of transportation that being used internationally. In other words, other mode of transportation like road, rail and the air could be used but the volume of trade supported by these modes put together compared to the volume carried by maritime transport is very insignificant [6-14].

In short, shipping enhances global economy. Most higher-income countries are traced to the ability to develop and manage efficient shipping trade.

The present condition and situation in the ports system in Nigeria as was established through Okon investigation falls short of global practices and efficiency [15]. This could be proved through the high turnaround time that are being experienced by ships in the ports. This resulted to ships and cargo meant for Nigerian ports being diverted to other neighbouring countries in West-African ports that share borders with Nigeria (Ghana, Republic of Benin, Togo etc) [16]. The study therefore will X-rayed the various delay factors with the view of establishing the influence and effect of each of the delay factor in order to ascertain the critical ones [13, 17].

2. Study Location

Lagos in which the Tin Can Island port is located is the economic capital of Nigeria. It is the fastest growing city with a population of over 15 million people. It has so many commercial activities that give rise to the presence of many large markets such as the Alaba international market which has the largest concentration of electronics in the world (that is, at a single market place).
Tin Can Island port serves as hub for distribution of petroleum products such as PMS, AGO, DPK, JET A1, BASE OIL, etc by trucking to any part of the Country. As a result of its commercial advantage in terms of location, many private companies built their jetties presented in a map in Figure 1 and tank farms in Tin Can Island port which constitute an elongated types of water and they are as follows: Integrated jetty, Ibafon 1, Ibafon 2, Capital 1, Capital 2, Deejones Tank farm, Obat Oil jetty, Rahamaniyya jetty, Fatgbems jetty, Swift oil jetty, Techno oil jety, Index jetty, Wosbab oil jetty, Emadeb jetty, AA Rano jetty [6,8,18].

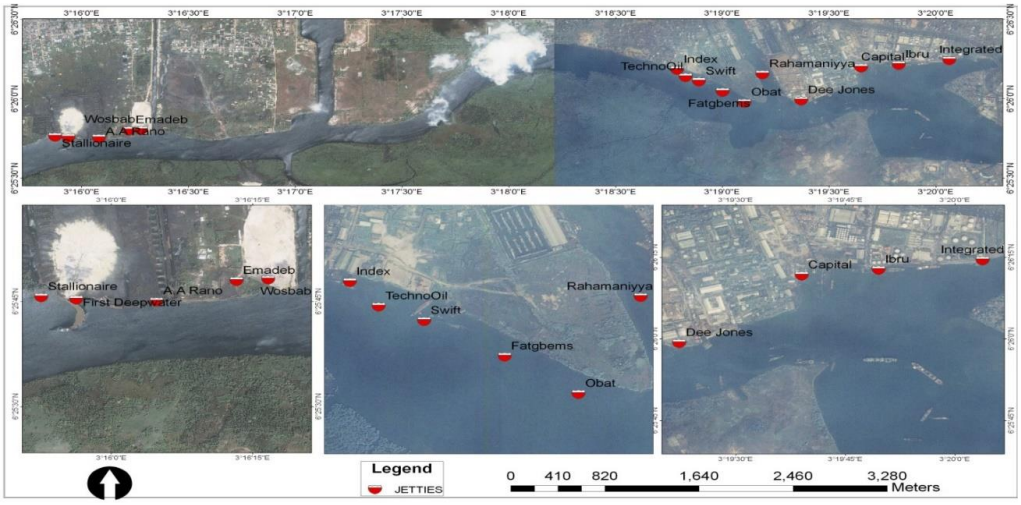

Figure 1. Map displaying various jetties at Tin Can Island port, Lagos. Source: NPA, 2014.

A new port, presented in Figure 2, was constructed in 1976 and was commissioned on the 14th October, 1977 . The new port was named Tin Can Island Port, which has capacity of handling minimum of 10 vessels at a time and maximum of 16 vessels while the main complex occupied a total area of 73 hectres.

Tin Can Island Port has several unique feature which has made it become investors' haven. Some of the features are:

1. The Port was built to handle diversified cargoes where each terminal operator specializes in handling unique form of cargo and task which could be: (Box- Containerized cargoes, Wet and Dry bulk cargoes, RORO services). Tin Can Island port, in fact, is the only Port in Lagos Pilotage District, that offers such services and this has made it a hub for investors in bringing their consignment and also has resulted in high patronage.
2. It is expected that the vessels the port will handle ranges from 100m – 260m.
3. The port has 24 hours Pilotage services.
4. The port is expected to operate on a quick turnaround time for vessels.
5. Up to date and well-equipped modern equipment are available at the port for clearing cargoes because each terminal operate in a unique way that made it different in its operations procedures which enhances quick delivery of cargoes.
6. Water supply and Bunkering: – The bunkering of vessels at the port are being undertaken by renowned and reputable oil companies. When it comes to well water, the Port has fresh water that was well sunk which has up to 250meters depth, this provides fresh water to vessels at berth.
7. The port operates functional CCTV (Closed Circuit Television) that monitors it operations digitally.
8. It has Kiri kiri Lighter Terminal (KLT) 1&11 which provides 780meters quay length and maximum water depth of 4meters;

(a) Phase 1:- serves as delivery points and discharge for containers bought in barges from mid-stream discharges and general cargo.
(b) Phase 11:- serve as discharge point for salt procession plant and fishing trawlers.

9. There is regular sea patrol for all jetties, anchorage and fair way buoys which is being carried out by the Nigerian Navy and Marine Police [1,19,20,21].

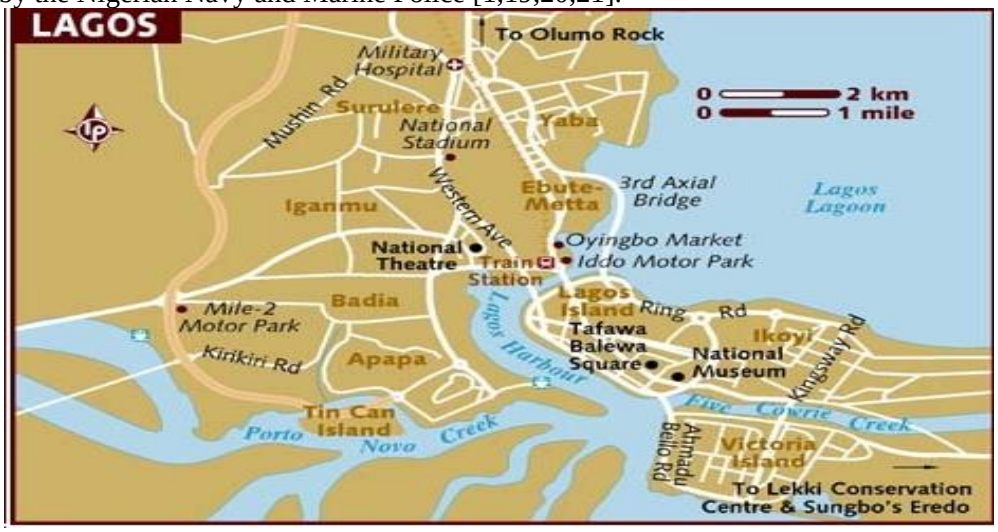

Figure 2: Location of Tin Can Island Seaport in Lagos State. Source: NPA, 2014.

3. Material and Methods

Major outputs looking for in this research is to establish delay model for Tin Can Island port in Nigeria. The data collected for the port under investigation was analyzed using factor analysis that links delays to causative factors. This is to establish the relationship that exist between each of the explanatory variable and the turnaround time of ship in the port.
Cumulative ranking system and regression model will be used to analyze the data collected from the survey at both aggregate and disaggregate levels. This research intend to discover factors working together to cause delay in the port that is under investigation thereby reducing efficiency in Nigerian ports industry. A well-structured questionnaire was developed for the purpose of this research and the 72 respondents were asked to rank the variables perceived to be causing delay at the port according to their respective perception of the effect of each factor on delay factors at the port. The monthly ranking values of the delay factors from the respondents were cumulated into annual values. The data collected was analyzed using version 25 of SPSS.

4. Results and Discussion

Table 1: Descriptive Statistics

	Mean	Standard Deviation	Analysis	Missing Value
NO BERTHING PROSPECT	0.6528	0.67469	72	0
FINANCIAL CONTRAINT	0.1389	0.34826	72	0
LINE DELAY	0.1944	0.59668	72	0
TIP ISSUE	0.0278	0.16549	72	0
LACK OF GOVT AUTHO.	0.2083	0.44207	72	0
ADMIN BOTTLENECK	0.5417	1.07386	72	0
ULLAGE CONSTRAINT	0.1389	0.34826	72	0
EQUIP. BREAKDOWN	0.0417	0.20123	72	0
INADEQUATE BERTH	0.0139	0.11785	72	0
LOGISTICS DELAY	0.0139	0.11785	72	0
LACK OF CARGO HANDLING EQUIPMENT	0.0139	0.11785	72	0

Table 1 gives the descriptive analysis of the data used for this research. The table contains mean and standard deviation values for each of the variable.

Table 2: Communalities

	Initial	Extraction
NO BERTHING PROSPECT	1	0.568
FINANCIAL CONTRAINT	1	0.743
LINE DELAY	1	0.622
TIP ISSUE	1	0.496
LACK OF GOVT AUTHO.	1	0.83
ADMIN BOTTLENECK	1	0.528
ULLAGE CONSTRAINT	1	0.806
EQUIP. BREAKDOWN	1	0.742
INADEQUATE BERTH	1	0.774
LOGISTICS DELAY	1	0.774
LACK OF CARGO HANDLING EQUIPMENT	1	0.722

Table 2 present the sum of squared factor loadings for each of the variables under consideration which measures the proportion of each variable's variance that can be established and explained by the delay factors (e.g., the underlying latent continua).
The table contains the initial value which is the principal factor axis factoring and extraction. The values under initial presents the diagonal values of the correlation matrix which are being determined by the squared multiple correlation of the variable with the other variables. While values in the extraction column represent the proportion of each variable's variance that can be explained by the retained factors. It is believed that any variables that has high values as presented in the above table are well represented in the common factor space, while variables that has low values could not be taken to be the one that causes delay because they were not well represented.

Table 3: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.689	15.35	15.352	1.689	15.35	15.352	1.55	14.112	14.112
2	1.395	12.68	28.031	1.395	12.68	28.031	1.48	13.46	27.572
3	1.298	11.8	39.831	1.298	11.8	39.831	1.23	11.161	38.733
4	1.205	10.96	50.788	1.205	10.96	50.788	1.21	10.956	49.688
5	1.014	9.219	60.007	1.014	9.219	60.007	1.13	10.23	59.919
6	1.004	9.13	69.138	1.004	9.13	69.138	1.01	9.219	69.138
7	0.933	8.485	77.623						
8	0.815	7.411	85.034						
9	0.708	6.438	91.472						
10	0.542	4.925	96.397						
11	0.396	3.603	100						

Table 3 shows the actual factors that were extracted and the explanation for each of the column is given below:

1. **Initial Eigen values** – These are the values that presented the variances of the factors under investigation. It is expected that the variables are standardized as result of the factor analysis that was conducted on correlation matrix.
2. **Total** - This column contains the eigen values which rank the variables or factors under investigation in order of priority. It is believed that the first factor accounts for highest delay follow by the successive variables as presented in the table. The highest value from the table is 1.689 followed by 1.395, 1.298… 0.396 respectively.
3. **% of Variance** - This column present the percentages of each of the factors in order of priority. It also represent the total variance being accounted for by each of the factors. The highest percentage from the is 15.352, followed by 12.68, 11.8 … 3.603 respectively.
4. **Cumulative %** - The cumulative percentage of variance accounted for by the current and all preceding factors are presented in this column. The fourth row was taken as the cut-off point because is having 50.78%. This result means that, four of the factors are accounting for more than 50% of the delay in the port under considerations.
5. **Extraction Sums of Squared Loadings** – This section presents the factors that are retained through the number of rows in this panel of the table. The calculation of each of the values presented in each column was done using the same approach for the left hand side. The section shows that 6 factors are retained from the analysis because they account for approximately 70% of the delay in Tin Can Island Port. It is expected that the values in this section should always be lower in values than the one in left hand side of the table, because they are based on the common variance, which is always smaller than the total variance.
6. **Rotation Sums of Squared Loadings** - This maximization of each of the variance for each of the factors was presented here. It is believed that the total amount of variance accounted for by each of the factor will be redistributed over the extracted or the retained factors.

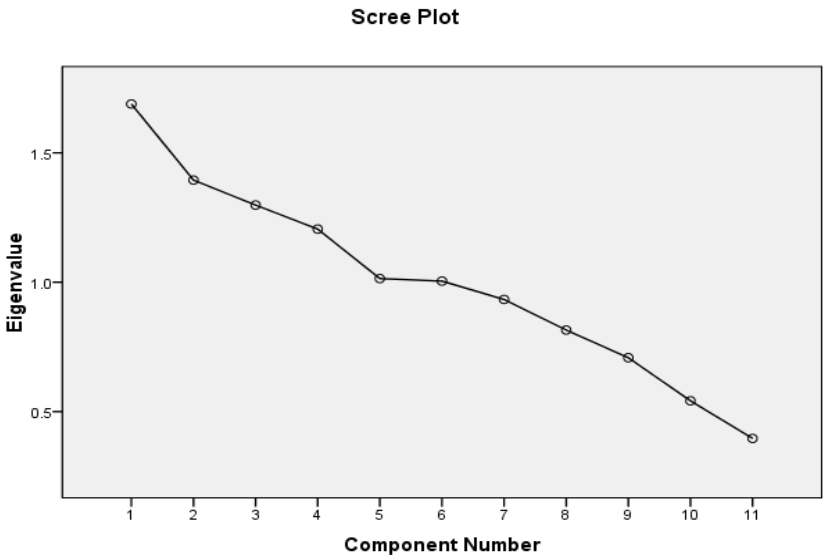

Figure 3 Scree Plot

The Scree graph presented in Figure 3 plots the factor number against the eigen value. The graph indicates that sixth factor are the major causative factors as it could be discovered from the table. It shows that the rate of total variance that is being accounted for by the successive factor become smaller and smaller.

Table 4: Component Matrix[a]

	Component					
	1	2	3	4	5	6
ULLAGE CONSTRAINT	-0.736	0.427	0.241			-0.12
EQUIP. BREAKDOWN	-0.634	0.535	0.149	0.15		
LINE DELAY	0.502	0.448	0.357	-0.204		
NO BERTHING PROSPECT	0.417	0.417	-0.401	0.243		
LACK OF CARGO HANDLING EQUIPMENT	0.448	0.619		-0.362		
TIP ISSUE	0.205	-0.128	0.636			0.176
FINANCIAL CONTRAINT	0.203	-0.178	0.603			-0.549
ADMIN BOTTLENECK			-0.229	0.628		-0.278
LOGISTICS DELAY		-0.24		-0.384	0.712	0.223
INADEQUATE BERTH		-0.24		-0.384	-0.712	0.223
LACK OF GOVT AUTHO.	0.149		0.298	0.496		0.686

Table 4 contains the comparison of the retained six factors with all the factors involved in the study and the result is presented in form of un-rotated factor loadings. These values on the table are the correlations between each variables and the retained factors. The values are expected to be between -1 to +1 because they are correlations values.

Table 5: Correlation Matrix[a]

	NO BERTHING PROSPECT	FIN. CONTRAINT	LINE DELAY	TIP ISSUE	LACK OF GOVT AUTHO.	ADMIN BOTTLENECK	ULLAGE CONSTRAINT	EQUIP BREAKDOWN	INADEQUATE BERTH	LOGISTICS DELAY	LACK OF CARGO HANDLING EQUIPMENT
NO BERTHING PROSPECT	1	-0.092	0.065	-0.039	0.01	0.069	-0.211	0.004	-0.116	-0.116	0.239
FINANCIAL CONTRAINT	-0.092	1	0.139	0.176	-0.008	0.022	-0.045	-0.08	-0.048	-0.048	-0.048
LINE DELAY	0.065	0.139	1	0.087	0.111	-0.04	-0.06	-0.07	-0.039	-0.039	0.362
TIP ISSUE	-0.039	0.176	0.087	1	0.112	-0.09	-0.068	-0.04	-0.02	-0.02	-0.02

LACK OF GOVT AUTHO.	0.01	-0.008	0.111	0.112	1	0.056	-0.099	0.059	-0.056	-0.056	-0.056
ADMIN BOTTLENECK	0.069	0.022	-0.035	-0.086	0.056	1	-0.091	0.024	-0.06	-0.06	-0.06
ULLAGE CONSTRAINT	-0.211	-0.045	-0.064	-0.068	-0.099	-0.091	1	0.519	-0.048	-0.048	-0.048
EQUIP. BREAKDOWN	0.004	-0.084	-0.068	-0.035	0.059	0.024	0.519	1	-0.025	-0.025	-0.025
INADEQUATE BERTH	-0.116	-0.048	-0.039	-0.02	-0.056	-0.06	-0.048	-0.025	1	-0.014	-0.014
LOGISTICS DELAY	-0.116	-0.048	-0.039	-0.02	-0.056	-0.06	-0.048	-0.025	-0.014	1	-0.014
LACK OF CARGO HANDLING EQUIPMENT	0.239	-0.048	0.362	-0.02	-0.056	-0.06	-0.048	-0.025	-0.014	-0.014	1
NO BERTHING PROSPECT		0.222	0.293	0.374	0.467	0.283	0.037	0.486	0.167	0.167	0.022
FINANCIAL CONTRAINT	0.222		0.122	0.069	0.475	0.427	0.353	0.242	0.345	0.345	0.345
LINE DELAY	0.293	0.122		0.233	0.176	0.386	0.297	0.284	0.373	0.373	0.001
TIP ISSUE	0.374	0.069	0.233		0.174	0.237	0.285	0.384	0.434	0.434	0.434
LACK OF GOVT AUTHO.	0.467	0.475	0.176	0.174		0.321	0.204	0.31	0.319	0.319	0.319
ADMIN BOTTLENECK	0.283	0.427	0.386	0.237	0.321		0.224	0.419	0.307	0.307	0.307
ULLAGE CONSTRAINT	0.037	0.353	0.297	0.285	0.204	0.224		0	0.345	0.345	0.345
EQUIP. BREAKDOWN	0.486	0.242	0.284	0.384	0.31	0.419	0		0.418	0.418	0.418
INADEQUATE BERTH	0.167	0.345	0.373	0.434	0.319	0.307	0.345	0.418		0.453	0.453
LOGISTICS DELAY	0.167	0.345	0.373	0.434	0.319	0.307	0.345	0.418	0.453		0.453
LACK OF CARGO HANDLING EQUIPMENT	0.022	0.345	0.001	0.434	0.319	0.307	0.345	0.418	0.453	0.453	

The table above gives the correlation values for the variables only.

Table 6: Reproduced Correlations

		NO BERTHING PROSPECT	FIN. CONTRAINT	LINE DELAY	TIP ISSUE	LACK OF GOVT AUTHO.	ADMIN BOTTLENECK	ULLAGE CONSTRAINT	EQUIP. BREAKDOWN	INADEQUATE BERTH	LOGISTICS DELAY	LACK OF CARGO HANDLING EQUIPMENT
Reproduced Correlation	NO BERTHING PROSPECT	.568[a]	-0.215	0.204	-0.21	0.086	0.256	-0.249	-0.065	-0.189	-0.189	0.389
	FINANCIAL CONTRAINT	-0.215	.743[a]	0.221	0.355	-0.143	0.074	-0.02	-0.176	-0.17	-0.17	-0.079
	LINE DELAY	0.204	0.221	.622[a]	0.263	0.107	-0.195	-0.073	-0.055	-0.093	-0.093	0.548
	TIP ISSUE	-0.21	0.355	0.263	.496[a]	0.359	-0.147	-0.079	-0.079	-0.017	-0.017	-0.061
	LACK OF GOVT AUTHO.	0.086	-0.143	0.107	0.359	.830[a]	0.059	-0.145	0.119	-0.086	-0.086	-0.12
	ADMIN BOTTLENECK	0.256	0.074	-0.195	-0.147	0.059	.528[a]	-0.136	-0.018	-0.281	-0.281	-0.194
	ULLAGE CONSTRAINT	-0.249	-0.02	-0.073	-0.079	-0.145	-0.136	.806[a]	0.705	-0.062	-0.062	-0.047
	EQUIP. BREAKDOWN	-0.065	-0.176	-0.055	-0.079	0.119	-0.018	0.705	.742[a]	-0.133	-0.133	-0.02
	INADEQUATE BERTH	-0.189	-0.17	-0.093	-0.017	-0.086	-0.281	-0.062	-0.133	.774[a]	-0.24	-0.04
	LOGISTICS DELAY	-0.189	-0.17	-0.093	-0.017	-0.086	-0.281	-0.062	-0.133	-0.24	.774[a]	-0.04
	LACK OF CARGO HANDLING EQUIPMENT	0.389	-0.079	0.548	-0.061	-0.12	-0.194	-0.047	-0.02	-0.04	-0.04	.722[a]
Residual[b]	NO BERTHING PROSPECT		0.124	-0.139	0.171	-0.077	-0.187	0.038	0.069	0.073	0.073	-0.151
	FINANCIAL CONTRAINT	0.124		-0.082	-0.178	0.135	-0.052	-0.025	0.093	0.123	0.123	0.031
	LINE DELAY	-0.139	-0.082		-0.176	0.004	0.16	0.009	-0.013	0.054	0.054	-0.186
	TIP ISSUE	0.171	-0.178	-0.176		-0.247	0.061	0.011	0.044	-0.003	-0.003	0.041
	LACK OF GOVT AUTHO.	-0.077	0.135	0.004	-0.247		-0.004	0.046	-0.059	0.029	0.029	0.064
	ADMIN BOTTLENECK	-0.187	-0.052	0.16	0.061	-0.004		0.044	0.042	0.221	0.221	0.133

ULLAGE CONSTRAINT	0.038	-0.025	0.009	0.011	0.046	0.044		-0.186	0.014	0.014	0
EQUIP. BREAKDOWN	0.069	0.093	-0.013	0.044	-0.059	0.042	-0.186		0.108	0.108	-0.004
INADEQUATE BERTH	0.073	0.123	0.054	-0.003	0.029	0.221	0.014	0.108		0.226	0.026
LOGISTICS DELAY	0.073	0.123	0.054	-0.003	0.029	0.221	0.014	0.108	0.226		0.026
LACK OF CARGO HANDLING EQUIPMENT	-0.151	0.031	-0.186	0.041	0.064	0.133	0	-0.004	0.026	0.026	

The first part of the table presented above contains the reproduced correlations while the second part present the residuals of the values that were obtained for the values.

Reproduced Correlation: The correlation matrix called reproduced correlation is the correlation matrix that is based on the factors were being extracted from the analysis. It is expected that the values obtain and presented in the reproduced matrix should not be too far from the values in the original correlation matrix that is the two values should be very close. It is also expected that the values of the residuals matrix should be very close to zero if not zero value because it present the differences between the reproduced matrix and the original. The idea behind the result is to show whether the factors that were extracted from the analysis is accounting for a great deal of the variance in the original correlation matrix, and also whether these few factors can be taking to represent the original data and other factors. The diagonal values of the reproduced correlation table are already presented in the communalities table under the Extracted column.

Residual - the values in this part of the table represent the differences between the reproduced correlations and the original correlations.

5. Conclusion and Recommendation

The main thrust of this research was to ascertain the factors that cause delay in Tin Can Island Port. This was done by collecting and analyzing relevant data for the research. In addition, the results obtained were presented and discussed accordingly. The results shows that the following factors: Lack of Government Authority with 0.83 extraction value, Ullage Constraint with 0.806 extraction value, Inadequate Berthing with 0.774 extraction value, Logistics Delay with 0.774 extraction value, Financial Constraint with 0.743 extraction value, and Equipment Breakdown with 0.742 extraction value are the major factors that causes delay in Tin Island Port of Nigeria respectively. Therefore, the listed factors, (Lack of Government Authority, Ullage Constraint, Inadequate Berthing, Logistics Delay, Financial Constraint and Equipment Breakdown) should be attended to in order to resolve any delay problem at the port. For future research, the authors recommend that stake holders' engagement should be taking into considerations

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REFERENCES

[1]. Audige, M., Marding, L. (2001). Private Investment in Port Operations, Global perspective. A paper presentation at a workshop on Increasing Private sector Participation in Ports Operations 9th-11th July 2001
[2]. Adedotun, A.F., Onasanya, O.K., Alfred, O.O., Agboola, O.O., Okagbue, H.I. (2022). Measure of volatility and its forecasting: eveidence from Naira/Dollar exchange rate. *Mathematical Modelling of Engineering Problems*. 9(2), pp. 498-506
[3]. Agbakoba, O. (2001). Legal and Regulatory framework of concessioning in Ports Operation A paper presented at the sensitization workshop on Increasing private sector participation in seaports. 9th-11th July 2001
[4]. Gwandu, B. (2000). "Corruption: A bane of efficient Port Services "A paper presented at a National Seminar on Eradication of Corruption and Sharp Practices in Nigerian Ports 24th - 26th October.
[5]. Adizes, I. (1999). Corporate Lifecycles: How and why corporations grow and Die. Englewood Cliff, NJ: Prentice - Hall.
[6]. Babajide, A.A., Ishola, L.A., Adekunle, A.K. Achugamonu, B.U., Bosede, A.V. (2021). Financial sector reform and economic development in Nigeria. *Asian Economic and Financial Review*. 11(2), pp. 160-172
[7]. Beynon, M. (2002). An analysis of distribution of priority-values from Alternative comparison scales within AHP. *European Journal of Operational Research* 140:104-117.
[8]. Chwolka, A., Raith, M. (2001). Group Preference aggregation with the AHP implications for multiple issue agendas. *European Journal of Operational Research*. 132:176-186.
[9]. Chin-Yuan, C., Wen-Chih, H. (2001). Mutual Shore Cranes Interference exponent study at a container terminal. *Port of Kaohsiung maritime quarterly*. 10 (1) 65-77.
[10]. Dey, P.K. (2004). Benchmarking Project Management Practices of Caribean organization using analytic Hierarchy Process. *Benchmarking an International Journal.* 9, 326-356.
[11]. Emeghara, G.C. (1991). Capacity Utilization of Nigerian Ports. An unpublished M.Sc Thesis Presented to the Department of Transport Management Technology, PUT, Owerri.
[12]. Haralambides, H.E. and Veesutra, A.W. (2000). "Modeling performance in line shipping "Handbook of transport modeling. Pergamon Elsevier Science.
[13]. Hayes, B.H (1997). Measuring Customer Satisfaction. Survey, design, use and statistical analysis, and methods 2nd Edition ASQ Quality Press, Milwaukee Wl.
[14]. Okagbue, H.I., Odetunmibi, O.A., Ezenkwe, A.M., Offiah, I.B., and Akinsola, B.E. (2021). Factors affecting the study time of first and final year students of a world class university. *Journal of Physics Conference Series*. 1734(1), 012008
[15]. Chosh, B., and De, P. (2000). Impact of Performance Indicators and Labour endowment on traffic: empirical evidence from Indian Ports. *International Journal of Maritime Economics*. 2 259-281.
[16]. Addicco, M. (2000). Ghananian Shipping, Facts and Figures. Fair shipping publications
[17]. Smith, P.G.M. (2000). Ports in the MERCOSURE region published in International Navigation Association Bulletin, No 103, February edition.
[18]. Gwandu, B. (2001). "Extent of Private Sector Participation and Opportunities in Nigerian Seaports. A paper Presentation at a Sensitization Workshop on Increasing private Sector participation in Nigerian Seaports 9th -11th July.
[19]. Badejo, D. (2000). The role and implication of Governmental policies in charting the course of the maritime industry. A paper presented at the stakeholder's summit: Fighting corruption and ship practices in the Ports System 24-26th October.
[20]. De, P. & Ghosh, B. (2001). Causality Between performance and traffic an investigation with Indian Ports, proceedings of the 5th Annual Conference International Association of Maritime Economists.

[21]. Gayle, D.J. and Goodrich, J.N. (1990). "Exploring the Implications of Privatization and Reregulation in Global perspectives Printers Publishers, London.