

**Game Model: An Innovative Approach for Optimizing Competitive Efficiency of
Commercial Airlines in Rivers State**

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Abstract

This study seek to innovatively apply game model algorithm in optimizing strategic performance among the competing commercial airline firms in Rivers State. The objective of the study was to innovative apply game approach in obtaining optimal strategy among strategic option in the competitive industry. This study was necessitated as a result of the conflicting interests arising from 8 (eight) operating firms, in their strategic option to gain competitive dominance over each other. The study adopted a correlation design method with the aid of structured questionnaire as primary source of date for the study. Question items were drawn from 3 (three) research questions stated in the study. The population size was 8 firms, while the sample size was 72. The proportional sampling technique was used to select 9 staff which consisted of managers, and senior staff from each firm. Spearman correlation coefficient was used to analyze responses from respondents. Findings revealed that, among the least predictor variables measured, it was positively significant at the sign $0.61 (p) \geq 0.00$. It was indicative to conclude that, variable of the game measured provided a positive saddle point as optimal strategy in favor of row players. The outcome was suggestive amongst recommendations, that managers of commercial airlines should subject their competitive strategy to game analyses in order to maximally optimize dominance in the industry.

Introduction

The competitive state of our present organizations is dearly geared by the level of globalization and standard placed on the method, approach and technological innovation for doing business. The aviation industry most especially the commercial airlines operating in Nigerian air space are not in exception. In the work of Obanla, & Jashuka, (2022) and Esan, & Adangor, (2023), they posited that, the persistent drive to satisfy their customers has always triggered the focus for each airline dominance by developing strategic approaches to stay competitive ahead in the industry. Belfign, et al., (2023) avowed that, game theory is a quantitative model developed to enable organizations to strategically position their self to out rival their competitors in terms of resolving conflict, negotiations, and competitive edge. With the review of the works of Manson, & Gilbert, (2023); Shedrak, & Omorode, (2023) and Harry, & Ugoru, (2022), they all buttressed that competitive efficiency determined how well each firm in the airline industry adequately optimize customers based interest in the mode of their operation and services rendered, given the rate of automation and artificial intelligence. Given the fore understanding, Atoume, et al., (2023); Lishman, & Babatunde, (2023); and Opeyemi, et al., (2023) all asserted that game model approach offers an inbuilt strategies that enables the quest for dominance given the approaches such as pure strategy, mixed strategy

and dominance concept. Competitive efficiency enabled the studied organization to actualize and predict a stable operations index to evaluate return on investment, customers' satisfaction and loyalty as a result of repeat patronage among the commercial airlines operating in Rivers State, Nigeria. It was continent of the fore goings that this study was stimulated.

Statement of Problem

One of the strategic objective of organization is in the efficient transformation of allocated finance into satisfactory product of services that could stimulate customers to make repeat purchase over a period of time. Thus, the airline commercial industry is a unique sector whose mode of operational activity is highly technical, dictated by a high level of global standard and regulation, its key success matrix is hinged on technical complexity geared towards safety of life and property. Customer's preference to make a repeat is highly influence by the commensurate comfort they derive in services offered, timely scheduled departure, and timely arrival. As against this, firms ability to maintain have and maintain a market share given choice of customers pleasure for adventure if a function of strategic and competitive analyses amongst competitive firms, Although, several researchers has carried out studies on this subject, but the commercial airline has attracted less or no interest in the adoption of game model for competitive edge in the sector studied.

Conceptual Framework

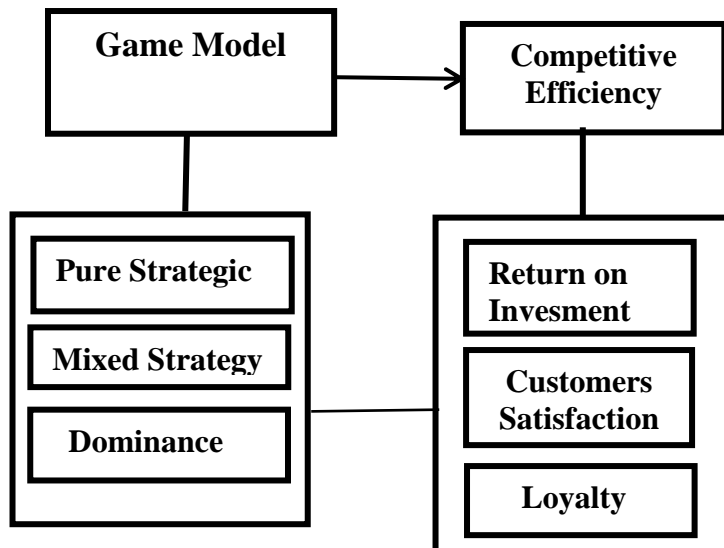


Figure 1. Adopted Conceptual Framework

Source: Researcher's Conceptualization (2023)

Objectives of the Study

1. To determine how pure strategy affects return on investment in the studied organizations
2. To determine how mixed strategy affects customer's satisfaction in the studied organizations
3. To determine how dominance affects loyalty in the studied organization

Research Questions

1. What is the relationship between pure strategy and return on investment in the studied organizations?
2. What is the relationship between mixed strategy and customer's satisfaction in the studied organizations?

3. What is the relationship between dominance and loyalty in the studied organization?

Statement of Hypotheses

H₀₁. There is no significant relationship between pure strategy and return on investment in the studied organizations

H₀₂. There is no significant relationship between mixed strategy and customer's satisfaction in the studied organizations.

H₀₃. There is no significant relationship between dominance and loyalty in the studied organization.

Scope of the Study

Basically, the scope of the study was centered on three key areas, which consisted of content, geographical and unit of analyses.

The content was primarily centered on the predictor and criteria variables, in accordance with both dimensions studied. The geographical, it actually encompassed the area of coverage in the application of these variables studied, with specific limitation to organizations under study in Port Harcourt, Rivers State. Whereas, the unit of analyses was both macro and micro which consisted of operations manager and operations engineers

Conceptual Review

The Theory of Game

Decision making is an aspect of top level management responsibility that present real life situations among different players interest to be accommodated. The theory was formulated by John von Neumann and his associate Oskar Morgenstern in the year 1944 (Christian. & Dennis, 2022). Chiome, & Walton, (2023) asserted that gaming is adopts a qualitative or algorithm approach in finding an optimal solution in resolving conflict, argument or competitive discord of divergent or collective interest. In the evaluation of Keshi, et al., (2023), they identified the basic assumptions of the theory were founded on: optimal strategy of player A or B as the saddle point; when the outcome of a game is positive (+) (Salakor, & Shade, 2022). The game is in favor of the A player; and when the game is negative, it is in favor of B player; when the outcome of the game is zero (0), it is a fair game, both player have perfect knowledge of the strategies to play, but each does not know which of the strategy to play by each other found in the work of Cagnati, & Anume, (2023).

Game and its Strategies

Pure strategy. This is a strategy that is strictly determined with the use of a saddle as premised in Eniya, et al., (2022). Mixed strategy. This is a strategy that adopts matrix formation of 2 by 2 matrix. Hence, it is a two person game. Morison, & Fashino, (2023) posited that, It is a class of probability distributions in which each player's choice is made independently of his choice

Dominance concept. It is a strategy that provides for both row and column penalty in the determination of interest to be chose in the evaluation for saddle point of optimal strategy (Oyinyechi, & Egbo, 2022).

Concept of Competition

One important aspect of economic life is competition based of the fundamental of perfect market condition where the taste and choice of consumer predicts demand as it relates to preference and quantity. Lusima, et al., (2023) alludes that, organization that produces or are of the same product line are bound to engage in conflicting interest arising from the proportionality of the consumers share to appropriate or control in their peculiar industrial setting. Hence, the quest to market dominance, product leadership by firms in the industry stimulate competitive conflict.

Efficiency

This is a subject of multiplication function in the variables that cumulate in the decision index. Ernest, & Okilo, (2023) in their contribution posited that, competitive efficiency is determined in the effective blind of strategic option that promotes actualization of organizational objectives, in positioning the organization to gain strategic edge, to assume more risk for the satisfaction of consumers' choice or taste in the market. Halima, & Farouk, (2022) alludes that, the competition is solely influenced by standardization, globalization, increasing rate of technological speed and the proportionality in the forces of demand and supply. Nevertheless, competition is found to dwell in the heart of marketing strategy, and the type of the marketing decision made by most firms defines the competition (Lusima, et al. 2023).

Theoretical Review

Monopolistic competitive theory by Edward Hastings Chamberlin in 1933 found in the work of Silvester, & Bashuru, (2023). Perfect Market Competition Theory by Loen Walras in 19th Century made popular by Kenneth Arrow and Garard Debreu in Bashiru, & Kelsly, (2023)

Empirical Review

Mahmudu, & Shitu, (2023) carried out a study on actualizing operational gains: game approach as a tool of saw mill firms in Osun State Orlu. & Melvin, (2023) conducted a study on strategic repositioning for competitive goal through the application of dominance concept of paint manufacturing firms in Delta State Barivule, & Tonaci, (2022) carried out a study on influencing operations competitiveness: adoption of mixed strategy game of Aluminum manufacturing firms in Ogun State.

Research Design

In the design of this study, the correlation method was used, with the use of a structured questionnaire as primary source of data. Also, the analytical technique adopted for the study was the Spearman Rank Correlation Co-efficient with the aid of Statistical Package for Social Service (SPSS) Version 25.00.

Population of Study

Thus, the population for this study was 8 commercial airline in the studied organizations, hence a census study.

Sample Size

The sample size of the study was fifth six (56), which comprised of managers and senior staff of the studied organizations. The researcher considered the size of 56 adoptable because of the sensitivity of subject studied. Thus, the purposive sample technique was suitable as adopted.

Table 1. List of Firms and Departments of Respondents

S/N	Firms	Status	Department		Total
			Operations	Maintenance	
1	Air Peace	Engineers	3	4	7
2	Allied Air	Engineers	2	3	5
3	Arik Air	Engineers	3	4	7
4	Dana Air	Engineers	4	5	9
5	Fly Aero	Engineers	3	5	8
6	First Nation	Engineers	2	5	7
7	Glory Air	Engineers	3	3	6
8	Med-View	Engineers	2	6	7
	Cumulative		22	35	56

Source: Field Survey (2023)

Instrumentation

The instrument for this study was questionnaires designed in a manner that enable the researcher gather as much information as possible from the respondents. The questionnaire contains 12 questions items, patterned after the modified 4 point Likert scales with response options such as: strongly agreed; agreed; disagreed, and strongly disagreed.

Validity of Instrument

The face value and expert opinion was adopted to ascertain validity of the instrument.

Reliability of Instrument

The reliability analyses technique used was Cronbach Alpha, and its degree of measure was considered reliable at 75.00 index, which indicated a high significant level of measurement.

Administration of Instrument

The research instrument used for the research was the questionnaire. 56 copies of questionnaires were administered to solicit responses from the respondents. The same number of 56 copies administered were retrieved personally within a relative time interval

Method of Data Analysis

Responses were analyzed and hypotheses were tested, all with the use Spearman of Rank Correlation Coefficient which is given in Equation below, while Regression Analyses was further used to test the effect of predictor variable (dimensions) on the criteria variable (dimensions).

$$\rho = 1 - \frac{6\sum(R1-R2)^2}{n(n^2-1)}$$

Where: ρ = Spearman correlation coefficient; n = Number of cases in the sample; $R1$ = independent variable; $R2$ = dependent variable; \sum = Summation.

The equation enabled the researcher to determine the nature of relationship between the independent ($R1$) and dependent ($R2$) variables in the study. The significance of an independent variable as it correlates with a dependent variable was ascertained using the t-test for small sample, are computed as given in Equation below:

$$t_c = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$$

Where: t_c = a measure of the significance of the correlation coefficient; r = Pearson product moment correlation coefficient; n = Number of cases or scores in the sample

Table 2: Correlation Matrix of Bivariate Analyses

		Pure	Mixed	Domi- nance	Return on Inv	Custo mers Sat	Loyalty
Pure	p-Value						
	2t - Value						
Mixed	p-Value	.44**					
	2t - Value	0.00					
Dominance	p-Value	0.28	0.15				
	2t - Value	0.60	0.29				
Return on Investment	p-Value	0.49	0.50	.855**			
	2t - Value	0.52	0.51	0.00			
Customers Satisfactn	p-Value	0.12	0.31	.79**	.81**		
	2t - Value	0.42	0.92	0.00	0.00		
Loyalty	p-Value	0.23	0.13	.82**	.67**	.84**	
	2t - Value	0.10	0.36	0.00	0.00	0.00	
	N	56	56	56	56	56	56

Source: SPSS 25.00 Output. Field Survey, (2023)

Table 2 revealed that all variable tested and analyzed were positively correlated. The degree of measure at which variables were positively significant were strong and very strong.

Table 3 Linear Regression of Pure Strategy on all Independent Variables

	B	Std. Error	Beta	t	Sig.
(Constant)	4.47	0.52		8.63	0.00
Return on Inv	0.83	0.17	0.84	4.85	0.00
Customers Satisfaction	-0.33	0.36	-0.29	-0.91	0.37
Loyalty	-0.63	0.31	-0.55	-2.00	0.05

Source: SPSS 25.00 Output. Field Survey, (2023)

Table 4 Linear Regression of Mixed Strategy on all Independent Variables

	B	Std. Error	Beta	t	Sig.
(Constant)	4.24	0.65		6.51	0.00
Return on Inv	-0.20	0.21	-0.20	-0.94	0.35
Customers Satisfaction	0.61	0.45	0.53	1.35	0.18
Loyalty	-0.57	0.40	-0.50	-1.45	0.15

Source: SPSS 25.00 Output. Field Survey, (2023)

Table 5 Linear Regression of Dominance on all Independent Variables

	B	Std. Error	Beta	t	Sig.
(Constant)	0.19	0.23		0.79	0.43
Return on Inv	0.21	0.08	0.24	2.71	0.01
Customers Satisfaction	0.14	0.16	0.14	0.87	0.39
Loyalty	0.60	0.14	0.60	4.22	0.00

Source: SPSS 25.00 Output. Field Survey, (2023)

Discussion of Finding

The desire to accomplish objective stated was revealed in table 2, 3, 4, and 5 above. Using table 2, it was evident that pure strategy satisfied the accomplishment of competitive efficiency in association with its dimensions stated. Thus, spearman value was sign at $0.49 > 0.00$ probability value, $0.52 > 0.00$ of customers satisfaction and $0.10 > 0.00$ of loyalty measure. . Hence, this indicated that competitive efficiency using return on investment has a positive correlation with pure strategy. Significantly, this is in conformity with the study of Fredrick, et al., (2023). Which states that pure strategy enables operation competitiveness by strategically improving decision mechanism.

Lasisi, et al., (2022) alluded that, optimality of mixed strategy game is a significant approach for actualizing organization objectives given the rate of competition and need for organizations have a larger market share. Respectfully, values derived indicated that return on investment, customers satisfaction and loyalty were signed at 0.50, 0.31, and $0.57 > 0.00$ probability values. Thus, they all had a positive significant relationship. This implied that commercial airlines studied are at more competitive advantage in their strategic decision, enabling a favorable behavior. Dominance was significantly actualized given the values derived in table 2. It reflected a positive significant correlation for a more effective competitive efficiency. The values stood at 0.85 return on investment, 0.79 customers satisfaction and $0.82 > 0.00$ probability value. Hence the commercial airline are more position for dominance or market leadership in the overall industrial sector. Hence, operational efficiency dictates stability, prominence, and growth metric.

The study further established cause and effect relationship using regression values on dimensions studied. Table 3 revealed that, at a positive increase in the unit of strategy adopted at the value of 0.83, pure strategy significantly positioned the studied organization at a better competitive efficiency in terms of return on investment. While for customers satisfaction and loyalty, at a decrease in the unity of pure strategic not employed negatively affected competitive efficiency at -0.33 and -0.63. Also, mixed strategy game negatively affected return on investment, customers' satisfaction and loyalty at the decrease in the unit of its prominence at the value of -0.20, -0.61 and -0.57. This further implied that commercial airlines would be competitively disadvantage at any of the values lesser. Finally, Elvis, & Justice, (2023) opined that, dominance concept was also instructive in its downward negative correlation between the dimension of competitive efficiency studied. It revealed that return on investment and customers' satisfaction were both signed at -0.21 and -0.14 respectively. This indicated that, at any decrease in the value of strategy adopted would significant impact on the competitive efficiency of the firms studied negatively. While a

positive increase as at 0.60 would positively signal strategic decision favorable for competitive efficiency.

Conclusion

Organizations are more competitively efficient in the objective to gain dominance, leadership and market share with the efficient application and strategic evaluation of the difference approached in game theory. Hence gaming a strategic decision mechanism that satisfactorily improves decision behavior of the commercial airlines studied. Given the conflict that arises in the competencies of decision rule of variables studied,, operations are significantly stabilized for profitability and strategic market dominance in the aviation industry studied.

Recommendations

1. Firms in the studied industry should be prepared to make gain with optimal saddle strategy to improve profitability index as outcome of game model
2. Firms in the industry should stimulate innovative approaches through game model in resolving competitive market share options
3. Firms should analytically determine viability in the application of game, before it is adoption considering customers preference or loyalty

Areas for Further Study

It would be most desirable to carry out a comparative study, given the dimensions adopted for the study, to ascertain disparity that may exist in the best used of a particular strategy over the other within the interval of 2 years

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