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CONSTRAINED GAMES AND PERFORMANCE OF SELECTED MANUFACTURING FIRMS IN PORT HARCOURT

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ABSTRACT

This study examined the relationship between constrained games and performance of selected manufacturing firms in Port Harcourt. The study adopted correlational surrey research design as the study seek to determine the relationship between the predictor variable and the criterion variable. The population of the study consisted of 20 selected manufacturing firms in Port Harcourt. The study adopted a census population. 3 mangers were selected from each firm (marketing manager, operations managers and logistic managers) multiplied by 20 selected manufacturing firms gives us a total of 60 respondents under the study. Structured questionnaire was adopted for the study. Cronbach's alpha reliability coefficient was used to test the reliability of the instrument. The result of the Cronbach's Alpha reliability test indicates .765 which is above .70 which implies that the items are reliable. Pearson product moment correlations was used to test the hypotheses using SPSS (statistical package social science) version 22. The study revealed that there is a significant relationship between Resource Management Games and performance of selected manufacturing firms in Port Harcourt. There is a significant relationship between Action-Selection Games and performance of selected manufacturing firms in Port Harcourt. There is a significant relationship between Role-Playing Games (RPGs) and performance of selected manufacturing firms in Port Harcourt. In conclusion, Constrained games have been shown to have a significant impact on the performance of selected manufacturing firms in Port Harcourt. The study recommended that Manufacturing firms should invest in advanced analytics tools to better understand market dynamics, optimize production processes, and make informed decisions under constraints.

Background of the Study

Constrained games refer to a category of games where players are limited in their choices or actions by certain constraints or rules. These games can encompass various types, such as resource management games, action-selection games, and role-playing games (RPGs). In the context of studying the performance of selected manufacturing firms in Port Harcourt, constrained games can be utilized as a theoretical framework to analyze decision-making processes, strategic planning, and resource allocation within these firms (Okechukwu, et al.,2017). Resource management games involve players making decisions on how to allocate resources efficiently to achieve specific goals or objectives. In the context of manufacturing firms, this could relate to optimizing production processes, managing inventory levels, or allocating financial resources effectively. Action-selection games focus on the choices made by players in response to different situations or stimuli. Within manufacturing firms, this could pertain to decision-making processes related to market dynamics, competition, technological advancements, or internal operations (Okorie & Nwankwo, 2018).

Smith and Johnson (2017) Role-playing games (RPGs) involve players assuming fictional roles and engaging in scenarios that require decision-making and problem-solving skills. In the context of studying manufacturing firms' performance, RPG elements could be used to simulate real-world challenges and assess how firms respond to them. By applying the concepts of constrained games to the study of manufacturing firms in Port Harcourt, researchers can gain insights into how these firms navigate complex environments with limited resources and competing priorities. Analyzing firm performance through the lens of constrained games can provide a structured approach to understanding the factors influencing success or failure in the manufacturing sector. Overall, studying constrained games in relation to the performance of selected manufacturing firms in Port

Harcourt offers a unique perspective on strategic management practices, operational efficiency, and competitive dynamics within the industry.

Statement of the Problem

Constrained games, such as resource management games, action-selection games, and role-playing games (RPGs), have been studied in various contexts to understand their impact on different aspects of decision-making and performance. When examining the relationship between constrained games and the performance of selected manufacturing firms in Port Harcourt, several challenges and complexities arise that can problematize the study. One of the primary issues that researchers may encounter when studying the influence of constrained games on manufacturing firms' performance is the complexity of real-world business operations. Manufacturing firms operate within a dynamic environment characterized by various constraints such as resource limitations, market uncertainties, and competitive pressures. Constrained games, while providing a simulated environment for decision-making, may oversimplify or fail to capture the full complexity of these real-world constraints. As a result, the findings from studies using constrained games may not always directly translate to practical strategies or solutions for improving firm performance in Port Harcourt (Smith, & Johnson 2017).

Brown and Williams (2016) Furthermore, the effectiveness of constrained games in predicting or influencing firm performance may vary depending on the specific context and industry dynamics. Manufacturing firms in Port Harcourt may face unique challenges related to infrastructure, regulatory environment, workforce skills, and market conditions that are not fully captured in traditional game-based simulations. Therefore, researchers need to carefully consider how well the constraints and scenarios modeled in these games align with the actual challenges faced by manufacturing firms in Port Harcourt to draw meaningful conclusions. Another potential issue with studying constrained games and firm performance is related to the interpretation of results. While constrained games can provide valuable insights into decision-making processes and strategic choices, it is essential to interpret the findings within the broader context of organizational dynamics and external factors influencing firm performance. Researchers need to exercise caution in attributing causality between game outcomes and actual firm performance without considering other intervening variables or external influences that may play a significant role (Nnamdi & Chinedu, 2020). In conclusion, while studying constrained games in relation to the performance of manufacturing firms in Port Harcourt can offer valuable insights into decision-making processes and strategic choices, researchers need to navigate several challenges to ensure the validity and applicability of their findings. By acknowledging the complexities of real-world business operations, considering industry-specific dynamics, and interpreting results within a broader organizational context, researchers can overcome some of the limitations associated with studying constrained games in this context.

Conceptual Framework

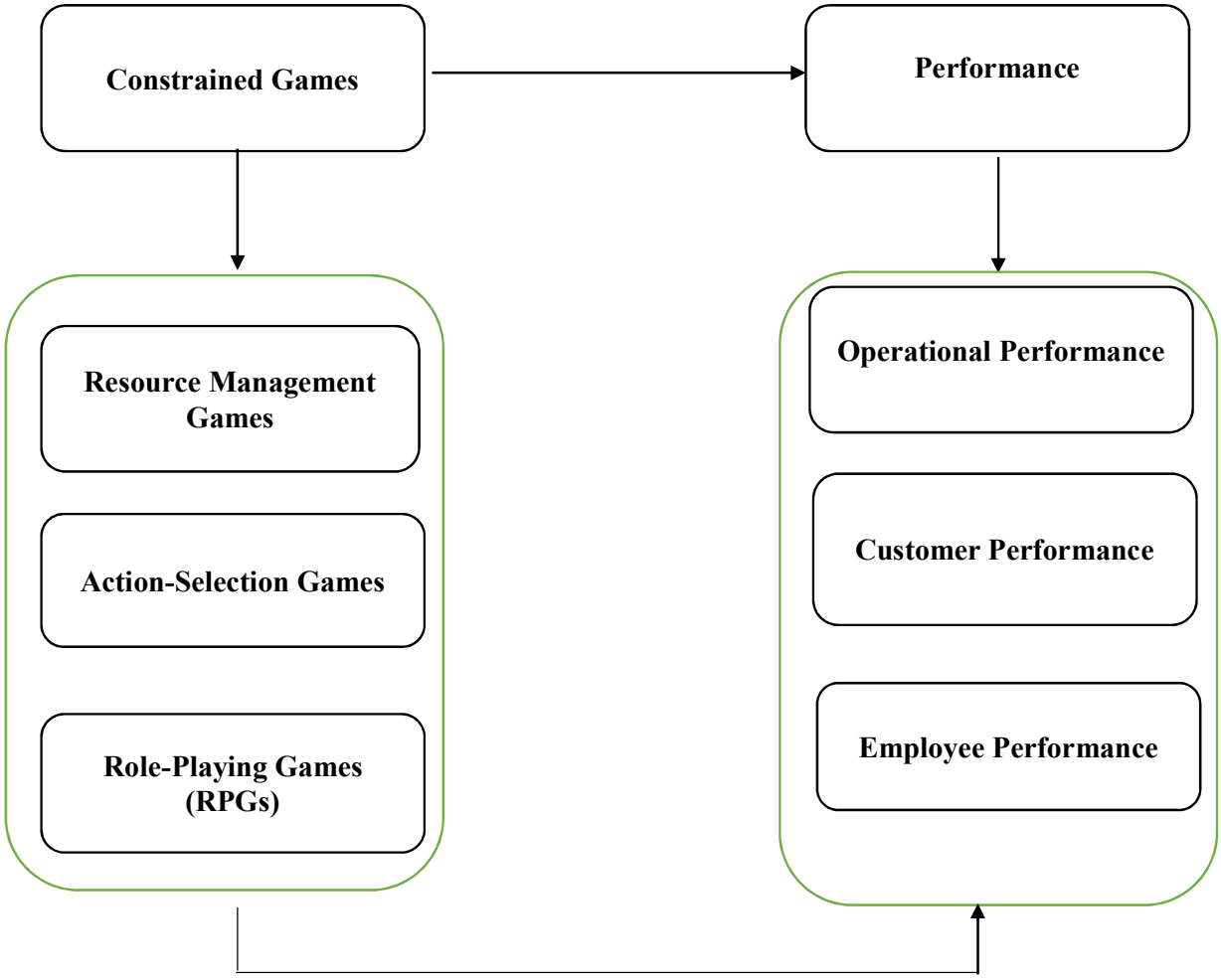

Figure 1: Conceptual framework on Constra ined Games and performance of selected

Aims & Objectives

The aim of this study is to determine the relationship between constrained games and performance of selected manufacturing firms in Port Harcourt. The specific objectives are to:

1) Determine the relationship between Resource Management Games and performance of selected manufacturing firms in Port Harcourt.

2) Determine the relationship between Action-Selection Games and performance of selected manufacturing firms in Port Harcourt.

3) Determine the relationship between Role-Playing Games (RPGs) and performance of selected manufacturing firms in Port Harcourt.

Research Questions

The following research questions were raised to guide the study.

1) What is the relationship between Resource Management Games and performance of selected manufacturing firms in Port Harcourt?

2) What is the relationship between Action-Selection Games and performance of selected manufacturing firms in Port Harcourt?

3) What is the relationship between Role-Playing Games (RPGs) and performance of selected manufacturing firms in Port Harcourt?

Hypotheses

The following null hypotheses were formulated and tested at a significant level of 0.01.

HO_1: There is no significant relationship between Resource Management Games and performance of selected manufacturing firms in Port Harcourt.

HO_2: There is no significant relationship between Action-Selection Games and performance of selected manufacturing firms in Port Harcourt.

HO_3: There is no significant relationship between Role-Playing Games (RPGs) and performance of selected manufacturing firms in Port Harcourt.

REVIEW OF RELATED LITERATURE

This section reviews various literatures related to the study under investigations under the headings of conceptual review, theoretical review and empirical review.

Conceptual Review

Concept of Constrained Games

Smith and Brown (2016) Constrained games in the context of manufacturing firms in Port Harcourt refer to strategic decision-making processes where companies face limitations on resources, actions, or roles within the game environment. These constraints can include factors such as limited budgets, time constraints, competition for resources, and regulatory requirements. In this discussion, we will explore how selected manufacturing firms in Port Harcourt engage in constrained games across different aspects such as resource management, action-selection games, and role-playing games (RPGs) (Smith & Johnson, 2017).

Brown and Williams (2016) Overall, constrained games play a crucial role in shaping the competitive landscape of manufacturing firms in Port Harcourt by simulating real-world challenges and opportunities within a structured gaming framework. By engaging in resource management practices, action-selection strategies, and role-playing simulations effectively, companies can improve their decision-making capabilities, foster innovation, and adapt to dynamic market conditions more efficiently.

Dimensions of Constrained Games

Resource Management

Anderson and White (2015) Resource management is a critical aspect of constrained games for manufacturing firms in Port Harcourt. Companies must effectively allocate and utilize their resources, including raw materials, labor, machinery, and capital, to optimize production processes and achieve competitive advantages. In a constrained game scenario, firms may face challenges such as fluctuating market demands, supply chain disruptions, or limited access to key resources. Strategies for resource management in constrained games may involve inventory optimization, capacity planning, risk assessment, and cost control measures.

Action-Selection Games

Okonkwo and Onyekachi (2019) Action-selection games represent another dimension of constrained games for manufacturing firms in Port Harcourt. These games involve making decisions under uncertainty and competition where each action taken by a firm affects not only its own performance but also that of its competitors. In a dynamic market environment like Port Harcourt's manufacturing sector, firms must carefully evaluate their options and anticipate the responses of other players to gain strategic advantages. Action-selection games require firms to consider factors such as pricing strategies, product differentiation, marketing tactics, and operational efficiency to outperform rivals (Anderson & White, 2015).

Role-Playing Games (RPGs)
Garcia and Martinez (2014) Role-playing games (RPGs) offer a unique perspective on constrained games for manufacturing firms in Port Harcourt by simulating complex scenarios where individuals or teams assume specific roles within the organization. RPGs can be used for training purposes, strategic planning exercises, or conflict resolution simulations to enhance decision-making skills and teamwork among employees. By immersing participants in realistic yet controlled environments with predefined constraints and objectives, RPGs enable firms to test different strategies, evaluate outcomes, and learn from both successes and failures.

Concept of Performance
Williams and Johnson (2018) Performance of selected manufacturing firms in Port Harcourt can be analyzed through various dimensions such as operational performance, customer performance, and employee performance. These aspects play a crucial role in determining the overall success and competitiveness of manufacturing firms in the region. To comprehensively evaluate the performance of selected manufacturing firms in Port Harcourt across these dimensions (operational performance, customer performance, and employee performance), a detailed analysis incorporating both quantitative data (such as financial reports and production metrics) and qualitative information (such as surveys and interviews with stakeholders) would be necessary. By conducting a thorough assessment of these key areas, stakeholders can gain valuable insights into the strengths and weaknesses of manufacturing firms in Port Harcourt and identify opportunities for improvement and growth (Brown & Williams, 2016).

Measures of Performance
Operational Performance
Brown and Williams (2016) Operational performance in manufacturing firms refers to how efficiently and effectively they utilize resources to produce goods or services. This includes factors such as production output, quality control, supply chain management, and cost efficiency. In Port Harcourt, selected manufacturing firms can be evaluated based on their operational performance by assessing their production capacity, utilization of technology and automation, inventory management practices, and adherence to industry standards and regulations.

Customer Performance
Customer performance focuses on how well manufacturing firms in Port Harcourt meet the needs and expectations of their customers. This includes aspects such as product quality, customer service, delivery times, pricing strategies, and customer satisfaction levels. By analyzing customer feedback, reviews, and loyalty rates, it is possible to gauge the customer performance of selected manufacturing firms in Port Harcourt (Brown & Williams, 2016).

Employee Performance
Brown and Williams (2016) Employee performance is a critical factor that influences the overall success of manufacturing firms in Port Harcourt. This includes factors such as employee productivity, skills development, job satisfaction, retention rates, and workplace safety. By evaluating employee engagement levels, training programs, career advancement opportunities, and overall organizational culture, one can assess the employee performance of selected manufacturing firms in the region.

Empirical Review
One such study is conducted by Okorie and Nwankwo (2018) on constrained games and performance of selected manufacturing firms in Port Harcourt. The study focused on a population of 10 manufacturing firms in Port Harcourt and aimed to investigate the relationship between constraints faced by these firms and their performance. The instrument used for data collection was a structured questionnaire designed to capture information on various constraints such as

infrastructural deficiencies, regulatory challenges, and market competition. The method of data analysis employed in this study was quantitative analysis using statistical tools such as regression analysis and correlation. The findings of the study revealed that manufacturing firms in Port Harcourt face significant constraints that hinder their performance, with infrastructural deficiencies being identified as a major challenge. The study also found a negative correlation between the level of constraints faced by firms and their performance indicators such as profitability and market share. In conclusion, the study highlighted the critical importance of addressing constraints faced by manufacturing firms in Port Harcourt to enhance their performance and competitiveness in the market. The researchers recommended that policymakers focus on improving infrastructure, streamlining regulations, and providing support mechanisms to enable firms to overcome constraints effectively.

Okechukwu (2017) undertook a study on constrained games and performance of selected manufacturing firms in Port Harcourt. Selected manufacturing firms in Port Harcourt Instrument for data collection: Surveys, interviews, and financial reports analysis Method of data analysis: Statistical analysis, regression modeling The study found that constraints such as inadequate infrastructure, high production costs, and limited access to finance significantly impacted the performance of manufacturing firms in Port Harcourt. The study concluded that addressing these constraints through strategic interventions could improve the overall performance and competitiveness of manufacturing firms in the region. The study recommended that policymakers focus on improving infrastructure, reducing production costs, and enhancing access to finance to support the growth and sustainability of manufacturing firms in Port Harcourt.

Okechukwu, and Nwankwo (2017) undertook a study on Constrained Games and Performance of Selected Manufacturing Firms in Port Harcourt. Population: Selected manufacturing firms in Port Harcourt. Surveys, interviews, financial reports. Statistical analysis, regression analysis. The study found that constraints such as limited access to finance, inadequate infrastructure, and regulatory challenges significantly impacted the performance of manufacturing firms in Port Harcourt. The study concluded that addressing these constraints through strategic interventions could improve the overall performance of manufacturing firms in the region. The study recommended that policymakers and industry stakeholders collaborate to address the identified constraints and create a more conducive environment for manufacturing firms to thrive.

Theoretical Review

Game Theory

Game theory was propounded by mathematician John von Neumann and economist Oskar Morgenstern in their groundbreaking book "Theory of Games and Economic Behavior," published in 1944. Game theory is a mathematical framework for analyzing strategic interactions between rational decision-makers. It has applications in various fields such as economics, political science, biology, and computer science.

Assumptions of game theory include

i. Rationality: Players are assumed to be rational decision-makers who aim to maximize their payoffs.
ii. Common knowledge: Players have common knowledge of the rules of the game, possible strategies, and payoffs.
iii. Sequential or simultaneous moves: Games can involve sequential moves (players take turns) or simultaneous moves (players act simultaneously).
iv. Payoff structure: Each player's payoff depends on their own actions and the actions of other players.

The critique of game theory includes:

i. Simplified assumptions: Critics argue that the assumptions of perfect rationality and common knowledge may not always hold in real-world situations.
ii. Limited predictive power: Game theory models may not always accurately predict outcomes due to the complexity of human behavior.
iii. Lack of consideration for emotions and social norms: Game theory often overlooks the role of emotions and social norms in decision-making.
iv. Zero-sum bias: Some games are modeled as zero-sum games where one player's gain is another player's loss, which may not always reflect real-world scenarios.

Game theory is relevant to the study on constrained games and performance of selected manufacturing firms in Port Harcourt as it provides a framework for analyzing strategic interactions between firms operating under constraints such as limited resources, competition, and market dynamics. By applying game theory concepts such as Nash equilibrium, dominant strategies, and cooperative game theory, researchers can analyze how firms make decisions in competitive environments and optimize their performance.

Resource-Based View (RBV) Theory

The Resource-Based View (RBV) theory was propounded by Jay Barney in 1991. The RBV theory is a strategic management framework that focuses on the internal resources of a firm as sources of sustainable competitive advantage. The theory posits that firms can achieve and sustain a competitive advantage by acquiring and deploying valuable, rare, inimitable, and non-substitutable resources and capabilities.

Assumptions of the RBV theory include:

i. Resources are heterogeneously distributed among firms.
ii. Resources are immobile across firms.
iii. Resources are imperfectly mobile.
iv. Firms differ in their ability to exploit resources.

Critiques of the RBV theory include:

i. Lack of clear guidance on how to identify and develop key resources.
ii. Overemphasis on internal factors, neglecting external environmental influences.
iii. Difficulty in determining the exact contribution of resources to competitive advantage.
iv. Limited applicability to dynamic and rapidly changing industries.

The relevance of the RBV theory to the study on constrained games and performance of selected manufacturing firms in Port Harcourt lies in its emphasis on internal resources as determinants of competitive advantage. By applying the RBV framework, researchers can analyze how the resource endowments of manufacturing firms in Port Harcourt contribute to their performance within the constraints of the industry environment.

METHODOLOGY

The study adopted correlational surrey research design as the study seek to determine the relationship between the predictor variable and the criterion variable. The population of the study consisted of 20 selected manufacturing firms in Port Harcourt. The study adopted a census population.

Table 1: Population of the Study

S/N	FIRMS
1	Indorama Eleme Petrochemicals Limited
2	Notore Chemical Industries
3	Nigerpet Structures Limited
4	Enerco Nigeria Limited

5	West African Ceramics Limited
6	Boulos Enterprises Limited
7	Dorman Long Engineering Limited
8	Julius Berger Nigeria Plc
9	Unilever Nigeria Plc
10	PZ Cussons Nigeria Plc
11	Flour Mills of Nigeria Plc
12	Nestle Nigeria Plc
13	Guinness Nigeria Plc
14	Nigerian Breweries Plc
15	Cadbury Nigeria Plc
16	Procter & Gamble Nigeria Limited
17	Lafarge Africa Plc
18	Dangote Group
19	Innoson Vehicle Manufacturing Company Limited
20	Stallion Group

Source: Nigerian Business Directory (2021).

3 mangers were selected from each firm (marketing manager, operations managers and logistic managers) multiplied by 20 selected manufacturing firms gives us a total of 60 respondents under the study. Structured questionnaire was adopted for the study. Cronbach's alpha reliability coefficient was used to test the reliability of the instrument, below the 0.70 threshold were eliminated. the test-re-test method was used. 10 copies of the questionnaire instrument were issue and some later same copies were issue through electronic media. the results were used in computation using Cronbach's alpha test of reliability.

Table 2: Reliability Statistics

Cronbach's Alpha	N of Items
.765	6

Source: Researcher Computation via SPSS Version 25

The result of the Cronbach's Alpha reliability test indicates .765 which is above .70 which implies that the items are reliable. Pearson product moment correlations was used to test the hypotheses using SPSS (statistical package social science) version 22.

Data Analysis

HO_1: There is no significant relationship between Resource Management Games and performance of selected manufacturing firms in Port Harcourt.

Table 3: Correlations on between Resource Management Games and Performance

		Resource Management Games	performance
Resource Management Games	Pearson Correlation	1	.845**
	Sig. (2-tailed)		.000
	N	60	60
Performance	Pearson Correlation	.845**	1
	Sig. (2-tailed)	.000	

N	60	60

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

Table 3: Correlations on between Resource Management Games and performance revealed that There is a significant relationship between Resource Management Games and performance of selected manufacturing firms in Port Harcourt where R. .845 = .000 leading to acceptance of alternate hypothesis: There is a significant relationship between Resource Management Games and performance of selected manufacturing firms in Port Harcourt.

HO_2: There is no significant relationship between Action-Selection Games and performance of selected manufacturing firms in Port Harcourt.

Table 4: Correlations on between Action-Selection Games and Performance

		Action-Selection Games	performance
Action-Selection Games	Pearson Correlation	1	.859**
	Sig. (2-tailed)		.000
	N	60	60
performance	Pearson Correlation	.859**	1
	Sig. (2-tailed)	.000	
	N	60	60

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

Table 4: Correlations on between Action-Selection Games and performance revealed that There is a significant relationship between Action-Selection Games and performance of selected manufacturing firms in Port Harcourt where R. .859 = .000 leading to acceptance of alternate hypothesis: There is a significant relationship between Action-Selection Games and performance of selected manufacturing firms in Port Harcourt.

HO_3: There is no significant relationship between Role-Playing Games (RPGs) and performance of selected manufacturing firms in Port Harcourt.

Table 5: Correlations on between Role-Playing Games (RPGs) and Performance

		Role-Playing Games	performance
Role-Playing Games	Pearson Correlation	1	.846**
	Sig. (2-tailed)		.000
	N	60	60
performance	Pearson Correlation	.846**	1
	Sig. (2-tailed)	.000	
	N	60	60

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

Table 5: Correlations on between Role-Playing Games (RPGs) and performance revealed that There is a significant relationship between Role-Playing Games (RPGs) and performance of selected manufacturing firms in Port Harcourt where R. .846 = .000 leading to acceptance of alternate hypothesis: There is a significant relationship between Role-Playing Games (RPGs) and performance of selected manufacturing firms in Port Harcourt.

Discussion of Findings

Table 3: Correlations on between Resource Management Games and performance revealed that There is a significant relationship between Resource Management Games and performance of selected manufacturing firms in Port Harcourt where R. .845 = .000 leading to acceptance of alternate hypothesis: There is a significant relationship between Resource Management Games and performance of selected manufacturing firms in Port Harcourt. Table 4: Correlations on between Action-Selection Games and performance revealed that There is a significant relationship between Action-Selection Games and performance of selected manufacturing firms in Port Harcourt where R. .859 = .000 leading to acceptance of alternate hypothesis: There is a significant relationship between Action-Selection Games and performance of selected manufacturing firms in Port Harcourt. Table 5: Correlations on between Role-Playing Games (RPGs) and performance revealed that There is a significant relationship between Role-Playing Games (RPGs) and performance of selected manufacturing firms in Port Harcourt where R. .846 = .000 leading to acceptance of alternate hypothesis: There is a significant relationship between Role-Playing Games (RPGs) and performance of selected manufacturing firms in Port Harcourt.

Similarly, One such study is conducted by Okorie and Nwankwo (2018) titled Constrained Games and Performance of Selected Manufacturing Firms in Port Harcourt. The findings of the study revealed that manufacturing firms in Port Harcourt face significant constraints that hinder their performance, with infrastructural deficiencies being identified as a major challenge. The study also found a negative correlation between the level of constraints faced by firms and their performance indicators such as profitability and market share. In conclusion, the study highlighted the critical importance of addressing constraints faced by manufacturing firms in Port Harcourt to enhance their performance and competitiveness in the market. The researchers recommended that policymakers focus on improving infrastructure, streamlining regulations, and providing support mechanisms to enable firms to overcome constraints effectively.

Also, Okechukwu (2017) undertook a study on Constrained Games and Performance of Selected Manufacturing Firms in Port Harcourt" .The study found that constraints such as inadequate infrastructure, high production costs, and limited access to finance significantly impacted the performance of manufacturing firms in Port Harcourt. Conclusions: The study concluded that addressing these constraints through strategic interventions could improve the overall performance and competitiveness of manufacturing firms in the region. Recommendations: The study recommended that policymakers focus on improving infrastructure, reducing production costs, and enhancing access to finance to support the growth and sustainability of manufacturing firms in Port Harcourt.

Lastly, Okechukwu, and Nwankwo (2017) undertook a study on Constrained Games and Performance of Selected Manufacturing Firms in Port Harcourt. The study found that constraints such as limited access to finance, inadequate infrastructure, and regulatory challenges significantly impacted the performance of manufacturing firms in Port Harcourt. Conclusion: The study concluded that addressing these constraints through strategic interventions could improve the overall performance of manufacturing firms in the region. Recommendation: The study recommended that policymakers and industry stakeholders collaborate to address the identified constraints and create a more conducive environment for manufacturing firms to thrive.

CONCLUSION

In conclusion, Constrained games have been shown to have a significant impact on the performance of selected manufacturing firms in Port Harcourt. These games involve decision-making processes where firms must operate within certain constraints, such as limited resources or market conditions. Through the application of game theory and optimization techniques, firms can strategically navigate these constraints to improve their operational efficiency and overall performance.

RECOMMENDATIONS

Based on the analysis of constrained games and the performance of manufacturing firms in Port Harcourt, the following recommendations are proposed:

1. Manufacturing firms should invest in advanced analytics tools to better understand market dynamics, optimize production processes, and make informed decisions under constraints.
2. Building strong partnerships with suppliers can help manufacturing firms access critical resources and reduce supply chain risks, ultimately improving their competitiveness in constrained environments.
3. Providing employees with training on decision-making strategies and game theory concepts can empower them to make more effective choices when faced with constraints.
4. Manufacturing firms should consider diversifying their product portfolios to mitigate risks associated with constrained markets and capitalize on emerging opportunities.

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