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UNICAF UNIVERSITY GRADUATE STUDENT PAPERS (UGraSP)

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Dear Readers,

Welcome to the Second Unicaf University Graduate Student Papers (UGraSP), a platform showcasing the innovative research and scholarly contributions of our doctoral students. It is with great pride that I introduce this special collection, a product of the Unicaf University Graduate Conference (UGraC 2023), where emerging scholars engage in critical inquiry and academic discourse.

As the Pro Vice-Chancellor, Teaching and Learning and the Principal Editor of the Unicaf Online Journal, I have witnessed first-hand the dedication, intellectual curiosity, and perseverance that define our doctoral students. This collection reflects their commitment to addressing real-world challenges through rigorous research and analysis.

This edition brings together studies that span key areas of education, leadership, sustainability, governance, and financial management. From the impact of resource accessibility on mathematics performance to the role of IFRS adoption in earnings management, and from circular economy approaches to sports leadership training, these papers contribute valuable insights to their respective fields.

This publication stands as a testament to Unicaf University's dedication to fostering a culture of academic excellence, innovation, and knowledge dissemination. I invite you to explore these pages, engage with the findings, and join us in celebrating the outstanding research of our doctoral students.

Thank you for being part of this academic journey.

Kind Regards,

Dr Elena Papadopoulou
Pro Vice-Chancellor, Teaching and Learning
Principal Editor, Unicaf Online Journal

Dear Esteemed Readers,

I would like to extend my warm greetings and congratulations on this special occasion as we present the second volume of the Unicaf University Graduate Student Papers (UGraSP). As the Dean of the School of Doctoral Studies at Unicaf University, I am proud to witness our doctoral students' journey, which has led to this volume.

Having actively participated in the first four Unicaf University Graduate Conferences (UGraC) that paved the way for this collection of papers, I can attest to our students' dedication to academic quality. It has been an honour to watch them grow from the start of their research to successful graduation, now contributing their insights to academia.

The UGraSP series exemplifies our commitment to fostering rigorous intellectual exploration, encouraging scholarly inquiry, and nurturing the next generation of scholars. I extend my gratitude to our students for their hard work and dedication to making this publication possible. Through their research, our doctoral students have enriched their fields and made meaningful contributions to their communities, reflecting our dedication to research and education excellence. The topics presented align with Unicaf's commitment to environmental, social, and corporate governance, supporting the growth of local communities.

I am expressing my appreciation to our dedicated faculty and staff members for their solid and invaluable support throughout this entire endeavour. Without their commitment, expertise, and tireless efforts, the journey of our doctoral students and the successful publication of this volume would not have been possible.

In marking this significant moment with the publication of the second volume, we envisage future volumes which will serve as a continuing example of scholarly excellence and intellectual exploration.

Warm regards,

Dr Olga Novokhatskaya
Dean, School of Doctoral Studies
Unicaf University

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Introduction

In today's rapidly evolving academic and societal landscape, the intersection of Education and Business Administration offers a fertile ground for interdisciplinary exploration. This special issue, curated by the UNICAF University School of Doctoral Studies, brings together diverse research contributions that reflect the dynamic interplay between these fields. As the boundaries between academic disciplines continue to blur, the fusion of educational theory with business practice emerges as a powerful avenue for understanding and addressing complex global challenges. This issue transcends traditional academic silos, demonstrating how knowledge from both domains can coalesce to inform more effective policies, equitable practices, and sustainable innovations.

The contributions featured in this special issue extend far beyond the realm of individual scholarly accomplishment—they serve as catalysts for critical dialogue, interdisciplinary synergy, and cross-sectoral engagement. Each piece contributes to a broader intellectual ecosystem, where theory is not confined to the abstract, but actively intersects with lived realities, institutional practices, and societal transformation. These works exemplify how rigorous academic inquiry can translate into actionable insights, shaping pedagogical strategies, informing public policy, guiding ethical leadership, and reimagining organisational structures in diverse contexts. From foundational questions in education to the strategic imperatives of business administration, the research assembled here affirms a shared commitment to innovation, equity, and systemic impact.

This issue does more than chronicle research—it constructs a vibrant platform where knowledge is mobilised, ideas are contested, and solutions are envisioned. It invites reflection, provokes inquiry, and offers a meeting point for scholars, practitioners, educators, policymakers, and community leaders navigating a rapidly changing world. In doing so, it challenges us to see scholarship not as an end in itself, but as a living, evolving force capable of driving meaningful change across institutions and borders. As you immerse yourself in the dialogues and discoveries presented, we encourage you to trace the thematic currents that bind these works together—currents grounded in a collective pursuit of academic excellence, transformative impact, and a more inclusive, sustainable future for all.

This special issue invites readers to listen closely—not only to the arguments presented, but to the subtleties that lie between the lines: the theoretical undercurrents, the contextual harmonies, and the methodological rigor that form the architecture of scholarly work.

In a world increasingly shaped by interconnected challenges, research that bridges education, environment, governance, and social transformation is more vital than ever. In "Impact of School-Related Resource Accessibility on the Mathematics Performance of IBDP Learners in South Africa and Singapore", Abel Wilson Magongo and Muraina Kamilu Olanrewaju examine how educational inequality manifests across borders. By comparing International Baccalaureate learners in two distinct contexts, their study highlights the critical role that access to resources plays in student achievement.

Urban sustainability continues to demand innovative strategies. In "Sustainable Plastic Waste Management Transition in Municipal Households of an African Megacity: Circular Economy and Transition Management Performance in Lagos", Clarkson I. Ojogun and Reginald D. Gwizai turn their attention to Lagos, unpacking how transition management frameworks and circular economy practices can reshape waste systems at the municipal level.

Integrity in sport is a growing global concern. Glenn Cheddie and Patricia Nchimunya Shansonga Kamanga, in "Exploring the Effectiveness of Sport Leadership Training that Engages Trinidadian Athletes as Whistle-blowers", delve into the empowering potential of leadership training to cultivate ethical responsibility among athletes. Their study opens up critical questions about accountability and moral courage in competitive sports.

Science communication can catalyse change when rooted in community engagement. In "Influence of Science Communication in Education Using Students as Purveyors of Knowledge on Technology Adoption by Women in Uganda", Grace Lonyo Prospero Ocheng and Melody Ndidi Modebelu investigate how student-led initiatives can influence technology uptake among women, particularly in underserved areas. Their findings reveal education's potential as a conduit for empowerment.

The intersection of education and environmental stewardship comes into focus in "Assessing the Impact of Waste Management Challenges on Pupils' Learning in Selected Public Schools in Kitwe District, Zambia". Judith Nakamba and Melody Ndidi Modebelu expose the overlooked yet urgent issue of how infrastructural challenges impact learning outcomes. Their work calls attention to the environmental dimensions of educational equity.

Corporate governance and financial ethics are central to economic development. In "IFRS Adoption and Earnings Management in Ghana", Nathaniel Owusu Ansah and Ali Saleh Alarussi probe the complex relationship between international financial standards and corporate reporting behavior. Their research adds depth to the ongoing discourse on transparency and accountability in emerging markets.

Finally, in "The Importance of Clinical Supervision for Guidance Teachers in Botswana Schools", Wyllie M. Tshidi and Muraina Kamilu Olanrewaju explore the often-underappreciated domain of teacher support systems. Their study emphasises how structured clinical supervision can enhance the efficacy of guidance teachers, ultimately supporting students' emotional and academic growth.

Collectively, these contributions reflect a shared commitment to understanding and addressing the multifaceted challenges of our time. From classrooms to boardrooms, sports fields to city streets, this issue highlights research that not only diagnoses problems but also envisions solutions for a more equitable and sustainable future. Each scholarly work featured here is a distinct strand in the ever-evolving tapestry of global knowledge. Collectively, they exemplify the UNICAF University School of Doctoral Studies' unwavering dedication to academic rigor, thought leadership, and visionary research. As you engage with these contributions, prepare to have your intellectual horizons expanded and your passion for scholarly exploration reignited.

Dr Isaak Papadopoulos
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Impact of School-Related Resource Accessibility on the Mathematics Performance of IBDP Learners in South Africa and Singapore

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Abstract

This study explored the relationship between accessibility to school-related resources and academic achievement among IBDP 2 Mathematics AA learners from South Africa and Singapore. Eight IBDP schools were selected to conduct the study, including all the IBDP schools in South Africa, and a sample of IBDP 2 Mathematics AA learners was chosen through systematic random sampling. The study included 169 learners from eight schools, including 89 learners from three schools in South Africa and 80 from five schools in Singapore. The researchers used a 170-item questionnaire to collect data, with most items being adopted from the TIMSS Advance 2015. The questionnaire was reliable and valid, with a Cronbach alpha of 1.0 overall for reliability and a validity of 93% of the questionnaire items, as tested using a two-tailed bivariate correlation at $\alpha = 0.05$ in the PSPP statistics program. Results indicated a positive relationship between school-related resource accessibility and learner achievement in both South Africa ($R = 0.58$, $R^2 = 0.33$, and $F = 3.91$ at $\alpha = 0.05$, $p = 0.000$) and Singapore ($R = 0.58$, $R^2 = 0.34$, and $F = 3.58$ at $\alpha = 0.05$, $p = 0.001$). It is recommended that South Africa invest more in school-related resources and that future research on pedagogical approaches in IBDP schools be considered.

Keywords: Accessibility, mathematics analysis higher level, pedagogical approaches, mathematics achievement, learner performance, standard level, school-related resources.

Introduction

South African grade-eight learners perform poorly in international Mathematics tests compared to Singaporean learners. Despite the Department of Basic Education's efforts, the education system has yet to improve. For example, in the TIMSS studies conducted in South Africa since 1995, South Africa got position 45 out of 45 countries, 38 out of 38 in 1999, 52 out of 52 in 2003, 41 out of 42 in 2011, 38 out of 39 in 2015, 38 out of 39 in 2019. Singapore got position one in all these years and two in 2011 (International Association for the Evaluation of Educational Achievement (IEA), 2019; Magongo, 2023; Mullis et al., 2020). Unlike in Singapore, the TIMSS studies conducted in South Africa compare learners from different curricula (Magongo, 2023). A study comparing International Baccalaureate Diploma Programme Year 2 Mathematics AA learners from South Africa and Singapore identified the real Mathematics problem in South Africa (Magongo, 2023).

South African learners perform poorly in Mathematics compared to other countries. Poor performance means fewer learners take mathematics-related careers at university, producing less mathematically skilled personnel, which is highly needed in South Africa (Spaull & Kotze, 2015). Testing learners internationally who are using the same curriculum will remove the assumption that poor performance in the study's results from the difference in mathematics curricula offered in each country.

The article discusses the significance of the International Baccalaureate (IB) programme in international schools. The research aims to compare the performance of IBDP 2 Mathematics AA learners in South Africa and Singapore using end-of-previous-year test scores. A correlational research design was used to compare school-related resources as determinants of Mathematics achievement among International Baccalaureate Diploma learners in the two countries.

Global benchmarking studies show that South African learners perform poorly in Mathematics compared to other regions (Adler & Pillay, 2017; Spaull & Pretorius, 2019; Spaull &

Kotze, 2015). Past interventions have yet to be successful. South African independent schools perform better than public schools in Mathematics. The current study investigates whether accessibility of school-related resources determines Mathematics achievement among International Baccalaureate Diploma Learners in South Africa and Singapore. The study compares learners using the same curriculum in both countries to determine if school-related resources are the fundamental determinants of South Africa's poor performance in mathematics. This research has filled the gap by investigating the relationship between accessibility to school-related resources and academic achievement among IBDP 2 Mathematics AA learners from South Africa and Singapore. It addresses the disparity in Mathematics performance between South African and Singaporean learners, providing insights into the factors affecting academic achievement within the IBDP framework and highlighting the need for investment in school-related resources in South Africa.

This study aims to identify areas for reform in teaching Mathematics and the IBDP Mathematics AA course in South Africa. The findings will guide South African policymakers and stakeholders in identifying interventions to improve Mathematics achievement. Policymakers, educators, and other stakeholders eagerly await the study's results.

Literature review

Mueni and Githinji (2019) discovered that teaching materials can facilitate the acquisition of Mathematics skills. As a result, educators and stakeholders are urging learners to allocate more resources to ensure that sufficient teaching-learning materials are accessible and available.

Importance of Teaching Materials in Facilitating Mathematics Skills:

Adegoke and Mefun (2016) studied the availability and sufficiency of material and human resources for implementing Nigeria's recently presented Mathematics school curriculum. They found that without the accessibility and availability of teaching materials in schools and valuable foundational infrastructure, the ability-based educational curriculum, no matter how well designed, will not be adequately executed. Olubunmi (2020) confirms that the availability and accessibility of educational resources improve schools' effectiveness and outcomes. These are fundamental elements that can lead to excellent academic achievements in learners. Teaching and learning resources provide students with equal opportunities and attention to acquire and practice skills (Olubunmi, 2020).

Impact of Resource Accessibility and Availability on Educational Outcomes:

The availability and accessibility of appropriate instructional resources significantly influence a learner's academic performance, according to Olubunmi (2020). However, the proper amount of instructional resources needs to be clarified. Resource accessibility and availability in schools are inadequate concerning textbook appropriation, infrastructure resources, and the learner-teacher ratio, as reported by the World Bank. Various studies have validated the significance of ICT availability in schools as a critical factor in its utilisation for learning, as highlighted by Drossel et al. (2017).

Role of Instructional Resources in Academic Performance:

Mnuabueze (2016) researched the standard and quality of resource maintenance, utilisation, and accessibility in education. The researcher found that school-related resources, including material and human resources for instructional purposes, play a significant role in proper instruction and learning. Gubbels et al. (2020) investigated the accessibility, utilisation, and attitudes of learners towards digital resources. The study revealed that moderate accessibility and utilisation of digital devices are positively correlated with electronically assessed reading achievement in Dutch learners. However, excessive accessibility and utilisation of digital devices have a negative relationship with Dutch learners' electronically evaluated reading achievements.

Significance of Educator Accessibility and Quality:

According to Superville (2017), accessibility to effective educators is the most crucial school-related factor responsible for improved learning outcomes. The quality of educators is the primary school-related factor that can have a more significant impact than several out-of-school factors. Schools in rural areas face a disadvantage in terms of technology accessibility, as noted by Zaenal et al. (2018). Accessibility to electronic devices may contribute to different attitudes towards electronic devices in Mathematics. This situation may differ for schools where most learners are from a lower-middle financial status. They may not have direct access to electronic devices and cannot afford individual gadgets.

Influence of Digital Resources on Learning Achievements:

The EU average is that five learners share one PC (Eickelmann et al., 2017), but this study is focused on IBDP Mathematics AA learners in South Africa and Singapore. While there are some "elite" public schools in a few African countries with appropriate class sizes, skilled teachers, and no school fees (Hill, 2018), a small proportion of public schools have class sizes ranging from 60 to 90 learners, including the final year of school, with no access to textbooks or stationery (Hill, 2018). Gubbels and colleagues (2020) investigated the availability of digital resources, learners' utilisation, and attitudes toward digital resources. They found that moderate availability and utilisation of digital devices positively impact Dutch learners' electronically assessed reading achievement. Educators' selection of digital technologies depends on educational goals, learning strategies, the level of technological proficiency of both learners and educators and the accessibility of technological devices (Joshi, 2017; Korenova & Mathematics, 2016).

ICT Integration and School Policy Planning:

Before approving schools to operate, educational authorities should ensure access to both material and human resources (Okori & Jerry, 2017) and recent scholarly research (e.g. Ada & Msughter, 2019; Adegoke & Mefun, 2016; Bassey & Okoro, 2019; Zilanawala et al., 2018) highlights that access to highly efficient and qualified teachers is a significant concern because teachers have a substantial impact on learner performance. The accessibility of resources is one of the critical prerequisites for integrating ICT into a lesson (Drossel et al., 2017). The availability and accessibility of an ICT school policy plan that encompasses the school's vision could facilitate ICT integration (Drossel et al., 2017).

Theoretical Framework

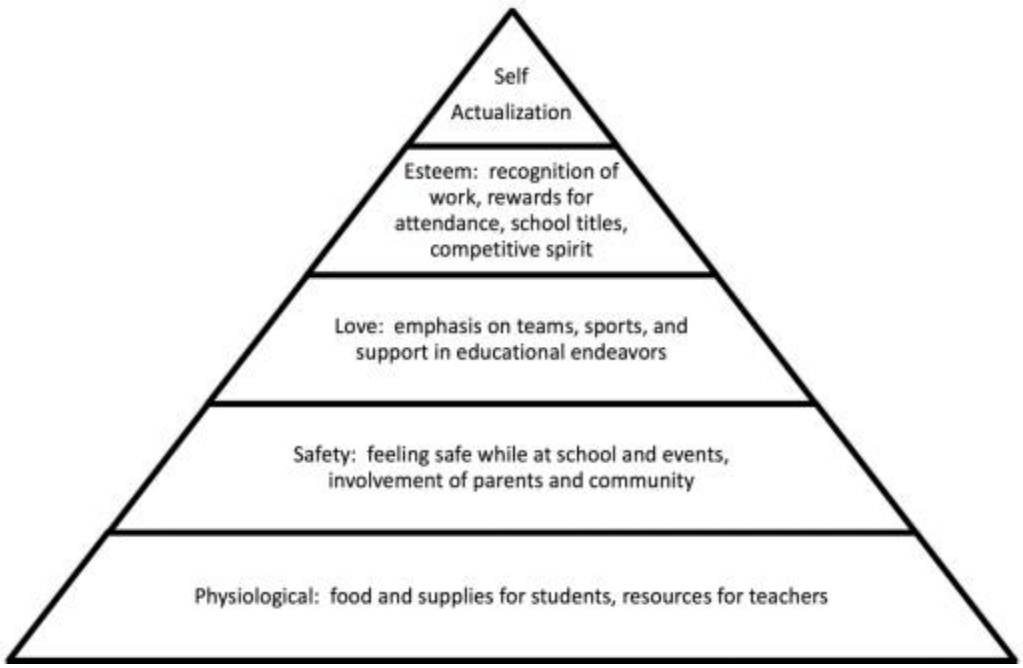
The current study's theoretical framework is anchored by two prominent theories: Abraham H. Maslow's Hierarchy of Needs theory **(Figure 1)** and Greg Kearsley and Ben Shneiderman's Theory of Engagement. These theories, with their well-established frameworks and well-defined technical details, provide a solid foundation for the research.

The article explores the relationship between school-related resources, precisely physiological needs, and Mathematics achievement in IBDP learners in South Africa and Singapore. It uses Abraham Maslow's hierarchy of needs theory as a theoretical framework to investigate the accessibility of school-related resources as determinants of collaboration, engagement, and participation in the classroom for effective learning (Magongo, 2023).

Additionally, the article introduces Greg Kearsley's theory of engagement as another theoretical framework to explain the importance of learners' engagement with their coursework for effective learning. The engagement theory emphasises three essential means for achieving engagement: collaborative determinations in learning exercises, project-based tasks, and non-academic work (Magongo, 2023). The article concludes that the accessibility of school-related resources through schoolroom collaboration, engagement, and participation is crucial for good academic performance.

Figure 1

Needs Hierarchy of Maslow Regarding Support in Schools



Note. In Maslow's Hierarchy of Needs, physiological needs are fundamental for human motivation. In education, prioritising these needs is crucial for optimal learning. They include access to learner supplies, teacher resources, nourishment, and physical well-being. Unaddressed, students may need help to focus and engage in learning.

The research process's theoretical framework primarily draws from educational psychology and resource dependency theory. It incorporates elements of cognitive theory to understand the impact of resource availability on learning outcomes while also considering how resource dependency theory can explain the influence of school-related resources on academic performance.

Purpose of the Study

This study aims to establish a correlation between the accessibility of school-related resources and the Mathematics achievement of IBDP 2 learners in South Africa and Singapore using a correlational research design. This research delves into the correlation between the accessibility of school-related resources and the Mathematics achievement of IBDP 2 Learners in South Africa and Singapore. The study aims to provide an in-depth analysis of the impact of resource accessibility on academic performance in Mathematics.

Methodology

The study population comprised learners in South Africa and Singapore who were doing IBDP 2 Mathematics Analysis and Approaches in 2022. The article discusses a study on research design that aims to identify the difference in the availability, accessibility, and utilisation of school-related resources and the Mathematics achievement of IBDP 2 Learners in South Africa and Singapore.

The research employed Pearson's correlation analysis to examine the relationship between school-related resource accessibility and learner achievement in South Africa and Singapore. This statistical method allowed for assessing the strength and direction of the relationship between the variables. Correlational research does not require the researcher to intervene; it is conducted to forecast probable outcomes or comprehend human behaviour. The correlational study discovers relationships among variables, and the primary characteristic of correlational exploration is to seek out relationships among variables. Correlational studies illustrate existing associations between variables and do not manipulate variables in the research.

The Nature of Correlation Research

Correlational research is a form of descriptive research that aims to identify relationships between variables. It does not attempt to manipulate or influence the variables in any way. The correlation coefficient (R) measures the strength and direction of the association between two or more quantitative variables. Positive and negative relationships can exist between variables, and scatterplots and regression lines are used to predict the score of a dependent variable based on an independent variable. Correlational studies help understand significant human actions and predict possible outcomes.

Coefficient of Determination

The coefficient of determination, commonly referred to as R^2, is a statistical measure that quantifies the proportion of variance in a dependent variable that can be explained by the variance in an independent variable. It is calculated as the square of the correlation coefficient (R) and ranges from 0 to 1. A higher R^2 value indicates a stronger relationship between the two variables, while a lower value suggests a weaker relationship. In essence, R^2 provides a valuable tool for assessing a regression model's goodness of fit and determining the independent variable's predictive power.

Steps for Conducting Correlational Research

Correlational research involves several steps, including problem selection, sample selection, questionnaire selection or development, procedure determination, data collection and analysis, and results interpretation. Scholars recommend a sample size of at least 30 in correlational studies to estimate the degree of association accurately. Sample sizes over 30 are more likely to yield meaningful results.

Data Analysis and Interpretation

The text explains the concept of correlation coefficients and their significance in determining the relationship between two variables. A coefficient closer to ±1 indicates a stronger association, while a coefficient closer to zero indicates no relationship. Weak, moderate, and strong relationships are associated with different ranges of coefficients. Correlation coefficients can be utilised to test the reliability and validity of research instruments, with recommended minimum values for each. The text also shows how reliability and validity were tested in a specific study using the PSPP statistics program.

Procedure and Survey Tracking Forms

The procedures followed in conducting a field test before the main study are described in the text. The field test was conducted in South Africa and Singapore, involving 60 IBDP 2 learners taking IBDP Mathematics AA courses. An online survey was utilised in the field test, and the same procedures were applied in the main study. A tracking form was used in the current study to track learner information, school, document sampling procedures, and the participation position of the learners. The research process involved several steps, including sampling schools, conducting the field test, collecting data for the main study, scoring the Constructed Response Items, and creating a database for data capture.

Instrument

The article discusses the tool utilised in correlational research and clarifies that the current data collection method involves an online survey. The instrument was a 170-item questionnaire, with most items adopted from the TIMSS Advance 2015. It included sections related to resource accessibility, academic achievement, and demographic information, providing a comprehensive assessment of the factors under investigation. The survey was conducted online in seven schools in South Africa and Singapore, and the scoring of the survey items was more straightforward due to the use of online questionnaires. Additionally, the text emphasises that the online survey has various items that filter out respondents, resulting in more consistency in the data provided to the researcher. The online system only permitted respondents to proceed to the next question once the previous question was fully answered and prevented respondents from submitting an incomplete survey.

Questionnaire Scaling

The text discusses a scale that measures the accessibility of school-related resources for learning the IBDP Mathematics AA course. The scale consists of ten items, and learners rate their level of agreement with each assertion. The data is set on a ten-point-centre scale using item response theory (IRT) partial credit scaling. Learners with access to school-related resources for the Mathematics AA course generally agree with five of the ten items and concur with the other five items to a lesser extent. In comparison, those with limited access disagree with five items and agree with the other five items to a lesser extent.

Instrument Validity and Reliability

The article discusses a questionnaire to assess the learners' attitude towards learning the IBDP Mathematics AA course. The questionnaire consisted of five sections, each containing multiple items. The text also highlights the potential threats to validity in correlational studies and emphasises the importance of using high-quality research instruments. Furthermore, the article explains the concept of reliability in research and the methods used to obtain a reliability coefficient. The instrument's validity and reliability were ensured through a rigorous process, including content validity assessment by experts in the field, pilot testing, and statistical tests for internal consistency. The Cronbach alpha coefficient was used to assess reliability, demonstrating internal solid consistency. Finally, the text emphasises the significance of internal consistency, equivalent forms, and test-retest in obtaining a reliability coefficient.

Sampling of Schools in Singapore and South Africa

A study was conducted to compare IBDP 2 learners taking IBDP Mathematics AA courses in South Africa and Singapore. The sampling of schools involved selecting eight IBDP schools, including all the IBDP schools in South Africa, and a sample of IBDP 2 Mathematics AA learners through systematic random sampling. Additionally, a field test school in South Africa was selected through simple random sampling, ensuring the representation and generalisability of the findings. The population in this study consists of IBDP 2 learners taking IBDP Mathematics Analysis and Approaches courses with external examinations in 2022. The schools in Singapore were categorised based on their respective regions.

The article describes the sampling techniques used by a researcher to select International Baccalaureate Diploma Programme (IBDP) schools in Singapore and South Africa for a study. Simple random sampling was used to select five IBDP schools in Singapore, while all three IBDP schools in South Africa were automatically included. Stratified random sampling was then employed in each of the five schools in Singapore to select ten learners doing the IBDP Mathematics AA Standard Level course and ten learners doing the IBDP Mathematics AA Higher Level course.

Table 1 provides information on the availability of the International Baccalaureate Diploma Programme (IBDP) in South Africa. The IBDP is offered only in Gauteng Province and Western Cape Province. At the same time, the other provinces, namely North West, Northern Cape, Mpumalanga, Limpopo, KwaZulu-Natal, Free State, and Eastern Cape, do not have any schools that offer the IBDP.

The following text outlines the methodology used to sample participants for a study on the IBDP Mathematics AA course in South Africa and Singapore. The study included all three IBDP schools in South Africa and learners from both strata, with appropriate sampling weights used for result analysis. The schools' recycling was similar to the global TIMSS Advanced study conducted in 2015. The study focused on IBDP 2 learners taking the IBDP Mathematics AA course for examinations in 2022 in South Africa and Singapore. While the study results are not intended to be generalised beyond the studied population, they may be ecologically generalisable.

Procedures employed in data collection

The Unicaf UREC committee approved the study before data collection. An application letter, the study proposal, consent forms, and the data collection tool were sent to the Gauteng and Western Cape Departments of Education to obtain permission for data collection in the Gauteng and Western Cape provinces in South Africa. Authorisation letters were issued by each department of education, allowing the data collection process to proceed. In Singapore, permission was obtained by sending an application letter, the study proposal, consent forms, and the data collection tool to the Research Department of the Singapore Ministry of Education. Additionally, an authorising email was obtained from the Ministry of Education. Lists of learners were obtained from Singaporean schools for further sampling to select 50 learners doing the IBDP Mathematics AA Higher Level course and 50 learners doing the IBDP Mathematics AA Standard Level course. Learners who provided their consent and assent forms were included in the study for data collection.

Data analysis techniques

Cross break tables are a common way to display the connections between two categorical variables. The contingency coefficient is a widely used index for measuring relationships in cross break tables. Although cross break tables are not very accurate in predicting outcomes, they can still be used to explore potential relationships between categorical variables. Additionally, the study analysed all relationships in the collected data using cross break tables, correlation, or a comparison of means. Descriptive statistics were also used to present the data in multiple scores with only a few indices.

Results

The study had a sample size of 169 participants, 80 from Singapore and 89 from South Africa. However, one school from South Africa had to be excluded from the study for personal reasons, including fear of exposure.

The Relationship between School-related Resource Accessibility and Mathematics Achievement of IBDP 2 Learners in South Africa and Singapore

The study investigated the correlation between accessibility to school-related resources and Mathematics achievement of IBDP 2 learners in South Africa and Singapore. A ten-item survey was administered to achieve this, and the data collected were analysed for reliability and correlation. The reliability coefficient (Cronbach's Alpha) was found to be 0.97 and 0.85 for South Africa and Singapore, respectively (Magongo, 2023), and 0.97 for both countries combined (Magongo, 2023), indicating that the survey items were reliable. The Spearman's rank correlation coefficient was computed, and the results showed a correlation coefficient of 0.58 for both South Africa and Singapore. Detailed information about the data collected and analysed can be found in Table 1 and Table 2.

Findings

Table 1 presented descriptive statistics of the sampled schools and learners, providing an overview of critical demographics and academic performance measures.

The statistical analysis revealed a noteworthy correlation between South Africa's and Singapore's variables. In South Africa, the correlation was significant at $p = 0.000$, lower than the significance level of 0.05. The corresponding F-value was 3.91. Similarly, in Singapore, the correlation was significant at $p = 0.001$, which is lower than the significance level of 0.05. The F-value for Singapore was 3.58. Additional details can be found in Tables 3 and 4.

Table 3 has documented the results of an ANOVA test, with the independent variables representing different categories of resource accessibility. This would be appropriate for identifying potential differences in academic achievement based on varying levels of resource accessibility.

The statistical analysis revealed a direct correlation between the accessibility of academic resources and Mathematics Achievement of IBDP 2 Learners in South Africa and Singapore (Table 5).

Table 1

The Correlation Between the Accessibility of School-Related Resources and the Mathematics Achievement of International Baccalaureate Diploma Programme (IBDP) 2 Learners in South Africa

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.58	0.33	0.25	0.84

Table 2

The Correlation Between the Accessibility of School-Related Resources and the Mathematics Achievement of International Baccalaureate Diploma Programme (IBDP) 2 Learners in Singapore

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.58	0.34	0.25	0.39

Table 3

The Correlation Between the Accessibility of School-Related Resources and Mathematics Achievement of IBDP 2 Learners in South Africa Using ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	27.35	10	2.74	3.91	0.000
Residual	54.53	78	0.70		
Total	81.89	88			

Table 4

The Correlation Between the Accessibility of School-Related Resources and Mathematics Achievement of IBDP 2 Learners in Singapore Using ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	5.45	10	0.54	3.58	0.001
Residual	10.50	69	0.15		
Total	15.95	79			

Table 5

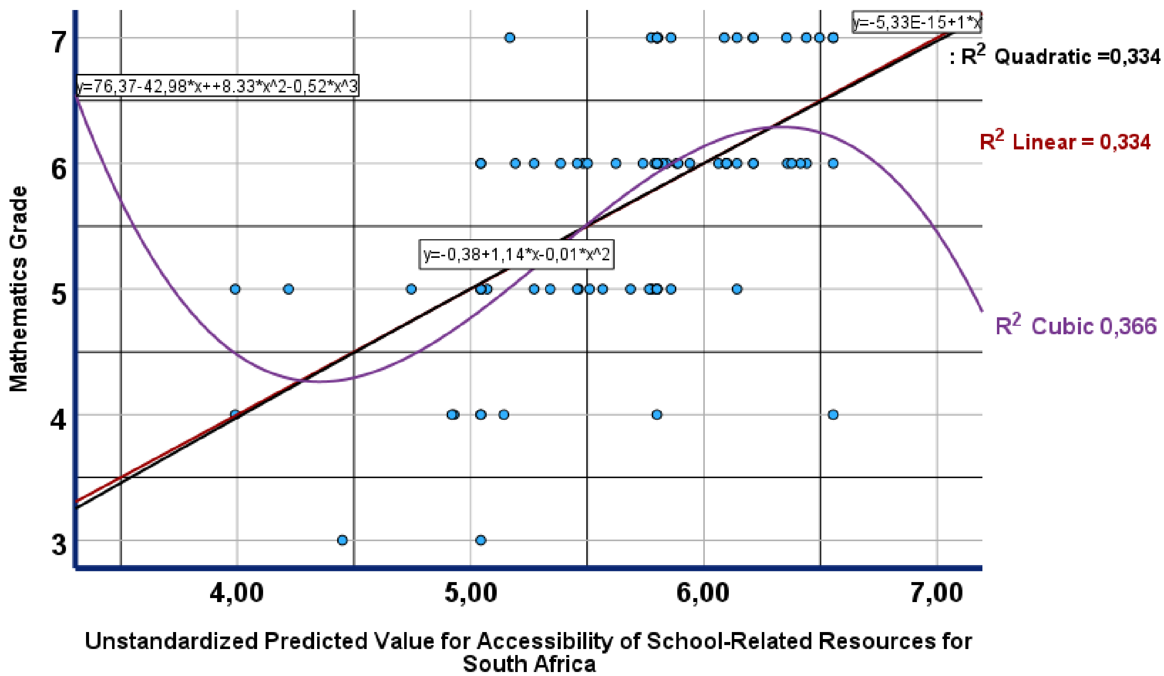
Unstandardised Predicted Value for Accessibility of School-Related Resources for South Africa

ID	Unstandardised value	Math Grade	ID	Unstandardised value	Math Grade	ID	Unstandardised value	Math Grade
1	5.8	7	31	5.7	5	61	5.4	6
2	6.6	4	32	5.8	5	62	5.5	5
3	5.8	6	33	5.9	6	63	5	3
4	6.4	7	34	5.8	7	64	6.5	7
5	6.4	6	35	5.6	5	65	6.4	6
6	6.4	6	36	5.1	4	66	6.6	7
7	6.4	7	37	5.8	6	67	5.6	6
8	6.6	7	38	5.8	5	68	6.2	6
9	5.8	7	39	5.8	6	69	5.3	5
10	6.6	6	40	5.5	6	70	5	5
11	6.2	7	41	5.8	5	71	5.3	6
12	5.5	5	42	5.8	5	72	6.2	7
13	6.1	6	43	5.8	5	73	6.4	6
14	5.8	7	44	6.1	7	74	5	5
15	6.1	6	45	5	4	75	5.5	6
16	6.1	5	46	5.8	6	76	5	6
17	6.1	6	47	5.8	7	77	5	4
18	6.2	6	48	6.1	6	78	5.8	6
19	5.8	6	49	6.1	6	79	5.2	7
20	5.8	4	50	5.8	6	80	5	5
21	5.9	7	51	5.8	6	81	5	5
22	5.9	6	52	5	5	82	4.5	3
23	5.9	5	53	5.8	6	83	5	6
24	5.5	5	54	6.1	7	84	4.7	5
25	5.9	6	55	5.8	5	85	4	5
26	5.7	6	56	5.1	5	86	4	4
27	5.8	6	57	5.5	6	87	4.2	5
28	5.8	6	58	4.9	4	88	5.2	6
29	5.8	7	59	5.8	6	89	4.9	4
30	5.8	5	60	5.3	5			

Figure 2 below shows regression models, including linear, quadratic, and cubic models, developed to analyse the correlation between the accessibility of school-related resources and Mathematics achievement in South Africa.

Figure 2

The Correlation between Accessibility of School-related Resources and Mathematics Achievement in South Africa



The study investigated the relationship between the accessibility of school-related resources and the academic performance of IBDP students in South Africa. The research used three regression models, including linear, quadratic, and cubic, to evaluate this relationship. The results showed that the accessibility of school-related resources accounted for only a small percentage of learners' Mathematics achievement, with coefficients of determination (R^2) ranging from 33.4% to 36.6%. Therefore, the study revealed that the correlation between the two variables was weak since the independent variable explained only a small proportion of the dependent variable (Magongo, 2023).

The relationship between the accessibility of school-related resources and the Mathematics achievement of IBDP learners in Singapore was analysed through three regression models (linear, quadratic, and cubic), as depicted in Figure 3. The three models' coefficients of determination (R^2) were 34.1%, 38.2%, and 39.2%. These scores pointed out that the accessibility of school-related resources, the independent variable, only accounted for a small proportion (between 34.1% and 39.2%) of the dependent variable (Mathematics achievement) in the current study. Therefore, all three regression models indicated that the independent variable had a limited impact on the dependent variable. Figure 3 below presents regression models, including linear, quadratic, and cubic models, used to analyse the correlation between accessibility of school-related resources and Mathematics achievement in Singapore. Figure 3 below shows regression models, including linear, quadratic, and cubic models, developed to analyse the correlation between the accessibility of school-related resources and Mathematics achievement in South Africa.

Evaluation of Findings

This study compares the influence of school-related resources on Mathematics achievement among IBDP learners taking Mathematics AA courses in South Africa and Singapore. The study's research framework is based on Abraham Maslow's Hierarchy of Needs theory and Greg Kearsley and Ben Shneiderman's Theory of Engagement.

The study focuses on Maslow's first stage of the needs hierarchy pyramid, which relates to physiological needs, specifically the availability, accessibility, and utilisation of school-related resources. The Theory of Engagement Kearsley states that learners' activities involve dynamic mental processes such as interaction, creative thinking, evaluation, and decision-making (Kearsley & Shneiderman, 1998; Olagbaju & Popoola, 2020). The research explores how good academic performance is achieved through schoolroom collaboration, engagement, and participation.

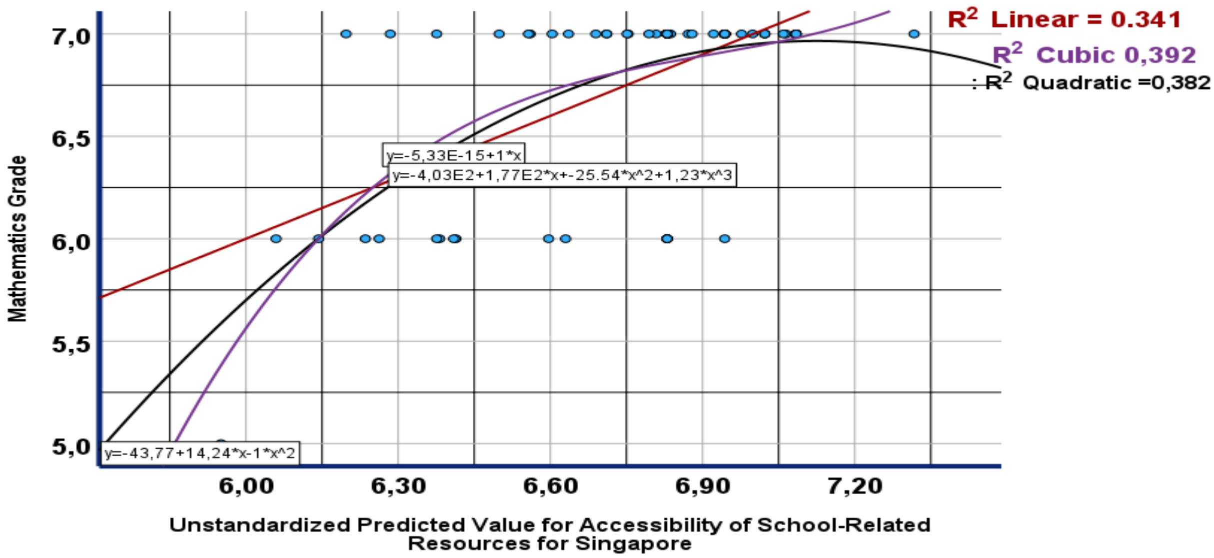
Table 6

Unstandardised Predicted Value for Accessibility of School-Related Resources for Singapore

ID	Unstandardised value	Math Grade	ID	Unstandardised value	Math Grade	ID	Unstandardised value	Math Grade
1	6.8	7	31	6.9	7	61	6.8	7
2	6.8	6	32	7.0	7	62	7.0	7
3	6.8	7	33	6.4	6	63	6.8	7
4	6.8	7	34	6.8	7	64	6.9	7
5	6.8	7	35	6.1	6	65	6.8	7
6	6.8	7	36	6.0	5	66	6.8	7
7	7.1	7	37	6.9	7	67	7.1	7
8	6.4	6	38	6.9	7	68	6.8	7
9	6.8	7	39	6.9	7	69	6.6	6
10	7.3	7	40	6.7	7	70	6.8	7
11	6.9	7	41	6.9	7	71	6.4	7
12	6.9	7	42	6.7	7	72	6.9	7
13	6.7	7	43	6.9	7	73	6.6	6
14	6.9	6	44	6.8	7	74	6.2	6
15	6.9	7	45	7.1	7	75	6.6	7
16	6.9	7	46	6.1	6	76	6.9	7
17	7.1	7	47	6.8	7	77	6.2	7
18	6.3	6	48	6.8	7	78	6.4	6
19	6.5	7	49	6.8	7	79	6.9	7
20	6.3	7	50	6.8	7	80	6.6	7
21	7.1	7	51	6.8	7			
22	6.8	7	52	6.8	7			
23	7.1	7	53	6.8	6			
24	6.4	6	54	6.8	6			
25	7.1	7	55	6.8	7			
26	7.0	7	56	6.8	7			
27	6.9	7	57	6.8	6			
28	6.6	7	58	6.8	6			
29	7.0	7	59	7.0	7			
30	6.6	7	60	6.8	7			

Figure 3

The Correlation between the Accessibility of School-Related Resources and Mathematics *Achievement in Singapore*



Although the results were statistically unreliable, they showed no significant difference in the accessibility of school-related resources for IBDP 2 learners in South Africa and Singapore. Previous research has shown that the distribution of educator resources was not significantly influenced by community or school size (Magongo, 2023; Smith et al., 2013). Okoji & Olubayo (2021) also found no statistical significance in the accessibility of teaching resources in Mathematics.

Discussion

The study found a strong correlation between the accessibility of school-related resources and the Mathematics Achievement of IBDP 2 Learners in South Africa and Singapore. This supports previous research that suggests learners perform better in Mathematics when they have access to better resources (Chudgar et al., 2015). Additionally, school-related resources play a significant role in the success of both schools and learners. However, the study also found that parental influence significantly impacts achievement more than school resources (Magongo, 2023). In South Africa and Singapore, the results indicated that improving the accessibility of school-related resources could enhance Mathematics achievement for learners. Therefore, education authorities and school administrators should prioritise making school-related resources accessible to all learners to improve their achievement in mathematics.

However, it is essential to note that providing school-related resources is a short-term solution to improve learners' Mathematics achievement. While investing in education infrastructure can have an initial positive impact, it may need to be more sustainable in the long run. To achieve more advanced results in Mathematics, other factors, such as the quality of teaching and learning processes, must also be addressed (Elezovic et al., 2022; OECD, 2019). Overall, the study's findings suggest that education authorities should focus on educational reform that improves the positive aspects of their systems and reduces any adverse effects to sustain improvements in learners' Mathematics achievement.

The acquisition of school-related resources alone cannot guarantee a successful educational system. Investing in ongoing professional development for teachers and principals, developing lifelong learning skills and expanding accessibility to information and communication technology (ICT) is also essential (Elezovic et al., 2022; Magongo, 2023). South African education authorities must focus beyond school-related resources to avoid negative consequences.

The study reveals that other intangible aspects of school life are equally crucial for improving Mathematics achievement. The analyses indicate that accessibility to school-related resources positively correlates with the Mathematics Achievement of IBDP 2 learners doing Mathematics AA courses in South Africa and Singapore. Therefore, accessibility to school-related resources significantly affects learner achievement. To improve accessibility, South African schools can learn from Singapore by observing the lessons and pedagogical practices of their IBDP 2 Mathematics AA courses.

Investing in ongoing professional development for educators and principals and improving the use of school-related resources by learners, educators, and school principals is also advisable. This includes enhancing their knowledge and ability to use school-related resources for instruction and conditions conducive to school-related resource use.

Recommendations

The study shows that accessibility to school-related resources positively correlates with the Mathematics Achievement of IBDP 2 learners in South Africa and Singapore. However, the research is limited to these countries, and future studies can be conducted in other contexts. The study recommends that educators, parents, heads of schools, and education authorities ensure learners have access to the relevant school-related resources used in Mathematics. Additionally, community libraries should have extended hours to allow learners to access school-related resources to enhance their Mathematics learning. The study also suggests that future research could investigate contextual factors on educators' and principals' relationship in school-related resources compared to achievement in learners doing IBDP 2 Mathematics AA courses. Finally, analyses across gender can be made in future research to describe the significant difference between the Mathematics Achievement of male and female IBDP 2 learners in South Africa and Singapore.

Conclusion

In conclusion, the study aimed to investigate the differences in the accessibility of school-related resources and the mathematics achievement of IBDP 2 learners in South Africa and Singapore. It was found that there was no significant difference in the accessibility of school-related resources between the two countries. The study also revealed a positive relationship between the accessibility of school-related resources and mathematics achievement in both countries. However, in Singapore, there was no relationship between the accessibility of school-related resources and mathematics achievement, while in South Africa, such a relationship was observed. The study confirmed a positive relationship between the accessibility of school-related resources and the mathematics achievement of IBDP 2 learners in both countries.

Additionally, the study recommended sending mathematics teachers from South Africa to Singapore for professional development. It emphasised the importance of making school-related resources accessible to improve mathematics achievement in both countries. The study's theoretical contributions included highlighting that the difference in Mathematics achievement was not solely due to differences in Mathematics curricula and emphasising the importance of accessibility to school-related resources in improving mathematics achievement. Future research should focus on contextual factors, gender differences, learner engagement, and the value of IBDP Mathematics AA courses.

Author Note

Dr Abel Wilson Magongo has more than 22 years of teaching experience. He holds a Doctorate of Education, a Master of Education, a Bachelor of Education, and a Secondary Teacher's Diploma. Dr Magongo has taught Mathematics in various institutions across Europe, Asia, and Africa, including universities, government schools, private colleges, and international schools. He is interested in Mathematics, Education, Administration, and Educational Law and has served as an IBDP Mathematics examiner. Additionally, he is a member of the Mathematics Curriculum Review Team of the IBO.

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Sustainable Plastic Waste Management Transition in Municipal Households of an African Megacity: Circular Economy and Transition Management Performance in Lagos

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Abstract

Attaining Sustainable Plastic Waste Management (SPWM) remains a fallacy as long as the traditional practices of Municipal Solid Waste Management (MSWM) remain harmful to the environment and the economy. Hence, the study sought to establish opinions, attitudes, practices, and the culture of households regarding MSWM. Data was collected through a survey (i.e. 225 respondents), three (3) Focus Group Discussions (FGDs) and four (4) variants of Key Informant Interviews (KIIs). The main findings showed high levels of knowledge among respondents with regard to challenges associated with plastic waste management (86.5%); affirmed the need for improved plastic waste management (94%) and its economic value (83.33%); patronised government–approved waste collectors (75.6%); paid waste carting fees (80.2%); and willingness to participate in sustainable solid/plastic waste management (92.5%), plastic waste sorting (92.1%), and government initiated programmes towards plastic waste minimisation (87%). The following variables were significant ($p < 0.05$) with regard to household waste generation: increased educational level; a socio-economic stratum; nature of dwelling; growing quality for the residential area; willingness to separate plastic waste; treatment of separated plastic waste; willingness to minimise plastic waste; accepting the ban on single-use plastic; disposal of municipal solid waste; hearing about the PAKAM App; and desire to participate in plastic waste recycling. Hence, plastic waste recycling, deposit refund schemes, and a shift to plastic governance involving households are recommended in line with the circular economy concept and transition management theory in Lagos.

Keywords: Plastic waste, environmental challenges, recycling, circular economy, transition management, Lagos – Nigeria.

Introduction

Capacity challenges in handling waste generation have been observed to lead to environmental nuisances (Ojelola et al., 2020; Ojewale, 2019). Plastic waste of all types is prominently generated as a solid waste fraction, leading to uncontrollable and unsustainable challenges in waste management (Adekomaya & Ojo, 2016). Plastic pollutants have been observed to be land-based macro-plastics that arise from daily usage (i.e., plastic bags); on the other hand, they are commonly non-biodegradable and have adverse effects on the environment, which leads to the pollution of soil and water bodies (Dumbili & Henderson, 2020; Ezeudu & Ezeudu, 2019). Sustainable Municipal Solid Waste Management (SMSWM) must reduce greenhouse gas emissions and provide ecological, social and economic benefits (Giurea et al., 2018; Permana et al., 2015; UNCED, 1992). However, this is not the case in most African cities, such as Lagos, as what obtains has serious adverse effects on the environment, the economy and society (Bello et al., 2016; Oteng–Ababio et al., 2013). The existing practice portends danger, and the need to proffer workable solutions to the challenge is of utmost importance (Abila & Kantola, 2020).

Households are significant generators of municipal solid waste, and poor waste management is a crucial challenge (Olukoju, 2018; Johnstone & Labonne, 2004; Ferronato & Torretta, 2019). To attain sustainable SWM, waste mismanagement reduction and integration of waste generators into the waste management system can curtail waste leakages. This study investigated the role of households in plastic waste management in Lagos, Nigeria (Ojogun, 2023).

Nigeria generates 42 million tonnes of solid waste annually, with plastic waste contributing 20%. However, only 31% of the waste generated is collected; the rest is indiscriminately discarded (Adeniran et al., 2017; Dumbili & Henderson, 2020). Furthermore, Nigeria contributes between 0.13 – 0.34 million tonnes of plastic waste to the marine environment. At the same time, it is estimated that Lagos contributes about 450,000 tonnes per annum, a trend that must be reduced or brought to a halt (Dumbili & Henderson, 2020). The negative impacts of unsustainable management of plastic waste include the blocking of drainage channels that exacerbate flooding, farmland clogging and the aiding of wildfires, water retention (leading mosquitoes' breeding and the transmission of malaria parasites), marine pollution and loss of aquatic life (Dumbili & Henderson, 2020; Edoga et al., 2008; Nnaji, 2015).

The paper focuses on the contribution of households to the existing unsustainable plastic waste generation levels as the significant Municipal Solid Waste (MSW) generators (Ferronato & Torretta, 2019). At the same time, we are determining the capacity to further aid the transition to sustainable plastic waste management with the view of advancing the concept of the Circular Economy (Geissdoerfer et al., 2016; Preston et al., 2019). Lagos generates about 2,250 tonnes of plastic waste daily, with only about 10% being recycled. On the other hand, Ojewale (2019) states that the Lagos environment is choked by plastic waste despite the potential for a multi-billion Naira recycling industry. Babayemi et al. (2019) observed that Nigeria is the second-highest importer and user of plastic in Africa and is in the top eight (8) countries responsible for resin production and consumption in Africa (Ojogun, 2023).

This study has a strong impetus as several solutions (i.e., Nylon Buyback Schemes, plastic waste bank constructions and recycling plants, ban on single-use plastics) previously proffered for the sustainable management of plastic waste in Lagos have failed to address the problem (LAWMA, 2020; Olukoju, 2018). Previous studies showed that implemented solutions were too technologically focused and excluded the human factor (Abila & Kantola, 2020; Afangideh et al., 2012). Most tenets of sustainability management and the circular economy concept, such as waste reduction at source, reuse, recovery, recycling, waste sorting, and plastic loop closing, will be challenging to achieve without the buy-in of local households along the value chain of solid waste management (Geissdoerfer et al., 2016; Leusbrock et al., 2015; Ogbazi & Ezeadichie, 2014). Hence, plastic waste can be sustainably managed by integrating households into waste management plans in order to find lasting solutions to plastic waste management (Ojogun, 2023).

Conceptual/Theoretical Frameworks

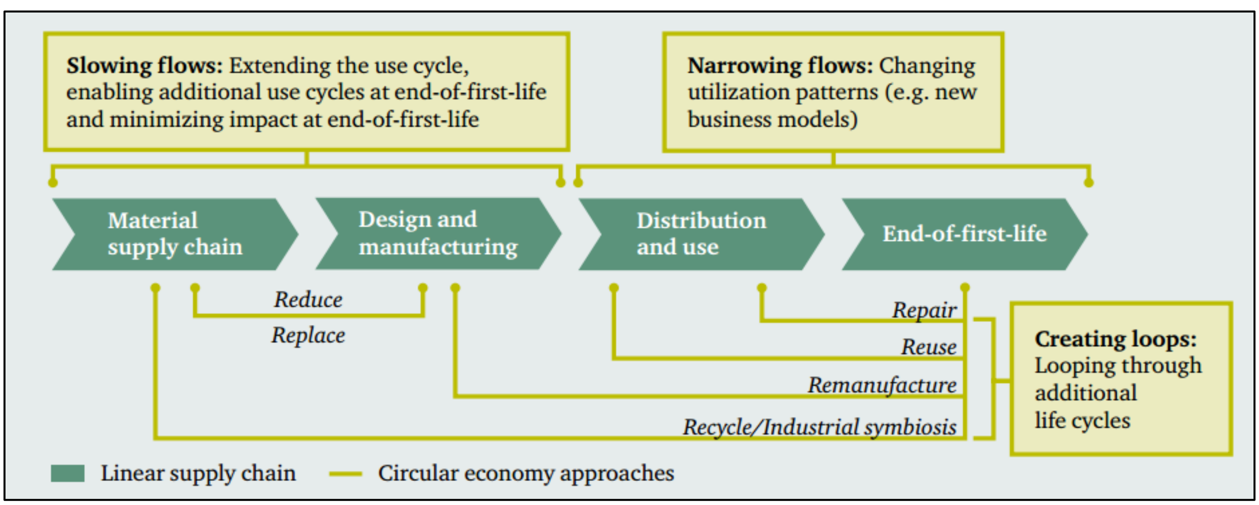
The Circular Economy (CE) concept and the Transition Management Theory (TMT) have a track record of success in remediating environmental concerns. They are applied to enhance sustainability transitioning with respect to persistent environmental challenges (Ojogun, 2023).

Circular Economy Concept

Circular Economy is a concept that resembles Sustainable Development (SD). CE mimics a healthy ecosystem metabolism where the supposed end–of–life of material serves as a raw material for another process (Ojogun, 2023). Preston et al. (2019) define CE as the process of product recycling through repairs and reuse instead of throwing material away. CE ensures that wastes from specific processes are used as feedstock for other processes (Ojogun, 2023), and Preston et al. (2019) depicted the activities in CE as shown in Figure 1.

Figure 1

Linear and Circular Economy Activities



Note. Adapted from An Inclusive Circular Economy Priorities for Developing Countries, by Preston, F., Lehne, J., & Wellesley, L., 2019, p.100.

Transition Management Theory

Challenges of plastic waste mismanagement in Lagos, Nigeria, are complex and persistent and arise from human behaviour (Godfrey, 2019) that is profoundly engrossed in societal structures, diverse actors and varied interests that are difficult to manage (Ojogun, 2023). Such challenges are associated with system failures locked–into defects in the societal structures. Correcting system failures requires restructuring societal systems; succinctly put, a 'transition' (Loorbach & Rotmans, 2010; Rotmans & Loorbach, 2009).

Methodology

The study employed the Sequential Explanatory Research Design as a variant of mixed methods (i.e., qualitative and quantitative) while applying triangulation in the data collection and analysis stages (Wariri et al., 2020; Creswell et al., 2004; Brink, 1993). Data was collected through a questionnaire survey to establish the perceptions, behaviours, opinions, and attitudes on solid/plastic waste management, followed by interviews and Focus Group Discussions (FGDs) (cf. Kabir, 2016).

For the survey, Lagos was stratified into three Senatorial Districts (Oyedele, 2019). One Local Government Area (LGA) was picked from each District, and sampling wards were selected (Table 1). The LGAs were further divided into Wards that have, in most cases, visible social stratification based on socio-economic factors and were classified into Highbrow/High–Income areas (HI – exclusively rich) Middle–Income (MI – middle class) the low–income areas (LI – the poor). From each District, three wards were sampled as HI, MI and LI areas. For the self-administered questionnaire, 25 participants from each socio-economic stratum were sampled. Three Districts, each having three selected wards of 25 participants. A total of 9 wards with 25 participants each led to 225 participants (Ojogun, 2023).

Convenience sampling was applied to the survey (since it was during the COVID–19 pandemic lockdown era). In contrast, purposive sampling was used to draw participants for the interviews (for both interviews and FGDs) (Ojogun, 2023).

Table 1

Participants' Selection for the Interviews (FGD and Individuals)

N	Activity	Number Participants
1	FGD with MOE & WR Officials	8 Person–FGD
2	Individual Interview of MOE & WR Officials	7 Individuals
3	FGD with LAWMA Officials	5 Person–FGD
4	Individual Interview of LAWMA Officials	5 Individuals
5	Individual interviews with Plastic Recycling companies	5 Individuals from 3 different companies
6	FGDs with recovered plastic waste merchants (intermediaries) at Olusosun dumpsite, Ikeja and Solus dumpsite, Igando	15 (7 and 8 FGDs) Olusosun & Igando Respectively
7	Individual Interviews with Plastic Waste Scavengers at Olusosun and Igando Dumpsites	17 (10 & 7) Olusosun & Igando Respectively
	3 FGDs	28 Participants
	4 Variants of Individual Interviews	34 Participants
Total No. of Interviewees		62 Participants

Note. Adapted from An Assessment of the Role of Households in Transitioning to Sustainable Plastic Waste Management in the Mega–City of Lagos, Nigeria, by Ojogun, C. I., 2023, p. 147 (Unpublished Thesis).

Results

Survey Results

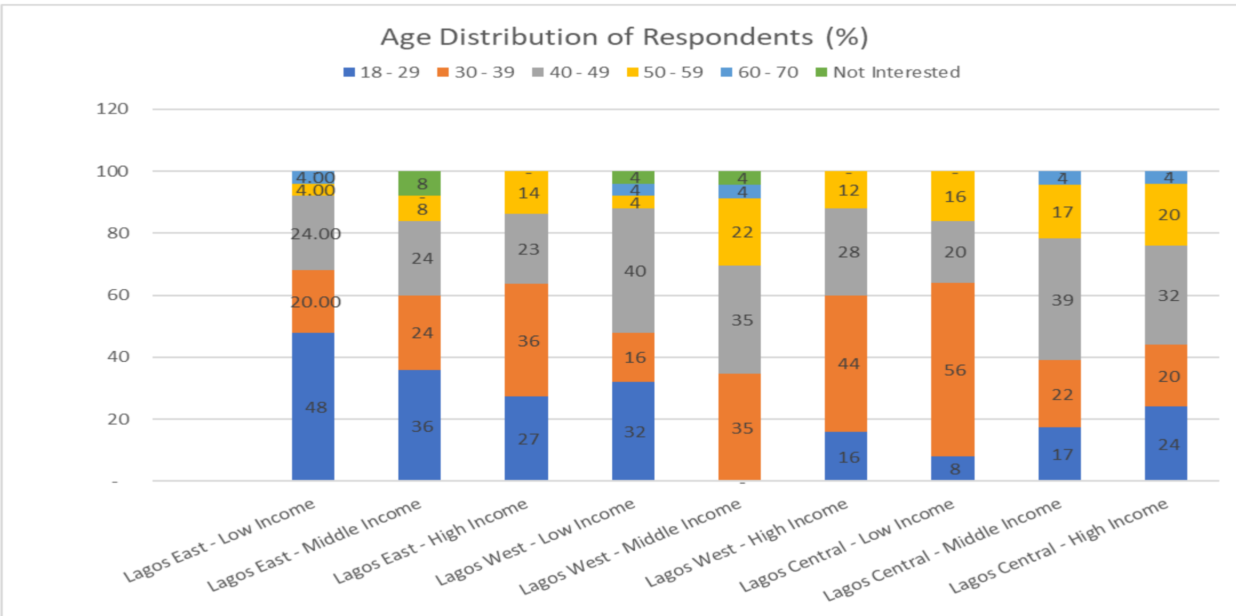
A cross-sectional survey was carried out using structured questionnaires. Microsoft Excel, descriptive analysis and Statistical Package for the Social Sciences (SPSS) were used to cross-tabulate independent and dependent variables on plastic waste management (Ojogun, 2023).

Demographic and Socio-Economic Characteristics of Respondents

Based on the income strata, more males (60.7%) than females (39.3%) participated in the study (Table 2). The bulk of the respondents clustered around the age ranges of 18 – 49, while the highest number of respondents (29.3%) were in the 30 – 39 age group (Figure 2).

Figure 2

Age Distribution of Respondents



Note. It is adapted from An Assessment of the Role of Households in Transitioning to Sustainable Plastic Waste Management in the Mega–City of Lagos, Nigeria, by Ojogun, C. I., 2023, p. 193 (Unpublished Thesis).

Table 2 below shows the demographic characteristics of the respondents.

The majority of the respondents (59.9%) attended the tertiary level of education (Figure 3). In like manner, respondents from high-income areas attained more education (i.e., secondary and tertiary levels) than those from the other economic groups. On the other hand, 43.3% of the respondents lived in a flat system, while 31.5% lived in self–contained dwelling units (Figure 3).

Figure 4 below shows respondent’s nature of dwelling.

Table 2

Demographic Characteristics of Respondents (N=219)

VARIABLES	CATEGORY	FREQUENCY	PERCENTAGE
Gender	Male	133	60.7
	Female	86	39.3
Age	18 – 29	51	23.3
	30 – 39	66	30.1
	40 – 49	64	29.2
	50 – 59	28	12.8
	60 – 70	5	2.3
Level of Education	None	3	1.4
	Primary	3	1.4
	Secondary	60	27.4
	Tertiary	137	62.6
Nature of Dwelling	Room	4	1.8
	Self–contained	42	19.2
	Flat	67	30.6
	Duplex	94	42.9
	Terrace	11	5
	No Dwelling Unit	1	0.5

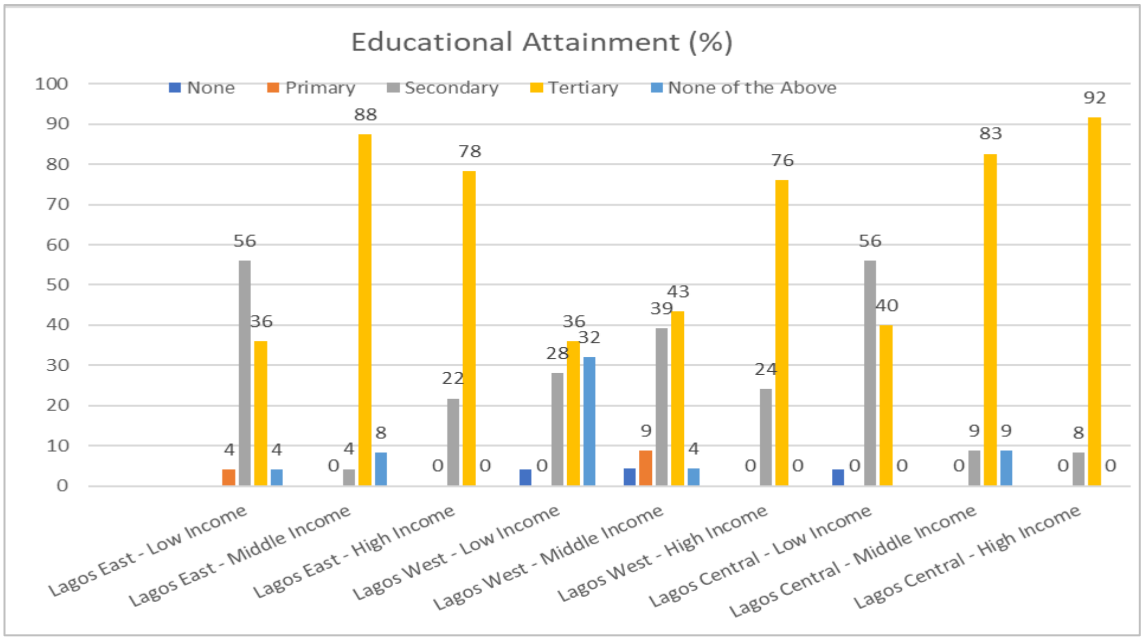
Knowledge of Solid Waste/Generation/Management

Most respondents (50%) used waste bins or baskets for temporary waste storage (see Figure 5).

The majority (92.1%) of the respondents acknowledged that plastic waste is a fraction of their municipal solid waste generated by households. Most respondents (86.5%) claimed they were aware of the environmental problems associated with plastic waste mismanagement. However, most respondents (64%) disposed of the plastic waste with other household waste (see Figure 6).

Figure 3

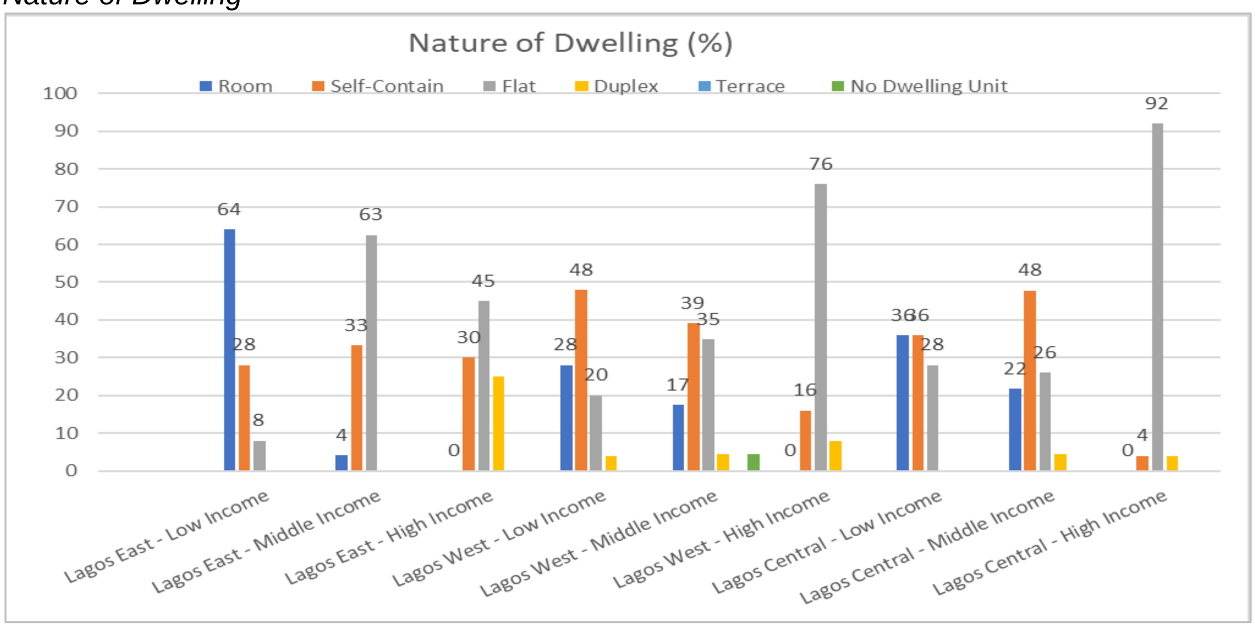
Highest Educational Attainment of Respondents



Note. Adapted from An Assessment of the Role of Households in Transitioning to Sustainable Plastic Waste Management in the Mega–City of Lagos, Nigeria, by Ojogun, C. I., 2023, p. 194 (Unpublished Thesis).

Figure 4

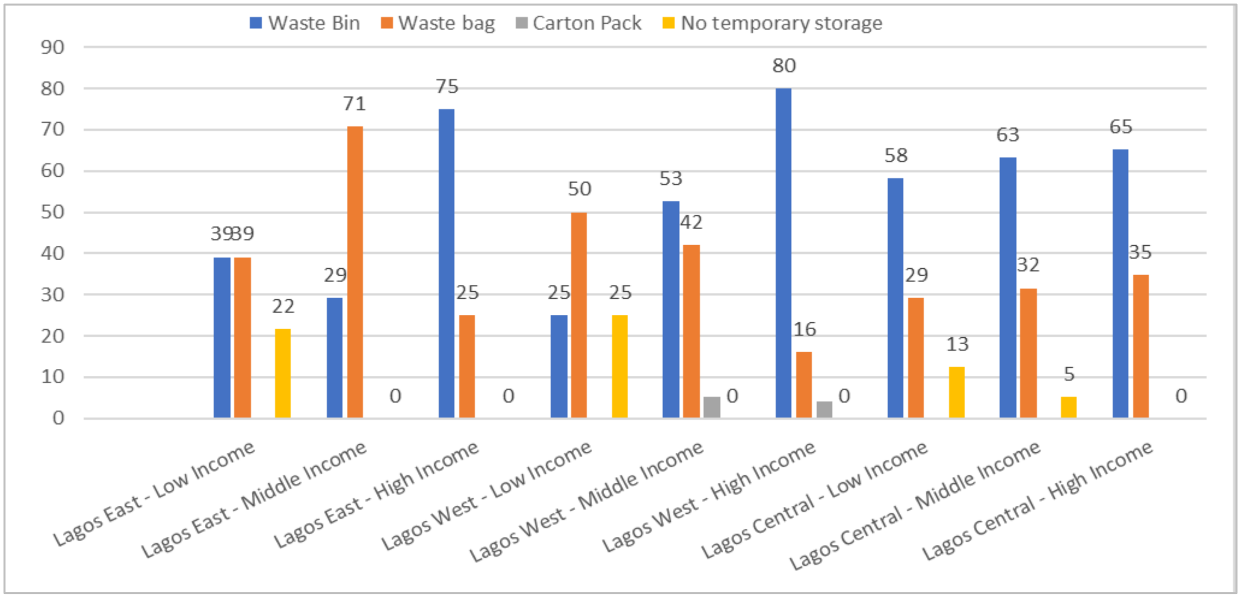
Nature of Dwelling



Note. Adapted from An Assessment of the Role of Households in Transitioning to Sustainable Plastic Waste Management in the Mega–City of Lagos, Nigeria, by Ojogun, C. I., 2023, p. 196 (Unpublished Thesis).

Figure 5

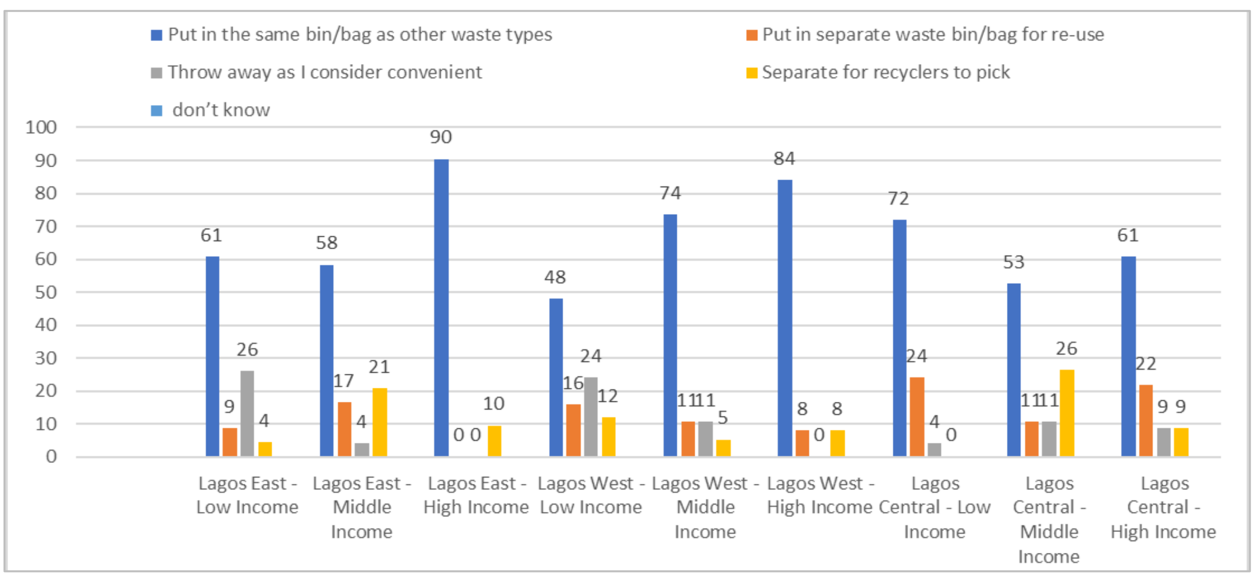
Temporary Storage of Municipal Solid Waste within the Dwelling Units



Note. It is adapted from An Assessment of the Role of Households in Transitioning to Sustainable Plastic Waste Management in the Mega–City of Lagos, Nigeria, by Ojogun, C. I., 2023, p. 198 (Unpublished Thesis).

Figure 6

Method of Plastic Waste Disposal by Households



Note. It is adapted from An Assessment of the Role of Households in Transitioning to Sustainable Plastic Waste Management in the Mega–City of Lagos, Nigeria, by Ojogun, C. I., 2023, p. 200 (Unpublished Thesis).

Perceptions and Attitudes towards Sustainable Plastic Waste Management

The majority of the respondents (94%) highlighted the need for better plastic waste management in Lagos. Most respondents (83.33%) knew the economic value of plastic waste—most (76%) reused plastic waste in their households. The majority (50%) of respondents have yet to make deliberate efforts to reduce plastic waste generation. Most of the respondents (62%) did not practice plastic waste separation.

Willingness to Participate in Sustainable Management of Solid/Plastic Waste

Most respondents (92.5%) were willing to participate in sustainable solid/plastic waste management. In comparison, Local Authority initiatives attracted a high level of willingness (92.1%) to implement plastic waste sorting and plastic waste minimisation (87.0%) through government programmes at household levels. Most respondents (75.6%) patronise government Private Sector Participation (PSPs) for waste carting and disposal (Figure 7), while waste carting charges are attached to PSPs, with most respondents (80.2%) paying for waste carting charges.

Solid Waste Management Associations in the Study Area

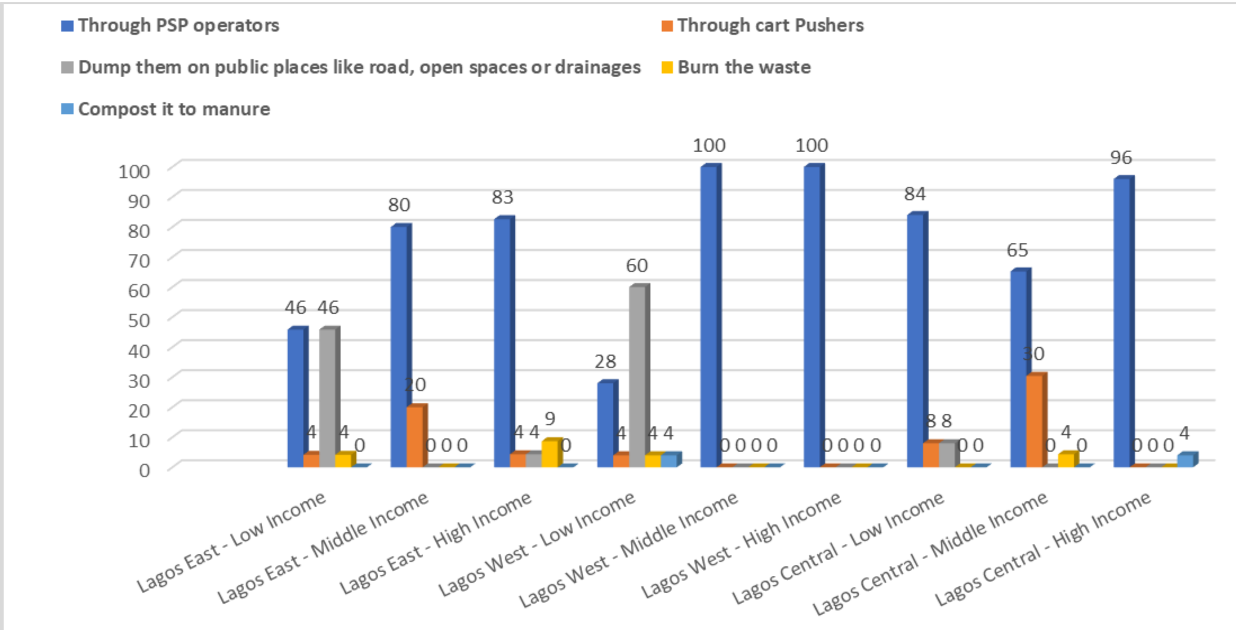
In-depth statistical variations were sought using IBM SPSS Software by doing a cross-tabulation of variables (Ojogun, 2023). Specifically, the cross-tabulation analysis centred on solid waste management associations with respect to respondents' age range, educational status, gender, household position, nature of dwelling unit, residential area, and socioeconomic area of dwelling (Ojogun, 2023). Chi-square test of independence and correlation tests were determined for the possible relationships of selected parameters (between two variables) at a significance level of $p<0.05$ (Majumder & Maheshwarappa, 2023; McHugh, 2013; Moore et al., 2013).

Household Waste Generation

A chi-square test of independence was significant for the following relationships: household waste generation and educational level [X^2 (10, N = 217) = 0.00, $p < 0.05$]; household waste generation and residential area [X^2 (3, N = 217) = 0.000, $p < 0.05$]; household waste

Figure 7

Method of Disposal of Household Waste



Note. It is adapted from An Assessment of the Role of Households in Transitioning to Sustainable Plastic Waste Management in the Mega–City of Lagos, Nigeria, by Ojogun, C. I., 2023, p. 220 (Unpublished Thesis).

generation and increasing socio-economic stratum [X^2 (3, N = 217) = 0.000, $p < 0.05$]. Hence, the lowly educated and socio-economically disadvantaged households (Lagos Central District) were less likely to generate household waste than the educated and socio-economically advantaged (Lagos West District). On the other hand, there is a significant positive correlation (N=217) between household solid waste generation and the nature of the dwelling (τ = 0.030, p <0.05). This has been observed to have a corroboration premised on the nature of dwelling having a direct relationship with household economic status (Adedayo et al., 2020; cf. Olayiwola & Ajala, 2022) with a similar trend as observed in previous studies (Awe et al., 2023).

Temporary Storage of Household Waste

The older age groups, in the low-quality nature of dwelling (i.e. Lagos East District) and low economic stratum households, are less likely to store household waste temporarily than the younger age groups, in high-income dwelling units (i.e. Lagos West and Central Districts). This is corroborated by Adzawla et al. (2019) and Soysa et al. (2022), who highlighted the influence of age on waste sorting behaviours.

Problems of Plastic Waste Mismanagement

The lowly educated and members of low-quality housing units are less likely to acknowledge that there are adverse issues associated with plastic waste mismanagement than the highly educated in high-quality dwelling units (Ojogun, 2023). This is similar to other studies (Bosah, 2013) where education is found to bolster environmental consciousness and pro-environmental behaviours (Osunji, 2021; cf. Pham & Nguyen, 2022).

Plastic Waste has Economic Value.

The lowly educated households (i.e., Lagos Central District) are less likely to acknowledge that plastic waste has economic value than those highly educated households (i.e. Lagos East District), as observed in previous studies, where education has been observed to be a predictor of recycling behaviour (cf. Bosah, 2013; Deshpande et al., 2024).

Plastic Waste Reuse and Reduction Efforts

Households in the high economic stratum are less likely to reuse plastic waste than those in the low economic stratum. In contrast, females in the low economic stratum are less likely to make an effort to reduce plastic waste generation than their counterparts in the high economic stratum (Ojogun, 2023).

Household Plastic Waste Separation and Treatment

A test of symmetry showed that there is a significant positive correlation (N=219) between household willingness to separate plastic waste and residential areas ($\tau = 0.005$, $p < 0.05$). A chi-square test of independence was significant for the following relationships: household treatment of separated plastic waste and residential area [X^2 (12, N = 219) = 0.00, p < 0.05]; household treatment of separated plastic waste and socio-economic status [X^2 (12, N = 219) = 0.000, p < 0.05]. Hence, low economic stratum households (i.e., Lagos East District) are less likely to treat separated plastic waste properly than high economic stratum (i.e., Lagos West District). This is similar to studies elsewhere that show the abundance of litter in socio-economically disadvantaged communities (Schuyler et al., 2022).

Reasons for not Separating Plastic Waste

The main reason outlined for not separating plastic waste was the availability of one waste receptacle in households (Ojogun, 2023). Other probable attributes include a need for more funds or physical space to have more waste receptacles. This is similar to the observations of Soysa et al. (2022), where household income and household type affected household behaviours with regard to waste segregation at source.

Willingness to Participate in Plastic Recycling and Separation

Willingness to participate in plastic waste recycling was significantly irregular with residential area ($p<0.05$) and socio-economic status ($p<0.05$). Households in the low nature of dwelling unit (i.e., Lagos Central District) and low economic stratum are less likely to participate in plastic waste recycling than those in high dwelling units (i.e., Lagos East District) and high economic stratum (Leknoi et al., 2024; Ojogun, 2023; Soysa et al., 2022). At the same time, lowly educated households in low nature of dwelling units (i.e., Lagos Central District) are less likely to be willing to participate in plastic waste separation in compliance with the Government's directive than those in highly educated households (i.e., Lagos East District) and the high nature of dwelling units, (Ojogun, 2023). This is corroborated by Ifegbesan et al. (2022), who surmised that social classes have a positive relationship with pro-environmental behaviour, likely determining the compliance levels of households to environmental directives of regulatory agencies (Amoah & Addoah, 2020).

Willingness to Minimize Plastic Waste Mismanagement

Lowly educated older age groups are less likely to be willing to minimise plastic waste mismanagement than those in highly educated households and the younger age group (Ojogun, 2023; cf. Ifegbesan et al., 2022). More so, there is a significant positive correlation for the following relationships: willingness to minimise plastic waste mismanagement and gender of respondents [(τ = 0.049, (N=217), $p < 0.05$)]; and the increasing nature of dwelling units [(τ = 0.042, (N=217), $p < 0.05$)]. Previous studies show that gender influences the environmental friendliness of individuals (Odia & Odia, 2019).

Acceptance of Ban on Single-Use Plastic

Households in the low-quality nature of dwelling units are less likely to accept the placement of a ban on single-use plastics than those in high-quality dwelling units (Ojogun, 2023). In view of the findings, Jenks and Obringer (2020) observed that a ban on single-use plastic leaves people with low incomes and people with disabilities more vulnerable. There is also a significant positive correlation (N = 215) between acceptance of a ban on single-use plastic and educational status (τ = 0.017, $p < 0.05$). Hence, the more educated are acclaimed to exhibit more positive pro-environmental behaviour towards the protection of the environment (cf. Osunji, 2021).

Household Disposal of Solid Waste

A chi-square test of independence was significant for the following relationships: household disposal of municipal solid waste and nature of dwelling unit [X^2 (25, N = 219) = 0.009, $p < 0.05$]; and socio-economic status [X^2 (10, N = 219) = 0.000, $p < 0.05$]. Households in the low nature of dwelling unit (i.e., Lagos East District) and a low economic stratum are less likely to properly dispose of municipal solid waste than those of high-quality dwelling units (i.e. Lagos Central District) and a high economic stratum (Ojogun, 2023). Hence, the main observation has been indiscriminate waste dumping in low–income, less organised communities and suburbs of Lagos. See Ichipi and Senekane (2023) for a comparison.

Household Payment of Waste Management Services

Households in the low nature of dwelling units and low economic stratum are less likely to pay for waste disposal services than those in high-quality dwelling units in higher economic strata

(Ojogun, 2023). Previous studies show that higher income levels in households have a positive impact on the willingness to pay for waste carting services (cf. Edeme & Nkalu, 2018; Rahji, 2009).

Hearing about PAKAM App

Households in the low-quality dwelling units (i.e., Lagos West and Central Districts) and low economic stratum are less likely to have heard of the PAKAM App than those in high-quality dwelling units (i.e., Lagos East District) and high economic stratum (Ojogun, 2023). There is a significant positive correlation (N=218) between having heard of the PAKAM App and educational level (τ = 0.031, p <0.05).

Findings from Interviews and Focus Group Discussions (FGDs)

From the interview manual and voice recordings transcribed, a word cloud was generated (Figure 8) to bring out salient points/words using the online Word Clouds application (https://classic.wordclouds.com/). A mix of inductive and deductive coding approaches was applied (Ojogun, 2023).

Findings show that the existing waste management policies were formulated without prior feasibility studies, which could have provided sufficient information for ease of development control and suitable policy interventions (Ojogun, 2023). Observations show the existence of poor plastic waste management, limited efforts to curb the nuisances, and exacerbation of poor waste management culture among residents (Ojogun, 2023). The informal sector and SMEs have championed a few efforts on plastic recycling for financial reasons. Lagos has been observed to be locked into an unsustainable socio-technological system of solid waste management (Figure 9).

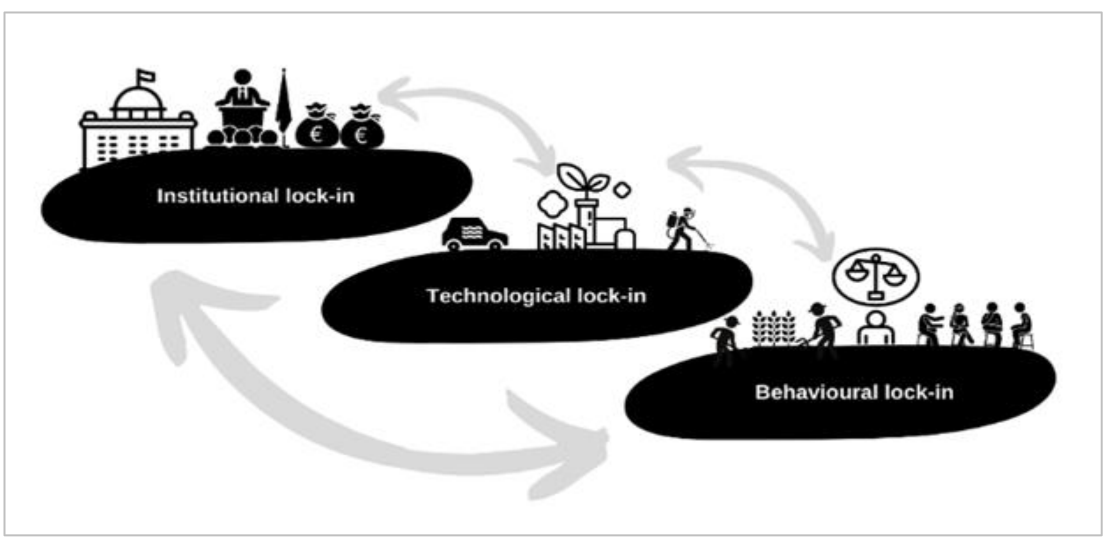
Figure 8

Word Cloud Generation of Codes from Interviews

Note. It is adapted from An Assessment of the Role of Households in Transitioning to Sustainable Plastic Waste Management in the Mega–City of Lagos, Nigeria, by Ojogun, C. I., 2023, p. 263 (Unpublished Thesis).

Figure 9

How the Elements Interact in a Lock-In Socio-Technical System



Note. Adapted from *Unlocking Lock–In: Accelerating Socio-Technical Transitions to Sustainability,* by Bjornavold, A., 2021.

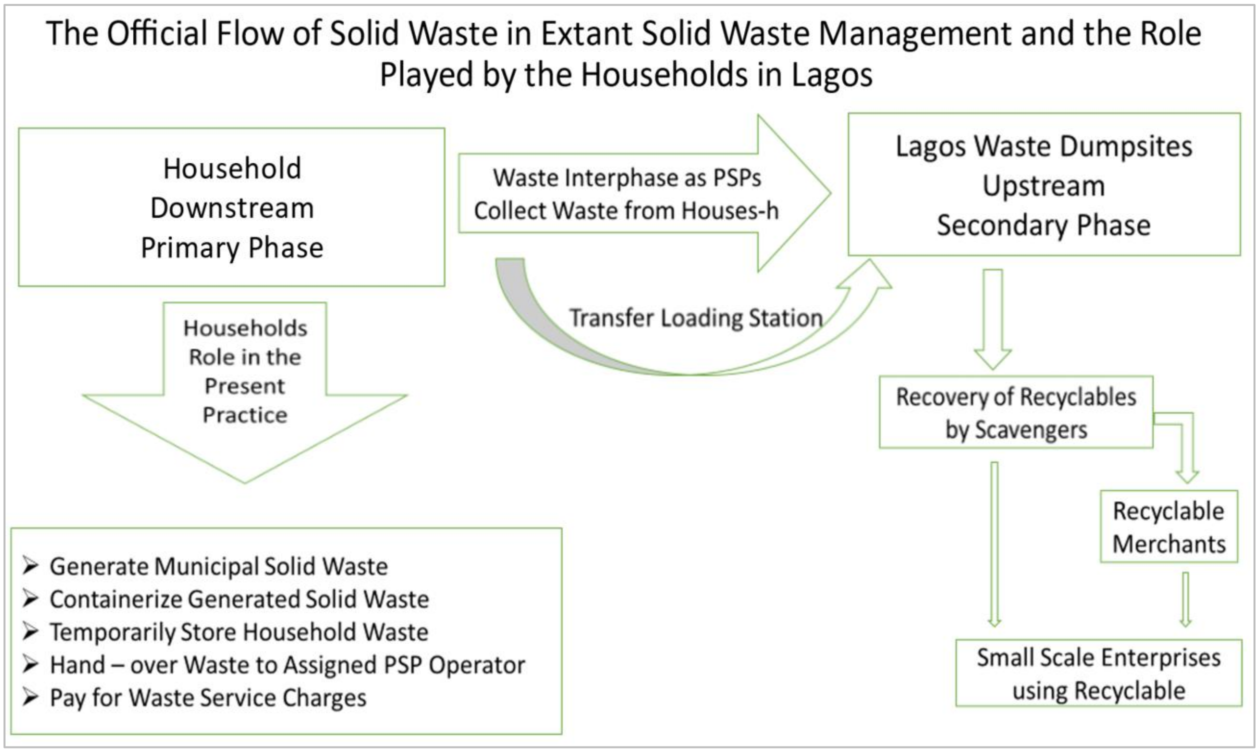
The socio-technical challenges may be addressed through the application of the Circular Economy concepts of plastic production, use and management of the subsequent waste (Ojogun, 2023). In transiting from the linear to circularity of plastic, the Transition Management Theory (TMT) is proposed in comparison to the command–and–control approach that has promoted the lock–in through system feedback (Ojogun, 2023). Solid waste management challenges are viewed to be more of a human factor; hence, human-based approaches are preferred over mechanical/technology-based applications (Ojogun, 2023). Household practices have the potential to be exhibited in public; thus, inadequate household containerisation contributes to solid waste leakages. Households deny local authorities access to waste (avoiding the payment of waste service charges), thereby exacerbating the prevalence of solid waste mismanagement in Lagos (Ojogun, 2023). Despite well-designed waste management initiatives and programmes, the lack of uptake for implementation by the residents leads to a natural dearth of the initiatives (Ojogun, 2023).

The approaches applied by the waste regulatory bodies did not encourage the households to play their part with regard to plastic waste management sustainability (Ojogun, 2023). Observations show that more is needed for regulatory bodies to enact compliance laws by initiating programmes to persuade stakeholders to play a part in new programmes (Ojogun, 2023). The current role of households in the study area was placed on a model presented in Figure 10.

A thematic map generated from the interview findings was presented as an overview of the extant solid waste management and the possible pathways toward transitioning to a Circular Economy of plastic waste management in Lagos (Figure 11).

Figure 10

Extant Official Flow of Municipal Solid Waste in Lagos Metropolis

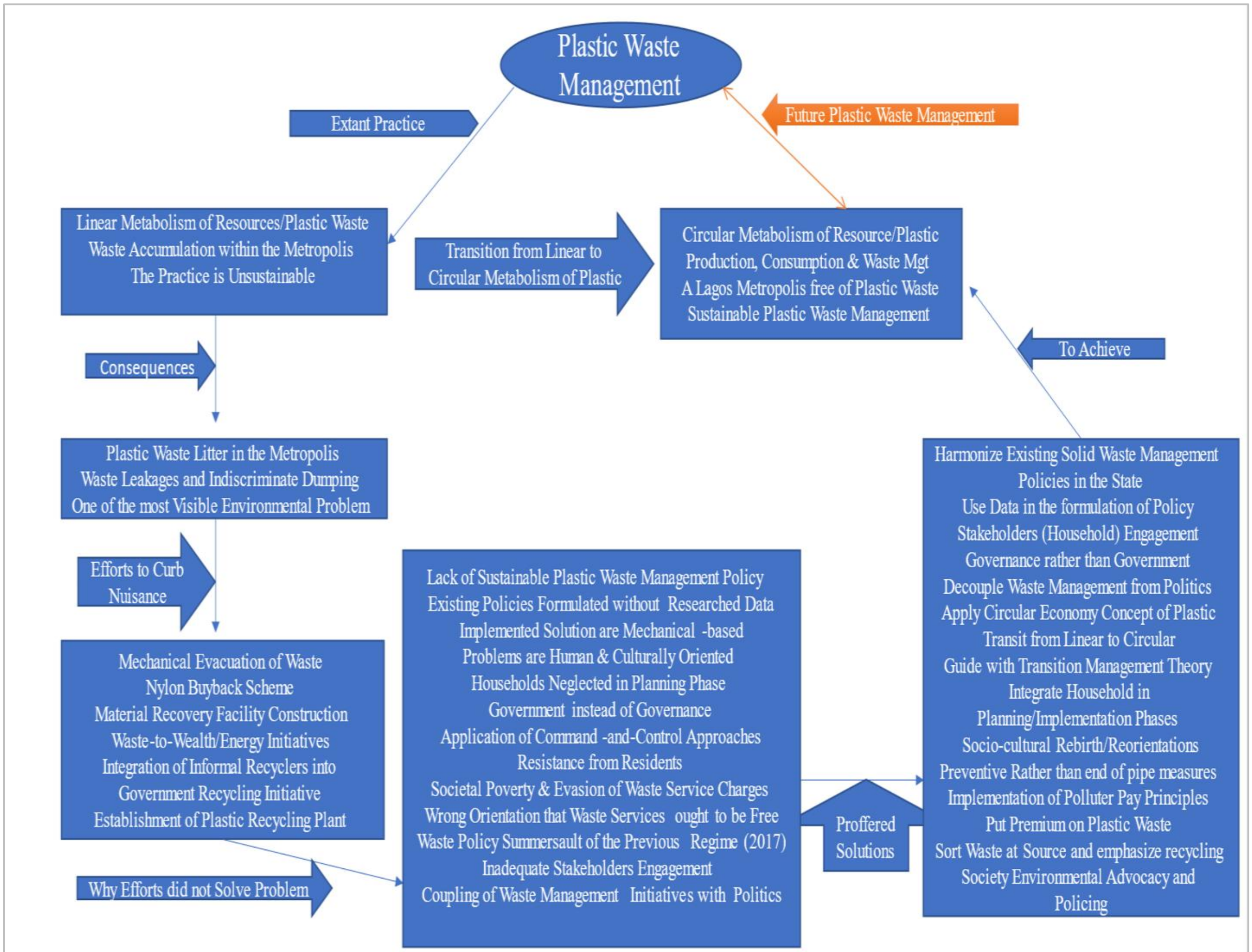


Note. Adapted from An Assessment of the Role of Households in Transitioning to Sustainable Plastic Waste Management in the Mega–City of Lagos, Nigeria, by Ojogun, C. I., 2023, p. 332 (Unpublished Thesis).

To achieve the proffered solutions in Figure 11, a hybrid of TMT tenets and the inherent principles of CE was developed as a model (Figure 12) to bring about a just transition with respect to plastic: from natural resources harvest to production, to purchase and consumption as well as the management of the end–of–life of the products. Hence, there is a need for the formulation and implementation of research-based TMT and CE-minded policies to guide and guard the already identified sustainability initiatives at the niche society level. The tenets of TMT are expected to steer the innovation in the desired direction. At the same time, the principles of CE will inform the practised production, consumption and management of arising waste or feedstock for other processes.

Figure 11

Macro–level Thematic Map from Interviews

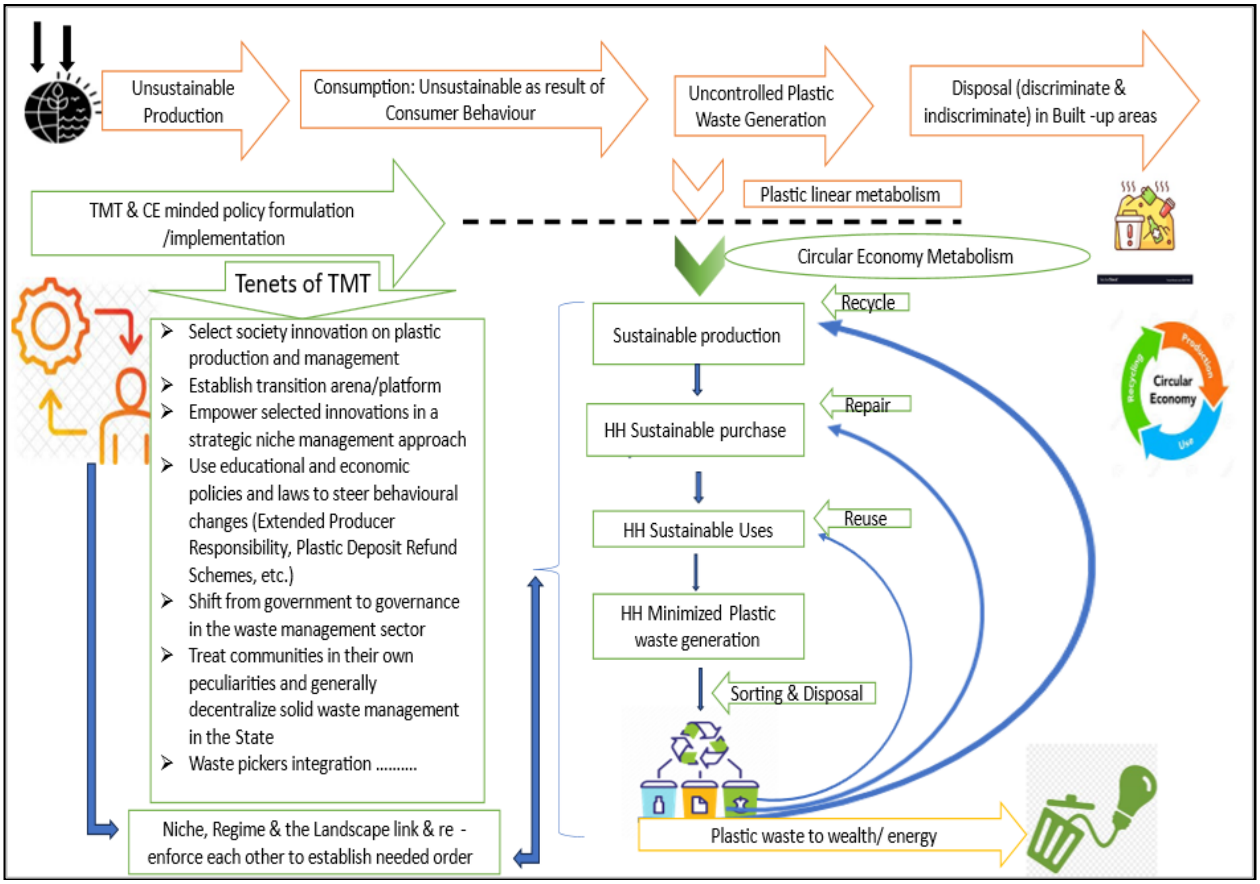


Macro-level Thematic Map of Extant Plastic Waste Management and Ways towards Transitioning to a Circular Economy of Plastic Wast e Management in Lagos

Note. Adapted from An Assessment of the Role of Households in Transitioning to Sustainable Plastic Waste Management in the Mega–City of Lagos, Nigeria, by Ojogun, C. I., 2023, p. 270 (Unpublished Thesis).

Figure 12

Proposed Hybridization of TMT and CE Concept to Steer the Plastic Transition



Note. It is adapted from An Assessment of the Role of Households in Transitioning to Sustainable Plastic Waste Management in the Mega–City of Lagos, Nigeria, by Ojogun, C. I., 2023, p. 372 (Unpublished Thesis).

Policy Implications and Recommendations for Stakeholders Based on the Study's Findings

The findings showed that there is a lack of appropriate policy on sustainable SWM; the existing policies were not evidence-based while they were formulated with linear mindsets of resource metabolism; inadequate stakeholders' engagement; unclearly spell-out roles of households; existing SWM problems resulting from human maladaptive behaviours; while efforts made to solve issues were mechanical–based. Thus, necessitating an urgent need for the formulation and implementation of comprehensive, integrated and circular–minded sustainable SWM policies to act as a roadmap to influence transitions (Joseph, 2006; Nwosu & Chukwueloka, 2020; Ojogun, 2023). The policies must not focus on the current waste management scenario as it obtains at present but must consider the economic, technical, environmental, legal, infrastructure financing, and administrative facets (Gana et al*.,* 2022; Ojogun, 2023). This should create avenue(s) for participation by significant stakeholders (state and non–state actors) (Figure 13) according to their identified roles. The revised policies must consider plastic production redesigns and standards for sustainable production, consumption, and the management of unavoidable waste generation. Hence, the policies will have to make provision for sustainable SWM infrastructures – roads, equipment, recycling hubs, recyclable waste banks, transfer loading stations, sanitary landfill sites and the closure of all existing dumpsites (as residential dwellings already encircle them) in Lagos (Ojogun, 2023).

Discussion

It is necessary to balance the role of the households in municipal solid waste management and avoid limiting their roles to service recipients (Ojogun, 2023). Household roles should be considered on a broader general dimension of being the major generator of municipal solid waste, first primary handlers of waste at the downstream level, deliverers of waste to the upstream level, as an essential stakeholder in finding solutions to the existing challenges in an Integrated Solid Waste Management (ISWM) approach (Joseph, 2006; Ojogun, 2023; Rosilawati et al., 2023: Vutivoradit & Jakkapattarawong, 2018). Households and residents should be taken as financial contributors through the payment of waste services to the PSPs in the waste management business and as custodians of their local communities to monitor the environment and the activities of the PSPs (cf. Solomon, 2011).

The households are significant generators of municipal solid waste in developing economies (Joseph, 2006; cf. Mshelia, 2015) and are the first handlers of waste with essential roles that may aid in transitioning to sustainable plastic waste management (Ojogun, 2023; Safitri et al., 2024). Therefore, all efforts must be put in place to ensure that households are convinced to participate in programmes without coercion (cf. Minn et al., 2010). However, the proposed roles could have cost implications compared to the old extant role (Figure 13).

Figure 13

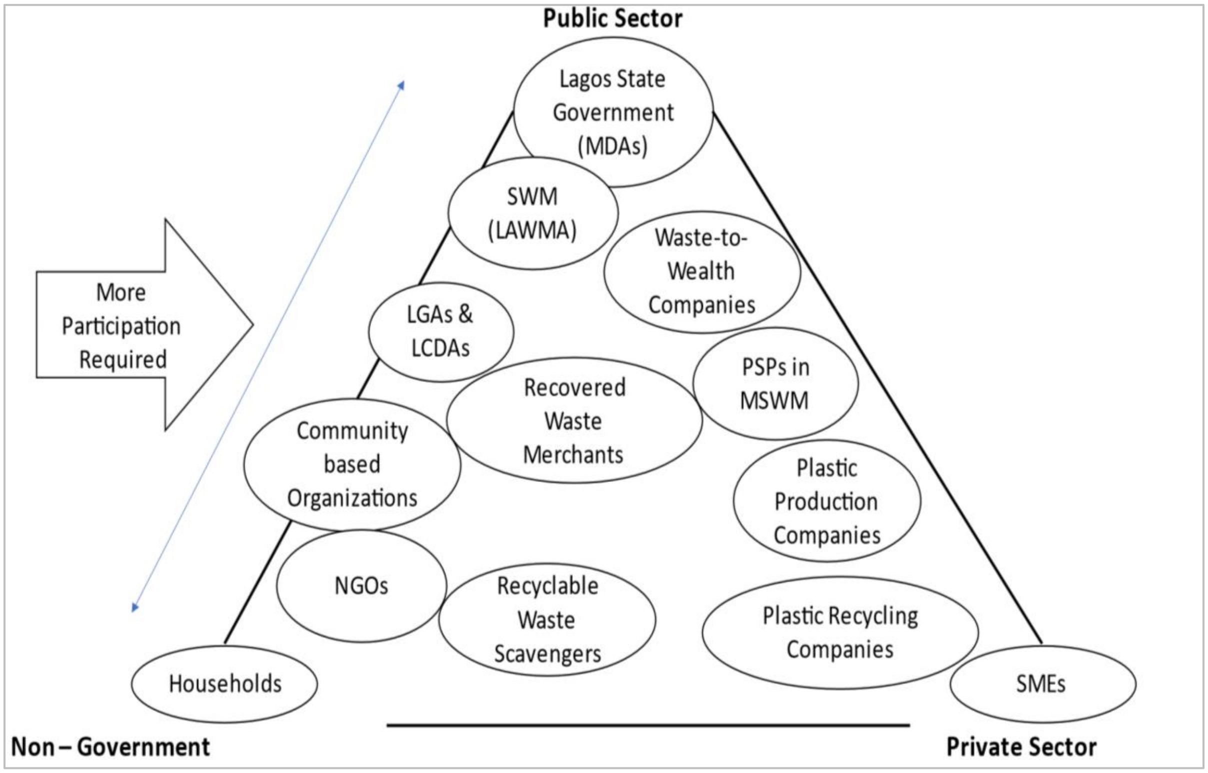
Expected Roles of Households in Sustainable Solid Waste Management

Note. It is adapted from An Assessment of the Role of Households in Transitioning to Sustainable Plastic Waste Management in the Mega–City of Lagos, Nigeria, by Ojogun, C. I., 2023, p. 333 (Unpublished Thesis).

Households play a major role in municipal plastic waste generation and need to participate in the policy formulation stages for sustainable solid waste management (Farrah & Ng'ang'a, 2022). A proposed stakeholders' matrix model was designed and presented to counter the current trends in policy formulation, where Ministries, Government Departments, and Agencies coin policies with limited consultations (Figure 14).

Figure 14

Proposed Stakeholder Matrix for Sustainable MSWM for Lagos



Note. Adapted from Analysis of Stakeholders Participation in Municipal Solid Waste Management – A Case *Study,* by Menon, J. V., & Palackal, A., 2021, p. 975.

Once new policies are formulated, they will teach the tenets advocated by the Circular Economy concepts. Hence, households will have to make concerted efforts to prevent the generation of plastic waste through behavioural change (Ojogun, 2023).

Conclusion

The current waste management system in Lagos leaves room for waste leakages along the value chain. The key observation is the failure to manage waste efficiently over the years. There are challenges in managing the application of plastic waste technologies, waste generation, and leakages in the context of behaviours and attitudes (Ojogun, 2023).

Formulating evidence/research–based sustainable policies is necessary at a comprehensive scale of involvement while catering to a balance in the engagement process to properly enforce the existing environmental management regulations. The service recipients should be convinced to participate willingly according to the rules (i.e., proper in–house waste containerisation, prevention of waste generation, sorting, reuse, recycling and payment for waste services) (Ojogun, 2023).

There is a need for a plastic Deposit Refund Scheme (DRS) and levy in order to develop economic policy instruments, develop and implement plastic production standards with respect to weight standard/thickness, additive/content control, and ban in phases as in regulatory instruments; In contrast, the informative instrument will consider the creation of awareness through massive campaigns and the insertion of environmental education in the primary schools' curriculum (Ojogun, 2023).

A society locked into an unsustainable socio-technical system can be subtly freed from entanglement by applying the principles embedded in the Transition Management Theory, as being used in the Netherlands (Loorbach & Rotmans, 2010; Rotmans & Loorbach, 2009), with the mindset of a Circular Economy concept of plastic production, consumption, and the management of the arising waste (Ojogun, 2023).

The study brought to bare the unsustainable nature of SWM practices in Lagos, mapped – out the extant official waste flow of MSWM and the roles played by the households identified reasons why previous efforts made to transit to sustainable SWM had failed and presented plausible pathways towards achieving the sought sustainability transitioning. It also mapped out the supposed roles of the households (Figure 13) in CE-minded situations with the development of a stakeholder's matrix (Figure 14), including the state and non–state actors for the Lagos context. The findings of the paper will inform policymakers in the development of a sustainable roadmap for SWM sustainability transitioning in the study area.

With specificity on transitioning to sustainable plastic waste management in the Lagos metropolis, a circular economic model (Figure 12) was developed that could shield the identified niche innovative initiatives in the PWM value chain to create a destabilisation at the societal regime level and usher in regime change. This model, developed by the hybridisations of the tenets of TMT and the underlying principles of CE, is envisioned to aid a break free from the lock–into the unsustainable socio-technical SWM by creating and implementing policies that allow householders and other stakeholders to play their peculiar sustainability management roles in Lagos.

One possible limitation of the study was the use of a non-random sampling technique (as a result of the lack of population data and the advised minimisation of contacts during the Covid–19 crisis) data in the quantitative strand of the explanatory mixed sequential research design deployed. To reduce the anticipated biases, data gathering and analysis were triangulated.

In addition to the above, it is suggested that future research could apply the random sampling technique to allow for a better generalisation of findings. In a similar vein, the study could be carried out to strategise Lagos broadly into slum and non–slum areas with an additional investigation on how best the informal sector in SWM could be integrated into the mainstream to aid the transition.

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Exploring the Effectiveness of Sport Leadership Training that Engages Trinidadian Athletes as Whistle-blowers

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Abstract

When sports results are predictable, viewers lose entertainment value. Athletes and sports officials are now protected from corruption by whistleblowing (WB) laws. To participate in the International Olympics (IOC) and World Games, National Sport Governing Bodies (NGBs) must now have WB policies. An empirical gap was found while searching for sports whistleblowing educational courses for sports leaders.

Semi-structured interviews and focus group interviews were utilised to conduct qualitative research. Data was collected using purposive and snowball sampling. The analysis used the Constructivist Grounded Theory (GT) approach described by Charmaz (2008). The participant's data were initially divided into 30 refined groups and then further categorised into five categories using TAGUETTE software. A core category was identified, and theoretical saturation was achieved after revisiting the GT steps twice. The data confirmed that participants recommended that leaders undergo specialised WB leadership training. The research data led the researcher to switch from behavioural theory to focus on the behavioural economics of social interaction, drawing on Dewey’s (1938) idea that "learning is a social activity."

Insights from McLeod (2023) influenced the shift in sports leaders' whistleblowing knowledge. This knowledge falls within the 'zone of proximal development,' where leaders reflect on their experiences as athletes and create mental leadership models while adapting cognitive and metacognitive strategies. The research findings indicate that sports leaders in Trinidad need training to convey WB knowledge to athletes. Without this training, NGBs disregard WB policies and education.

Keywords: Grounded theory, cognitive, metacognitive, neuroeducation, WB, sport WB definition, policies, strategies, WB education, sports federations, Trinidad sports.

Introduction

The signatories of the World Anti-Doping Code stated in March 2003 that they recognise and implement the Copenhagen Declaration on Anti-Doping in Sport. The code ensured compliance by harmonising anti-doping regulations. The World Anti-Doping Code requires that if International Sports Federations (IFs), National Governing Bodies (NGBs), and governments want their athletes to participate in the Olympic Games, they must conform to strict standards and regulations and ensure that their NGBs have whistleblowing policy (Gray, 2019).

Furthermore, Gray (2019) states that they must ensure that their NGBs have whistleblowing policies. IFs and the IOC require their NGBs to develop whistleblowing policies in response to this requirement. This study introduces the critical concepts of whistleblowing, including both selfless and egotistical motivations for whistle-blowers, the risks they face when exposing offenders, and the positive impact on sports. The study also provides insights into how sports leaders can effectively share whistleblowing knowledge in Trinidad and the Caribbean. According to Cotterill et al. (2022), leadership is a key factor for improving performance in all sports areas.

This study adds to the existing literature on sports leadership and sports education. The study proposes actionable strategies that Trinidad's sports leaders can implement to eradicate the fear of reprisals faced by whistle-blowers within sports. Significantly, this study can help Trinidad NGBs review, add and improve strategies that include safe and confidential reporting mechanisms, implementing clear anti-retaliation policies, supportive systems for sports whistle-blowers and educational strategies that sports leaders can adopt to make athletes more aware of whistleblowing.

Sports Whistleblowing Definition

Many sports whistleblowing articles reference Near & Miceli's (1985) definition of a whistle-blower as someone who informs a person or organisation of illegal, immoral or illegitimate practices. Whistleblowing in sports has increased in the last five years due to the growth in understanding and need for it in this industry.

Although Near & Miceli's (1985) definition of whistleblowing is generally accurate, there has been an increased focus on sports whistleblowing. Therefore, the author believes there is a need for a specific definition of sports whistle-blowers. To address this, the author has incorporated various whistleblowing definitions from researchers such as Adams & Kavanagh (2020), Erickson et al. (2017), Erickson et al. (2019), Kavanagh et al. (2019), Kerr & Stirling (2019), Moriconi & de Cima (2020), and Verschuuren (2020) to develop an interpretation that focuses explicitly on whistleblowers in sports: “A sports whistle-blower is someone who confidentially reports any illegal activities affecting sports to a designated platform, sports organisation, another athlete, or any other appropriate party”.

Literature and Knowledge Gap

The literature review and interviews revealed a need for more reference material and understanding regarding whistleblowing among sports leaders in Trinidad. Verschuuren (2020) stated that qualitative research is needed to fill the gap in the study of sports whistleblowing. Despite an extensive search on sports whistleblowing in Trinidad, no literature or studies have been found. However, he found that most sports whistleblowing researchers focused on the deterrent nature of whistleblowing in European and American contexts.

The literature review suggests that further research is needed on the influence of leadership strategies on whistleblowing in organisations and institutions. In Trinidad, the researcher found that many NGBs assumed that sports leaders were knowledgeable about whistleblowing. However, the study found that NGB executives needed a comprehensive grasp of whistleblowing and were, therefore, unable and unwilling to educate their athletes about it. Despite the encouragement of the World Anti-Doping Agency and the IOC to adopt WB policies, some NGBs opted for generic policies that did not align with Caribbean or Trinidadian cultures.

Qualitative research on sports whistleblowing in the Caribbean, particularly Trinidad, needs to be conducted. It is recommended that executives take the initiative to educate their sports and athlete leaders on WB and its advantages to sports. Introducing WB to athletes and developing or modifying policies are crucial to Trinidad's culture and society. As far as this researcher knows, this is the first study to use leadership strategies to engage athletes in whistleblowing.

Problem Statement

Edelman & Pacella (2019) questioned the effectiveness and use of the USAG whistleblowing policy based on the allegations of Larry Nassar, the former medical doctor for USA Gymnastics who was sentenced to 175 years in Michigan, USA, for abusing female athletes he was supposed to treat. According to Barkoukis et al. (2021), the relationship becomes stressful whenever someone blows the whistle on a teammate, coach, or official. Professional athletes often remain silent to avoid losing their spots in international events (Erickson et al., 2019). Grigori Rodchenkov is also noted in the literature for his involvement with the state-run program to evade doping control. Similarly, Yuliya Stepanova claimed that she was forced to dope by her coaches when they told her that achieving anything in sports required doping. As a result, she was banned in February 2013. Following her ban, she sent a ten-page confession to WADA stating that the Russian government encouraged doping among their athletes; as a result, she was dubbed by Kremlin officials a traitor, and her execution was demanded (Stepanova, 2021). Other than the above cases, Barry Bennell, a youth football coach, was also reported as sexually abusing young boys (Crepeau, 2016).

Furthermore, Coach Alberto Salazar was also reported to have subjected female athletes to physical and emotional abuse (Mountjoy, 2020). These aside, a study by Kavanagh et al. (2019) highlighted bullying incidents where coaches, teammates, and managers bullied athletes. According to Verschuuren (2021), sport’s governing bodies encounter problems due to a lack of whistleblowing and corruption denouncement. Zhang (2018) suggests that more proactive support and reporting channels for whistle-blowers are needed.

Purpose of the Study

Research into sports whistleblowing in Trinidad is necessary, especially in light of recent anti-doping and corruption cases (Haynes & Marcus, 2019). Several studies have concluded that athletes in the Caribbean can only escape poverty through sports competence and success in regional and national competitions, and high school sporting events can often guarantee an athlete a scholarship (Mitchell, 2016). This research will benefit NGB's recreational, elite, and secondary school athletes. This study examined Trinidad NGB's leadership strategies to determine their impact on whistle-blowers. The study's purpose is to suggest leadership strategies that promote and facilitate whistleblowing education in sports organisations while also engaging athletes in whistleblowing.

Aim and Objectives of the Study

This study examines the effectiveness of leadership training in engaging athletes as whistle-blowers. Its objective is to investigate the leadership strategies employed by NGBs to effectively engage athletes in whistleblowing. It also identifies the leadership styles utilised to educate athletes on whistleblowing policies and assesses their roles in deterring corruption. Furthermore, this study examines social factors influencing the Trinidad athletes' intentions to engage in whistleblowing activities.

Research Questions

The following research question, which delineates the research aim and strives to centre and emphasise the main research problem, is of the utmost importance in the study's quest to understand and improve organisational behaviour and ethics in the Caribbean.

Research Questions

1. What leadership strategies are employed by NGBS to engage their effectively

Athletes in whistleblowing education?

2. What leadership styles are used to educate athletes on whistleblowing policies?

3. What social factors influence athletes to engage in whistleblowing activities?

Theoretical and Conceptual Framework

Theoretical Framework

Three behavioural models were used in this study. Kohlberg (Kohlberg, 1969) believes that whistleblowing becomes easier when one is no longer associated with a wrongdoer and less likely when one is familiar with them. According to the Theory of Planned Behaviour (Parker et al., 2020), an individual's 'locus of control' influences behaviour. Whistle-blowers are most likely to be those who control conditions.

This study uses the Cohesive Whistleblowing Model (Goldsmith, 2015) as the framework. Goldsmith states that whistle-blowers affiliated with the same group are less likely to blow the whistle when observing wrongdoing. The greater the group cohesion, the greater the chance of someone blowing the whistle. Additionally, a whistle-blower incentive will be needed. This study focuses on incentives to whistle-blowers.

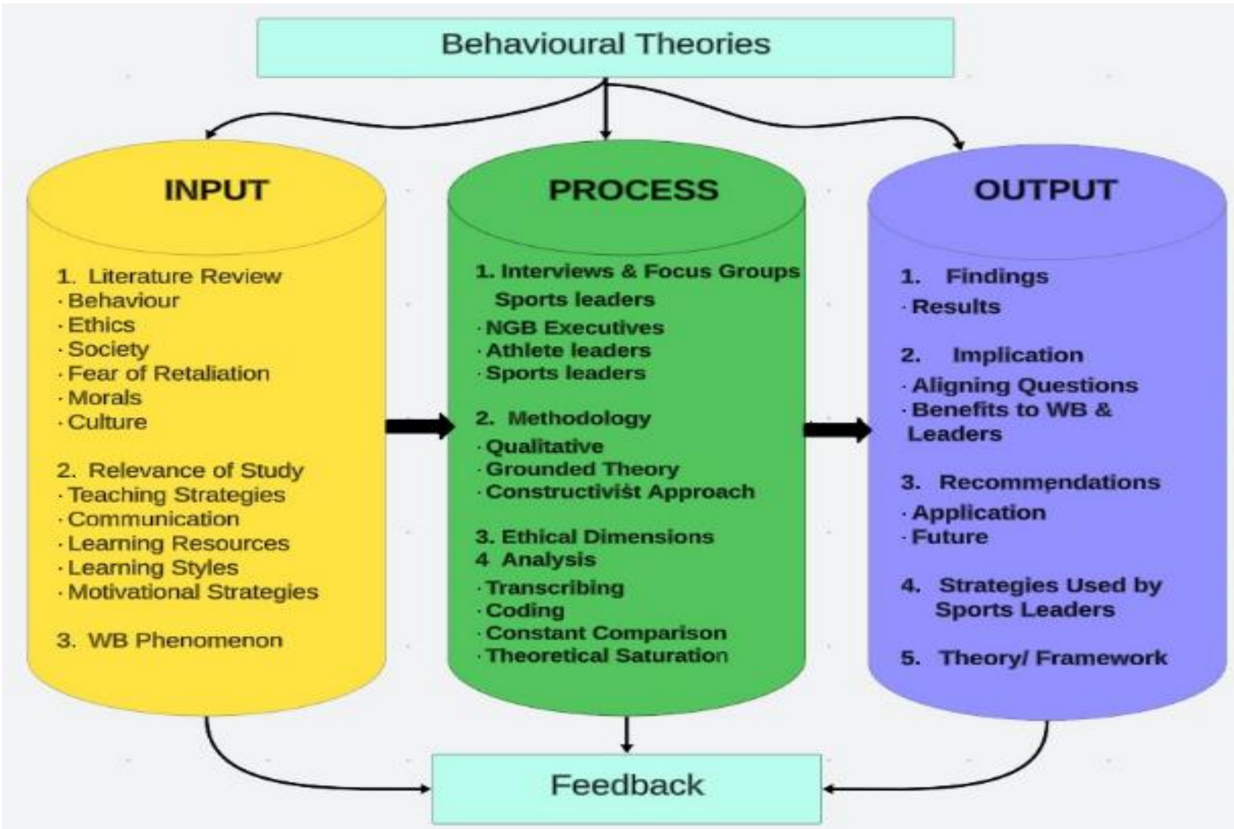
Conceptual Framework.

This study utilised the IPO (input-process-output) model shown in Figure 1 to visualise the necessary steps. The input contains the literature review, which represents empirical findings and concepts while demonstrating their relationships and relevance to the research study.

The Process Section identifies the instruments, sources of data, methodology, design, approach, and analysis. The Output Section includes the findings, evaluation of the findings, implications, and recommendations. Since this is a grounded theory design, the feedback is regular and constant, comparing the input and process framework.

Figure 1

Conceptual Framework



Note. Researcher's Construct, 2024

Methodology

This study employs a qualitative design, and as per Parry (1998), the grounding of a theory is the most reliable approach for leadership-related studies. As per Chun Tie, Birks & Francis (2019), grounded theory (GT) has become increasingly important for empirical researchers in the social sciences due to its rising popularity in literature. GT follows a systematic approach for collecting, comparing, and analysing data while implementing guidelines and procedures for conceptual level and theory scope controls.

While exploring the GT approach for this study, the researcher discovered from GT literature that GT progressed in different directions (Charmaz, 1983; Charmaz, 2006; Charmaz, 2017; Corbin & Strauss, 2014; Glaser, 1978; Glaser & Strauss, 1967; Strauss, 1987). To select the appropriate GT approach for this study, the researcher examined the philosophy of each approach. Based on this analysis, the researcher opted to use Charmaz's Constructivist Grounded Theory (CGT).

Grounded Theory Philosophy

GT is a research methodology defined by Kenny & Fourie (2015) as having three dimensions: Classic, Straussian, and CGT. Despite their common origin, each of these dimensions is characterised by different research procedures. The GT method developed by Glaser and Strauss is considered a methodology, while the approach by Corbin, Strauss, and Bryant is viewed as a set of methods. Charmaz's methodological approach is described as a constellation of methods, and Clark's GT approach is classified as interpretive. Tarozzi's (2020) analysis categorises GT based on its procedures. Rakhmawati (2019) described Glaser's work as the classic GT, while Strauss and Corbin's work was categorised as the Straussian GT and the second-generation approach. Charmaz's approach was recognised as the Constructivist GT and referred to as the third-generation approach.

The researcher considered the underlying philosophy of each approach when selecting the appropriate GT approach for this study. Although the approaches are rooted in the same philosophical foundation and can be used to comprehend and develop theories through data collection and analysis, Rakhmawati (2019) notes that their ontology and epistemology differ, so they cannot be evaluated using the same standard.

Charmaz's Constructivist Approach

The researcher's choice of Charmaz's Constructivist Approach was based on the allowance of the researcher's reflexivity in the study. Reflexivity allows subjective critique while evaluating the phenomenon (Charmaz & Thornberg, 2021).

According to Charmaz (2000), researchers can actively participate in constructing the study, and a researcher's stance towards knowledge affects the choice and use of research methodology. This approach recognises the researcher's perspectives and roles and acknowledges the impact of his sports law master's degree and experience as an athlete and coach on the research process. A reflexive approach allowed the researcher to subjectively critique and evaluate the research processes, which provided new insights into the phenomenon.

Figure 2 shows the GT approach used in this study. Although following Charmaz's CGT approach, the researcher follows Bryant’s (2017) statement describing Charmaz's approach as a constellation of methods. Therefore, the study used input and suggestions regarding GT coding, categorising, and analysis by the different GT scholars.

The methodology used to develop the current whistleblowing knowledge is illustrated in Figure 3. Research sources included Glaser, Strauss, Corbin, Charmaz, Bryant, and the study by Charmaz & Thornberg (2021).

The Methodological Steps

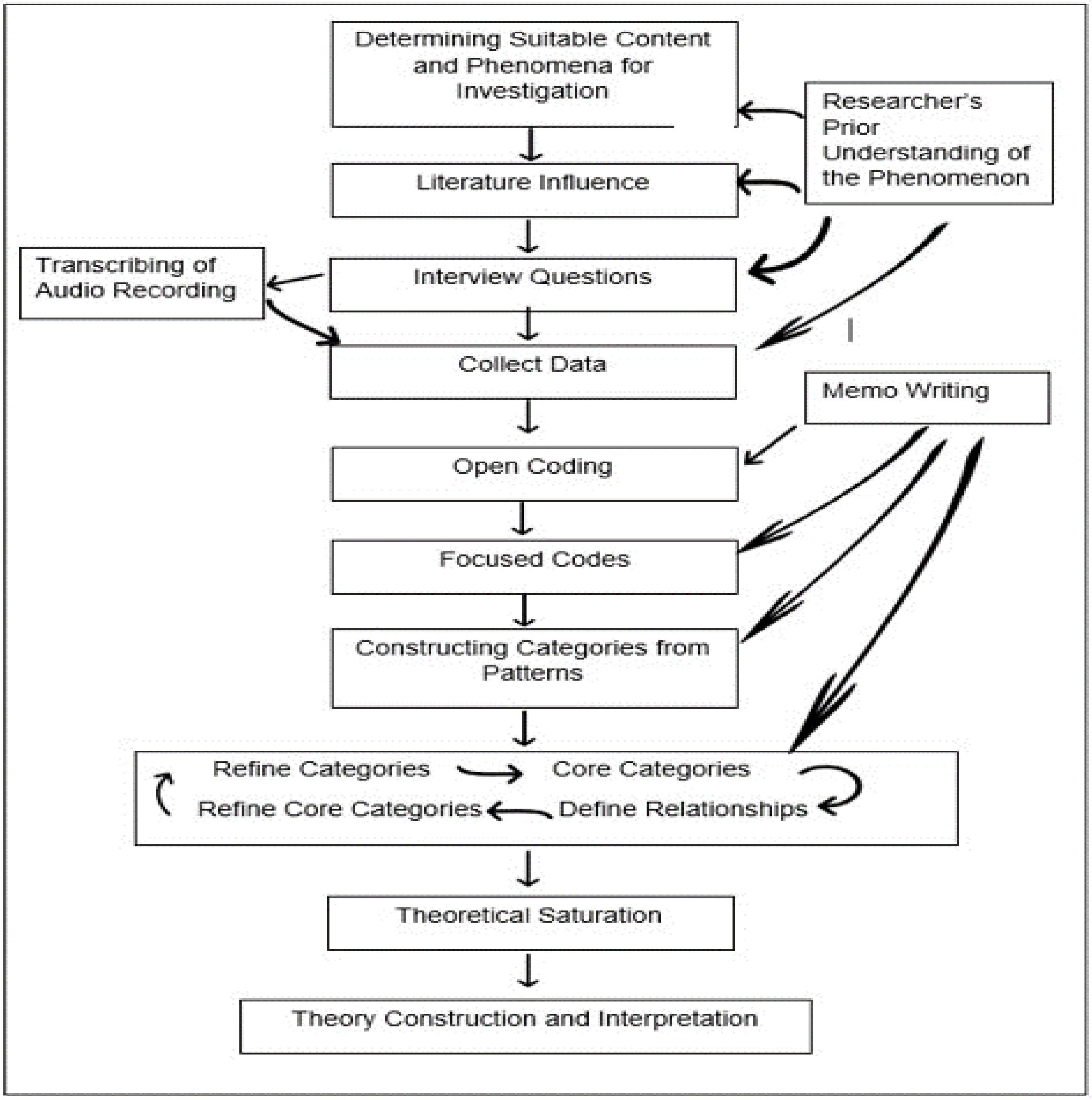
The research topic was explored without imposing any knowledge in preparation for data collection. The investigation reviewed the selection of Trinidad sports leaders between the ages of 18-55 with some prior knowledge of sports policies and WB. Participants in this population were NGB executives, athletes, athlete leaders, coaches, referees, instructors, captains, vice-captains, medical doctors and physiotherapists as participants. The initial sample size was 180 participants; however, based on theoretical sufficiency, 51 participants were selected.

As part of the research, the researcher created a set of open-ended questions relating to the particular phenomenon. The questions used an inductive, comparative, and interactive approach while aligning with the study’s aim and objectives (Constantin & Stoicescu, 2019).

The researcher conducted focus group discussions in addition to individual interviews. These discussions provided a platform for stimulating conversations, raising discussions, and delving into various cultural, social, ethical, and moral inferences and experiences (Foley et al., 2021; Smith & Sparkes, 2016).

Figure 2

Charmaz Grounded Theory Approach



Note. Researcher's Construct, 2024

The researcher identified the participants using the purposive and snowball sampling techniques (Naderifar et al., 2017). Initially, he contacted sports individuals he knew personally through his network. These individuals were then asked to provide additional contact information for other sports leaders interested in participating in the study. This approach allowed him to gather a broader range of information and viewpoints from various sources.

Figure 3

Grounded Theory Steps

Note. Researcher's Construct, 2024

The researcher then informed gatekeepers, including TT Sports ministries, NGB executives, and club executives, about the study. This process included obtaining permission to meet and interview their sports leaders and athletes.

Data Collection

Interviews and audio recordings were the primary data collection tools used in this study. Transcribing recordings into a written format allowed for interpretation, selection, and thematic analysis. Three devices were used for recording and transcribing. The researcher used the Otter.ai app to transcribe and record the interview in real-time, while the other two devices were audio recorders using voice recording apps.

The study utilised CGT methodology, which follows a series of steps. The first stage is Open Coding, where the data is converted into codes, and the goal is to identify concepts and themes through categorisation (Williams & Moser, 2019). The analysis process began with the researcher coding the data using Charmaz's (2008) guidelines, and the process was assisted by TAGUETTE software, an open-source CAQDAS package designed for qualitative research.

Initially, the transcripts were segmented and line-by-line coding was used to label each expression. The codes were either a single word or a short sequence of words, as defined by Charmaz (2008). In addition, in vivo codes were used to identify the exact words the participants spoke. According to Manning (2017), this method provided a more nuanced understanding of the data than other coding methods. In vivo coding was particularly helpful in this study as it helped identify specific cultural meanings of words or phrases used by the participants.

Codes were then grouped into categories and subcategories, usually termed axial coding (Corbin & Strauss, 1999; Vollstedt & Rezat, 2019). Charmaz (2008) identified focus or selective coding as the second stage following the formation of categories. According to Charmaz, the researcher can influence this stage by selecting and elevating the status of codes to theoretical categories. These theoretical categories carry the weight of the analysis and lead to thematic specificity, ultimately leading to the creation of theory and the construction of meaning.

Results

Data Analysis

Once the data was collected, the first step involved creating a memo. The second step focused on theoretical sampling, where the interview answers were read and re-read to capture the overall tone and feelings of the participants (Birks & Mills, 2015). The third step began the analysis process, where collected data was coded, following the GT design of line-by-line coding. As per Charmaz (2006), the coding phases were adhered to during the analysis process. The researcher created codes based on the relationship between different themes. After a deeper analysis of the existing data, these codes were reorganised.

After each interview, the researcher began coding the data as soon as possible. Each interview transcript line was assigned short-label initial codes. An excerpt of the initial codes and corresponding excerpts are provided in **Table 1**. Each piece of information was summarised and explained using these codes. Analytical thinking was stimulated, and preconceived ideas were

Table 1

Interview Excerpts and Initial Codes Leader MS 2

Excerpt	Initial code
Athletes will whistleblow as it all has to do with the comfort level of the athlete	Comfort of Athlete
You need to understand different personality and personality styles of your athlete and work with the athlete accordingly	Leader who believes in inspire, motivate and encourage (Transformational Leader)
Trust that whatever they shared with me would not create a negative outcome for them personally	Trust in Leader's advice
WB can be improved via increased knowledge and emotional intelligence while getting them to open up	Knowledge, psychological and listening to athlete
PE in schools is an excellent starting point while developing WB knowledge and building their attitude alongside the development of an athlete would go hand in hand	Journey, Education, Expansion which involves society, culture and government
You tailor the program based on the age and level of intelligence of the kids involved	Adapt, adjust and modify leadership skill. Use of strategies.
The coach or the leader need to have excellent comprehension of the different policies	Interpretation and training
And then the periodical review of the policies that affect WB	Occasional review, Education, Policy development
I would create a proper understanding with my athletes while explain benefits, how they can be protected, you create a learning mode based on their learning styles.	Strategy, recognition each athlete skill level
The NGB must give assistance to leaders as it relates to whistle blowing	Motivation

Source:’ Researcher’s Construct, 2024 (*The excerpts are quotes from participants.)*

prevented from influencing the coding. By ensuring objectivity through reflexivity, data was collected and analysed simultaneously.

The researcher followed Charmaz's (2000) approach to ensure that no preconceived theories or beliefs were imposed on the data during idea generation.

The data was carefully analysed, and ideas were formed and coded based on the transcribed information. The Taguette-assisted software identified 77 codes from 670 tagged highlights. Table 2 provides an example of the codes.

Table 2

Initial Codes Allocated Immediately After the Interviews

CODE	TAGUETTE HIGHLIGHTS
Experience Leaders	5
Certified Leaders	4
Safe Sport Training	6
WB Education Needed in Sports	3
Trained As a Leader	9
Need For WB Awareness	48
Executives Ignorance Of WB	12
Protection For Children in Policy	4
Self-Discovery Through Education	5
Cultural Upbringing Through Education	33
WB Reporting	10
Person In Authority Ignoring WB	3
Protecting Others by Ignoring WB	1
Leaders/ Executive Failing to Act	3
Leadership Training In WB	13
Policy Implementation Through Education	24
Policy Enforcement Through Education	16
WB Education from An Early Age	26
Use Of School Curriculum	17
Leaders In the Position to Educate	22
Leadership Style to Be Used	14
Ethical Culture	26
Caribbean Policy	4
No Foreign Policy	1
Strategy To Implement	34
Ethical / Fair	18
Need For Whistleblowing Education	4
Commitment By Athletes	4
Cheaters Should Be Reported	4
Cheating Is Unfair to Other Athletes	10
No Experience With WB	3

Source: Researcher’s Construct, 2024

Note. The excerpts are quotes from participants.

Highlights in the data included recurring words, sentences, and similar responses. Throughout the tagging process, data was compared to data, codes were compared to codes, and codes were compared to codes. The researcher meticulously compared the initial codes and the data with each other.

Charmaz and Thornberg (2021) use iterative coding and constant comparison in the fourth step, as shown in Table 3. Following Strauss's (1987) steps, the researcher separated scientific constructs from in vivo codes during pattern development. This allowed for a more precise set of codes that described the design process.

Table 3

Refined Codes Based on Tags Using Taguette Software

Coding Group	Refined Codes Based on Tagged Frequency
1. Awareness 2. Barriers To WB 3. Caribbean Policy 4. Cheating Is Unfair to Other Athletes 5. Education on WB For All Athletes 6. Ethical Culture 7. Ethical/ Fair 8. Government Ministries Responsible for WB Education 9. Ignorance of Need for WB Policy 10. Ignorance of WB 11. Leaders Are in The Position to Educate 12. Leadership Style to Be Used 13. Leadership Training In WB 14. NGBs Are Responsible for Educating Leaders On WB 15. Policy Enforcement 16. Policy Implementation 17. Reporting Channel 18. Strategy to Implement 19. Trust of Leaders 20. Upbringing Culture 21. WB Education from An Early Age 22. Whistleblowing Education	1. Caribbean Culture and Ethics 2. Executives Willingness to Develop WB Training 3. Leaders understanding Whistleblowing 4. Leadership Education 5. Strategies through education 6. WB Curriculum for Schools 7. WB Policies Development 8. Whistleblowing Awareness through Education 9. Whistleblowing Support System Through Policies

Source: Researcher's Construct, 2024

Note. The excerpts are quotes from participants.

The refined codes listed in Table 3 identified seven categories related to whistleblowing intentions and participants' similarities and differences in knowledge and beliefs: Leadership, Education, Policies, Culture, Ethics, Executives, and Behaviour. In the fifth step of the research process, the researcher conducted follow-up interviews with four participants to gain more insight into their experiences and perspectives. The author then refined the codes and categories by continuously switching between data, memos, and analysis.

After completing the previous steps, the sixth step followed the framework proposed by Charmaz (2006) and Charmaz (2014). The researcher revisited the coding process and merged the codes to identify the primary codes that were the most significant or frequent, eventually resulting in focused codes. This step also helped to categorise the codes into four groups, namely Education, Behaviour, Culture, and Policies. During a revision of the coding process, the researcher used the constant comparative analysis method and began merging the codes to identify primary codes that were most significant or frequent, eventually resulting in focused codes, as shown in Table 4. This step also helped to categorise the codes into four groups, namely Education, Behaviour, Culture, and Policies.

Table 4

Focused Codes

FOCUSED CODES
Caribbean Culture and Ethics
Executives Willingness to Develop WB Training
Leaders understanding Whistleblowing
Leadership Education
Strategies through education
WB Curriculum for Schools
WB Policies Development
Whistleblowing Awareness through Education
Whistleblowing Support System Through Policies

Source: Researcher’s Construct, 2024

Through the constant comparative method, the researcher analysed the data to identify common characteristics and differences. The final analysis was compared with existing literature, such as Megheirkouni's (2018) self-leadership strategies, Loprinzi et al. (2018) coaching effectiveness in analysing problems, and Ekholm & Lindström Sol's (2020) idea of promoting social, sporting objectives in young athletes.

The researcher compared incidents, codes, and categories among the same individuals over time, enabling a thorough assessment of the relationship between categories and memos.

Using the gathered data, the researcher identified and highlighted the significance of specific codes, which were then grouped into theoretical categories, as illustrated in Table 5.

Table 5

Tentative Categories from Focused Codes

CATEGORIES
1. Sports Personnel Leadership Programs
2. Whistleblowing Awareness through Education
3. Whistleblowing Policies Development
4. WB Strategies through Leadership training
5. WB Curriculum for PE programs
6. NGBs developing WB curriculum
7. NGBs developing WB support Systems
8. Understanding Cultural Behaviour.

Source: Researcher’s Construct, 2024

During step seven, the author determined whether theoretical saturation was reached and if the analysis could identify a core category. In GT, theoretical saturation occurs when no new information can be obtained from the data. Additional data beyond this point would not contribute to the study (Charmaz, 2006; Glasser & Strauss, 1967). According to the researcher, re-interviewing four participants, reviewing the transcripts, and attempting to record resulted in only minor changes, which did not affect the code's properties.

Glaser (2009) suggested that after theoretical saturation, GT comparisons involve generating conceptual categories and their properties, with patterns delimited by selecting a core category. Chong & Yeo (2015), while citing Strauss (1987), emphasised the importance of selecting a core category that can be related to other major categories, appears frequently in the data, has a logical and consistent explanation when compared to the major categories, and is named abstractly enough to be useful in other relevant studies.

The conceptual framework initially aimed to study behaviour, but the results revealed a need to improve whistleblowing education among Trinidad sports personnel, ultimately improving behaviour. As a result, education became the primary focus over behaviour-oriented approaches. The researcher concluded that "Whistleblowing Education for Leaders" was the core category.

GT approaches are aimed at theory development, and step eight focuses on theory development. In the view of Birks, Hoare & Mills (2019), a theory is an explanation that consists of a group of interconnected concepts. Charmaz & Thornberg (2021), while citing Glaser (1978) and Glaser (1998), suggested that theories must be workable, relevant, fit, and adaptable. As per Chong & Yeo (2015), the theory explains the conditions while maintaining its explanatory power.

Having arrived at a core category and understanding the theory definitions, the researcher realised that ‘Theory Construction and Interpretation’, as identified in Figure 2, had yet to be thoroughly explained by the scholars. Focusing on theory construction and the core category, the researcher revisited the data, codes, focused codes, and categories.

In the methodology section, the researcher clearly outlined those participants were specifically chosen based on their prior knowledge of sports policies and WB, which was the primary criterion for participation in the study. However, when revisiting the interview answers, the researcher discovered that participants needed to know WB's impact on sports and the WB confidential reporting system. In some cases, they needed clarification about WB and to learn the importance of whistleblowing policies.

After conducting a more in-depth literature analysis, the researcher came across a study by Kruger & Dunning (1999), which revealed that individuals often tend to overrate their abilities in multiple aspects of social and intellectual functioning, leading them to poor decisions, erroneous conclusions, and ultimately misjudging their understanding.

Heyes, Bang, Shea, Frith & Fleming (2020) added that such incompetence hinders individuals' metacognitive abilities, which are shaped by cultural learning and selection.

Revisiting the Theoretical Framework

As per the theoretical framework, the study is underpinned by Goldsmith’s (2015) Cohesive Behavioural Model, which posits that athletes are likely to blow the whistle in response to an incentive. The researcher focused primarily on the concept of incentives throughout the analysis. After reviewing the results, the researcher conducted further research on incentives. Reviewing the literature using keywords such as incentives, motivation, and cognition, the researcher concluded that cognition influences behaviour (Uddin, 2021). The conclusion focused on factors that improve sports leaders' cognitive reasoning, information processing, metacognitive control and evaluation of the processes (Loprinzi et al., 2018).

According to Zhang et al. (2021), incentive and motivation are closely related, and they referred to this relationship as "incentive motivation." Mitchell (1982) defined motivation as a cognitive, individual, intentional phenomenon. Loprinzi, Cardinal, Cardinal & Corbin (2018) suggested that sports leaders can help athletes better understand whistleblowing by emphasising increased cognitive and metacognitive understanding focused on incentives and motivation.

The researcher found that participants wanted to be viewed as socially oriented and not behavioural-oriented and were willing to become whistle-blowers when motivated by ethical and social change in sports rather than rewards (Loprinzi et al., 2018).

Prompted by the hindrance of individuals' metacognitive abilities, the researcher began an exploration of metacognitive ability, which involved revisiting data, participant actions, comments, and literature on metacognition and education. The researcher concluded that the focus should be on the sportsperson's cognitive process. In this way, the sportsperson can make sense of the world around him before encoding whistleblowing information. According to researchers, cognitive processing precedes metacognition, which is the process of making sense of information. This process applies to sports leaders who are viewed as sports educators (Chiu & Fujita, 2014; Smith & Mancy, 2018).

Motivation, therefore, is a crucial aspect when discussing metacognition. The results indicate that motivating athletes to understand and engage in whistleblowing is crucial for sports educators. To effectively instruct others on whistleblowing, sports leaders must first receive proper education beyond defining the term. This education process should include an awareness of their thought processes, which involves a comprehensive knowledge of different strategies and the ability to apply them appropriately based on specific participants. Therefore, based on these results, a theory of metacognitive sports whistleblowing can aid educators in comprehending decision-making complexity.

Findings

Sports leaders relied on self-leadership based on their past sporting experiences. The researcher found that the leaders who participated in the study were primarily focused on getting athletes to improve in their sport, and most had yet to receive any education or training on leadership skills. It was not considered the responsibility of sports leaders to educate their athletes about sports safety or whistleblowing policies. They acknowledged that their limited understanding of whistleblowing made it difficult for them to motivate others to come forward with information. NGBs should assist, train, and provide direction regarding leadership styles and policy training.

The participants recommended including whistleblowing education in schools and NGBs' training sessions. The participants believed this would encourage sportspersons to speak out against wrongdoing and help young athletes recognise unfair treatment.

During the interviews, the interviewees suggested that increasing awareness about the importance of whistleblowing, along with outlining its benefits and the dire consequences of not doing so, could contribute to making it a more accepted practice among athletes and leaders. The interviewees also recommended developing policies and procedures to ensure that all whistleblowing reports are consistently and appropriately handled. A few of these suggestions are highlighted in **Table 6.**

Discussion

The research showed that leaders significantly impact creating and maintaining an organisational culture that promotes ethical behaviour, including reporting misconduct. The study's findings were reinforced by incorporating research segments that support its conclusions and the corresponding theoretical framework.

According to Menon & D'Esposito (2022), NGBs can improve athletes' cognitive and metacognitive understanding by introducing neuroscience principles to enhance attention, memory, and executive control. This enables sports leaders to plan using mental steps and actions while retaining relevant, changing information crucial for athletes on the field. Using Neuro-education Strategies (NS) and cognitive tools provided by trained sports leaders, NGBs can improve athletes' cognitive and metacognitive understanding.

Agreement With the study

A parallel was identified between the study's results and those of other researchers. **Table 7** emphasises the study's contribution to findings from prior research.

After examining the data and considering the theoretical model and research title, the researcher concentrated on strategies to improve cognitive reasoning and metacognitive control for sports leaders. Several research studies have delved into the intricate cognitive and metacognitive mechanisms that shape an individual's decision-making process when blowing the whistle. **Table 8** gives an example of such studies.

Table 6

Example of Participants' Strategic Suggestions

- Formulate Ways to Incorporate Whistleblowing as Part of The Schools Social Culture
- We Try to Encourage the Children
- A Learning Mode Based on The Kids or The Athlete Style of Learning
- And You Would Have to Work Out a Means of Getting the Education Across NGB Executive
- Be Tailored to Suit the Group That You're Actually Dealing With
- For Kids We Would Not Use the Word WB
- Parents Need to Encourage Kids Use Role Playing Activities to Let Them See You Know What Constitutes Whistle Blowing
- So, I Started to Explain What Whistleblowing Is, And I Said Well Probably What You Need to Do Is Write a Letter Type It Out to The Dean and The Form Teacher
- The Primary School Might Be What Are the Easiest Things Because Children Have Not Developed.
- Through Class Sessions and Talk about Whistleblowing and whistle-blowers We Try to Encourage the Children.
- Using PE In Schools to Educate Young People
- The SBA (School Base Assessment) Where They Go Out and Interview People
- Out CXC Is Caribbean Based so It Could Reach Everybody If It on The Syllabus

Source: Researcher’s Construct, 2024

Note. The Excerpts Are Quotes from Participants.

Table 7

Agreement with Previous Findings

Agreement With the Study	Researchers
Contributes to Accountability	Constantin (2019)
Whistle-blower Protections & Compensation	O'boyle (2017)
Increases Organizational Culture:	Raeff, Fasoli, Reddy & Mascolo (2020)
Defends Organizations from Larger Scandals	Rajeevan (2019)
Strengthens Public Trust	Khan, Saeed, Zada, Ali, Contreras-Barraza, Salazar-Sepúlveda & Vega-Muñoz (2022).
Enhances Ethical Behaviours	DeTienne et al., (2021)
Promoting Whistleblowing Through Public Education	Misener (2021)
Utilise Educational Strategies More Effectively	Farias, Wallhead & Mesquita (2020)

Source: Researcher Constructed, 2024

Table 8

Studies That Explored How Cognitive and Metacognitive Processes Influence Individuals' Decisions to Blow the Whistle

Researchers	Strategies That Can Influence WB Decisions
Tormala & Petty (2023).	Delved into how cognitive and metacognitive processes distinctly shape individuals' decisions to engage in whistleblowing.
Schwartz & Paolacci (2021)	We analysed how metacognition impacts individuals' decision-making regarding whistleblowing during moral dilemmas.
Tang & Liu (2022)	They explored the impact of metacognitive strategies on moral reasoning and their variations across cultures, ultimately influencing decisions to expose unethical practices.
Renz & Gigerenzer (2021)	Their analysis conclusively demonstrates the impact of cognitive heuristics on ethical judgments and whistleblowing behaviour, highlighting the crucial interaction between fast thinking and deliberate metacognitive reflection.
Farias et al., (2020)	Suggested that equipping leaders with effective whistleblowing strategies will help in developing and implementing a whistleblowing curriculum

Source: Researcher Constructed, 2024

Trinidadian athletes are known for their unique blend of cultural norms and values and their cultural sensitivity. Social neuroscience can be used to determine the best approaches for whistle-blowing based on the learning objectives. Furthermore, creating culturally sensitive whistleblowing education programs, along with ongoing evaluation and feedback mechanisms, can promote a better understanding and appreciation of the importance of whistleblowing.

Implications

The findings of the study included both theoretical and practical implications. Following the GT steps, the *researcher* discovered whistleblowing strategies that activate cognitive and metacognitive processes in the athlete's brain. Richaud et al. (2018) suggest that neuro-education can incorporate enjoyable methods to develop memory structures, enhance creativity, and improve social and emotional cognition. Baena-Extremera, et al. (2021) further state that neuro-education can improve teaching and learning by promoting novelty, critical thinking, and proactive learning.

Using NS, as demonstrated in Figures 4 and 5, NGBs can effectively address the various concerns raised in the literature. One way to achieve this is by developing and implementing a clear anti-retaliation policy that enables employees to report issues without fear of retaliation. This can be achieved by providing a safe and confidential reporting mechanism encouraging athletes to report wrongdoing.

Figure 4

VEE Diagram Showing the Study's Approach

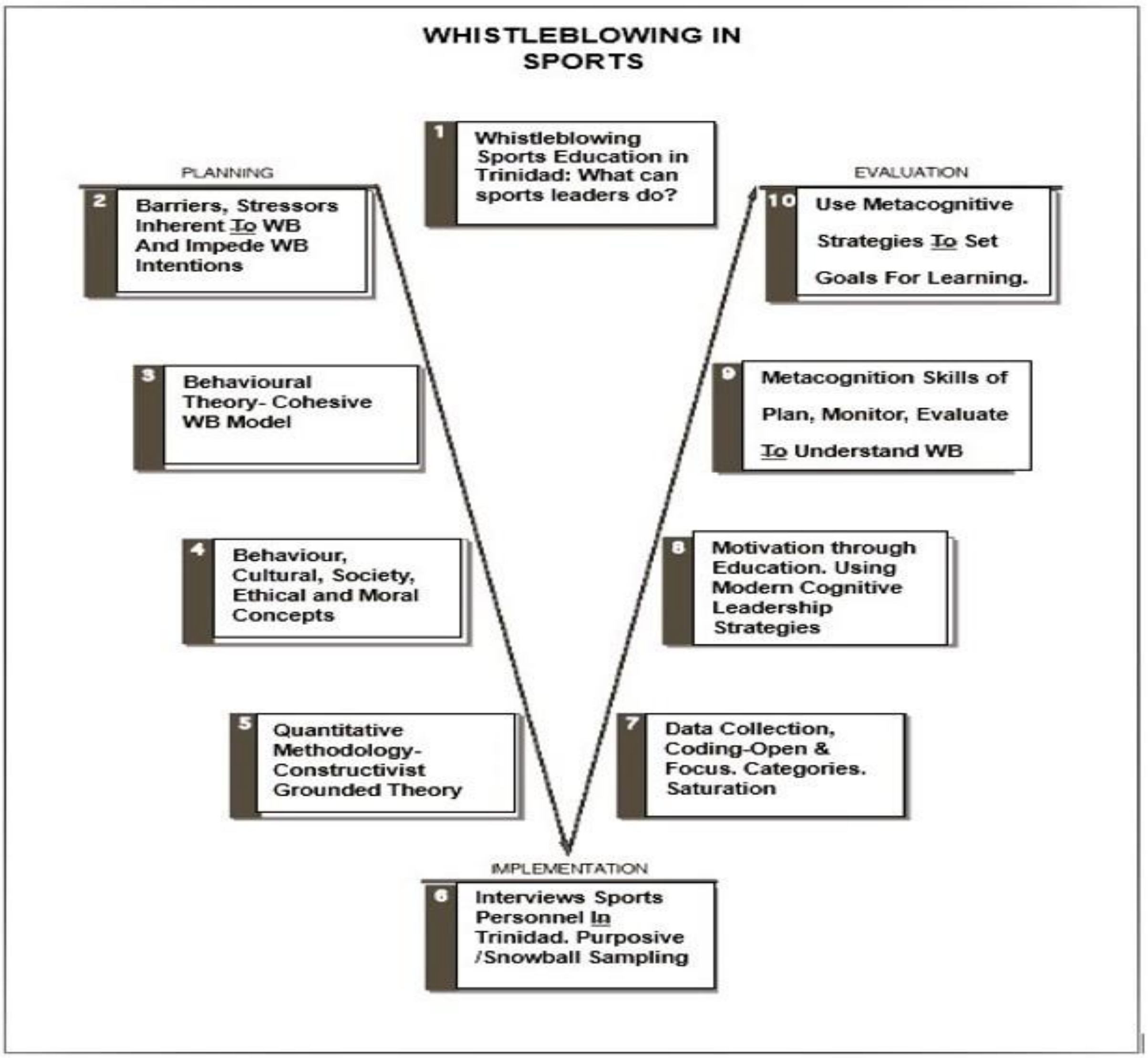
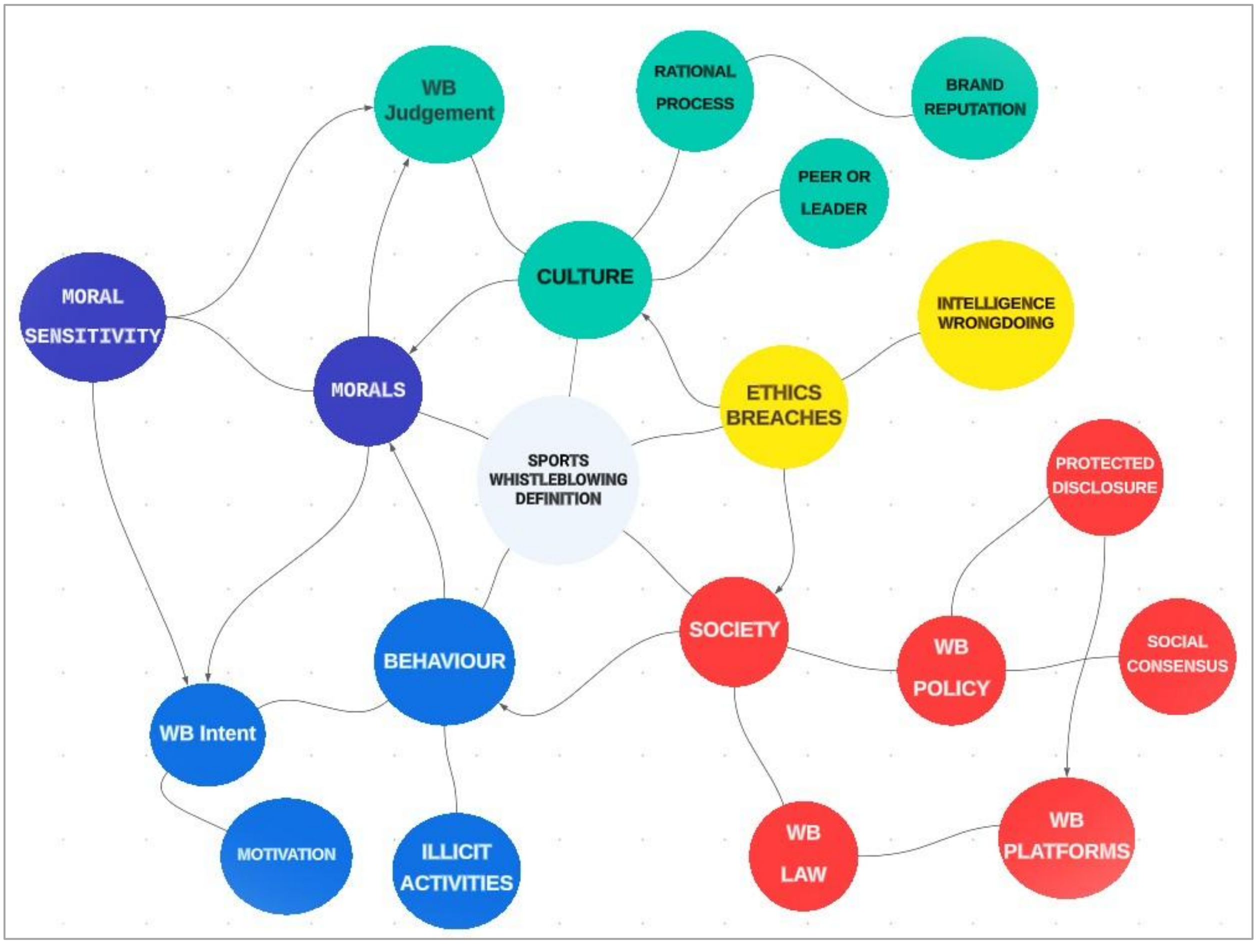


Figure 5

Concept Mind Map - Whistleblowing Strategy Planning



Source: Author's Construct

Using NS, NGBs should prepare and encourage workshops and awareness campaigns on the rights and importance of whistleblowing. Government ministries should encourage collaboration between NGBs, Athletes, and stakeholders to ensure a coordinated and effective approach to whistleblowing education.

Figures 4 and 5 depict a VEE Diagram and a Concept Mind Map as cognitive and metacognitive strategic tools that sports leaders can use to effectively introduce whistleblowing to athletes.

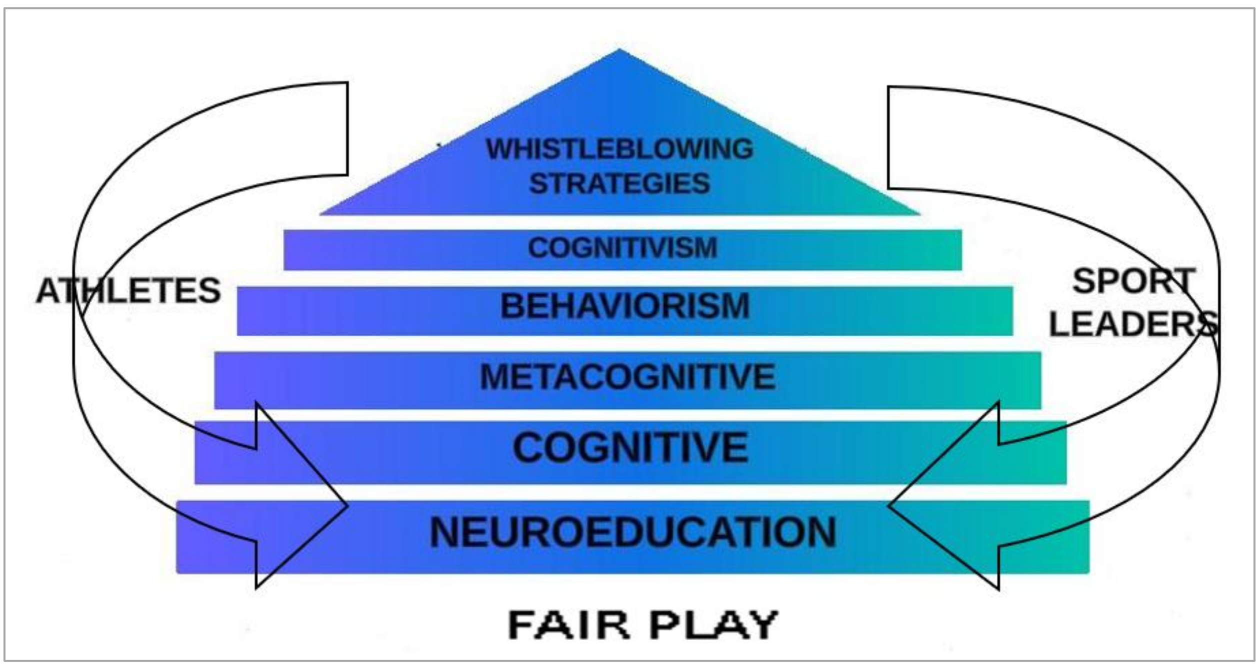
Theoretical Model

The researcher utilised GT's flexibility to develop a theoretical model based on neuro-education strategies used by sports leaders to encourage athletes to report wrongdoing. Figure 6 illustrates the researcher's proposed theoretical model:

Using neuroeducation to activate cognitive and metacognitive processes in athletes and sports leaders can help them organise and retain information that mirrors the behaviour and emotions that impact social organisations.

Figure 6

Sports Whistleblowing Education Model



Note. Starting with neuro-education, sports leaders learn strategies to encourage athletes to report wrongdoing until they achieve the goal of encouraging athletes to report misconduct. The learned behaviour affects both their emotions and attitude towards fair play, which positively impacts the organisation and enhances their social and emotional cognition (Researcher Constructed, 2024).

This research is expected to enrich the existing literature on whistleblowing in Trinidad sports by introducing a new perspective on whistleblowing in sports. In this context, the role of sports leaders is integral to the education of whistleblowing. The study provides educators with strategies from the literature review and offers sports leaders' models for effective leadership. The researcher envisions that future sports scholar will further refine the definition of whistleblowing in sports.

Conclusion

Recent studies suggest that whistle-blowers play a vital role in preventing negative behaviour in sports. Therefore, people involved in sports should cultivate a culture of open reporting to prevent and address crises in the sports industry. NGBs should establish policies and strategies to involve educators in providing education on sports-related issues and to educate sports leaders and athletes.

A significant impact of athletes' behaviour, culture, and morals on whistleblowing policies was evident through the interactions with many sports leaders in Trinidad. This study examined the effectiveness of leadership training in engaging Trinidad athletes as whistle-blowers. Following the steps outlined by Charmaz & Thornberg (2021), the researcher developed a theoretical model based on introducing neuro-education strategies using cognitive tools to implement education programs.

This study noted that financial rewards are not the primary motivation for individuals to engage in whistleblowing activities. Instead, athletes are more interested in incentives that provide motivation. In keeping with behavioural theory, the researcher argues that whistleblowing behaviour can be influenced by sports leaders' cognitive understanding and metacognitive control of whistleblowing processes.

Sports leaders can utilise NS to help their athletes appreciate and engage in whistleblowing, improving performance and decision-making through cognitive and metacognitive strategies. Sports leaders can improve their understanding of whistleblowing by incorporating neuro-education into their curriculum. Neuro-education involves using cognitive tools that can enhance the effectiveness of metacognitive training sessions. By doing so, sports leaders can improve their memory structures, creativity, and social and emotional cognition. Integrating neuro-education and cognitive learning strategies can enhance sports leadership training and help Trinidad athletes become effective whistle-blowers in a productive, creative, and critical manner.

Author Note

Glenn Cheddie currently works as a Law Lecturer and Sports Law Consultant. He has a Teacher's Diploma and has been in education for the past 35 years. He has an LLB Law degree from the University of London, as well as an LLM and a Master's degree in Sports Law from Sheffield Hallam University. Glenn is currently a doctoral student at Unicaf University Zambia. His educational background has enabled him to become a successful sports instructor and coach in many disciplines, including archery, firearms, fencing, swimming, and scuba diving. As an athlete, he has competed in international archery competitions and earned a silver medal in archery at the 2016 Masters Games held in Vancouver, Canada.

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Influence of Science Communication in Education Using Students as Purveyors of Knowledge on Technology Adoption by Women in Uganda

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Abstract

Adoption and use of technologies determine the post-harvest quality of agricultural products, which may be poor due to low levels of technology adoption. This study investigated the use of students as purveyors of the tamarind fruit picker (Prosfrupika) using the Knowledge Deficit Science Communication Model (KDSCM) as an educational tool for training to influence the adoption of the Prosfrupika by their mothers and female guardians. This quasi-experimental quantitative research involved training 266 randomly selected students aged 18-20 in two groups. The treatment group (A) was trained with a Science Communication Model using a skit, while the control (B) was trained without the skit. Fifty-seven randomly selected mothers/female guardians of the student participants were interviewed to determine knowledge and adoption of the Prosfrupika. Findings from the statistical analysis of data indicated that 78.6% of the women did not attribute the adoption of the Prosfrupika to the students' influence. A P-Value = 0.467 showed no evidence of either sex of the students influencing the adoption of the Prosfrupika significantly. 55.6% of the women perceived difficulty in the use of the Prosfrupika.

In conclusion, neither the students nor their sex influenced adoption, and the women did not perceive that the Prosfrupika was easy to use. This study is significant because it can be used for policy direction to use students to influence community knowledge. The outcomes of the study include improved livelihoods, use of the Prosfrupika to harvest other fruits, and enhanced environmental conservation.

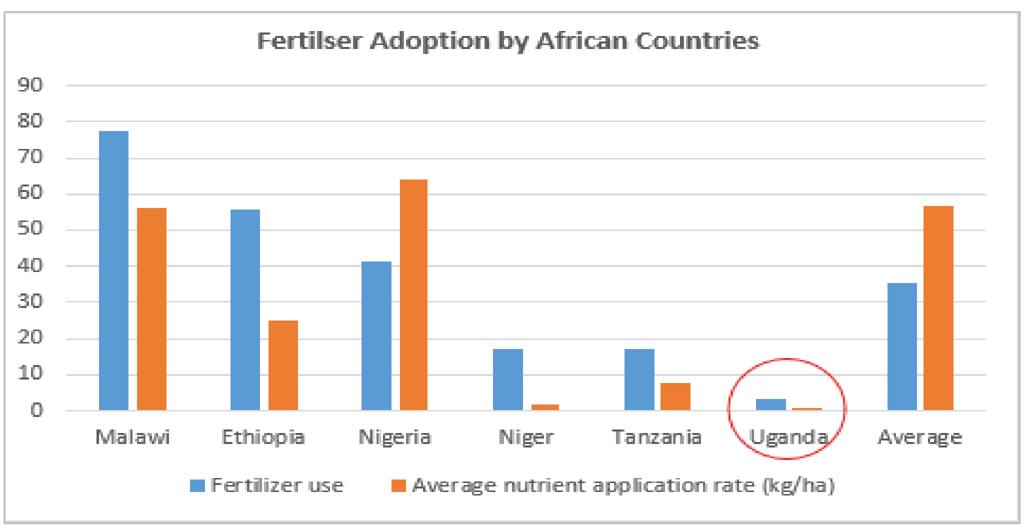
Keywords: Science communication, technology adoption.

Introduction

Effective communication is essential for the adoption of technology in various sectors. Several communication methods have promoted technology adoption among which are farmer-to-farmer initiatives, print and audio-visual media, and extension services. However, efforts to enhance technology adoption among farmers, especially in East and Central Africa, have faced challenges. Odame et al. (2011) found that only half of the agricultural innovation recommendations of extension workers are implemented. Hill et al. (2018) indicated that between 2005 and 2016, over 40% of households adopted improved agricultural inputs to boost production. Nonetheless, Uganda experienced reduced output due to inadequate utilisation of these agro-inputs like fertilisers, as Hill et al. (2018) highlighted in Figure 1 below, showing Uganda's rank in fertiliser adoption among African countries;

Figure 1

Fertiliser adoption by African countries.



Source (Hill et al. 2018)

Technology adoption models

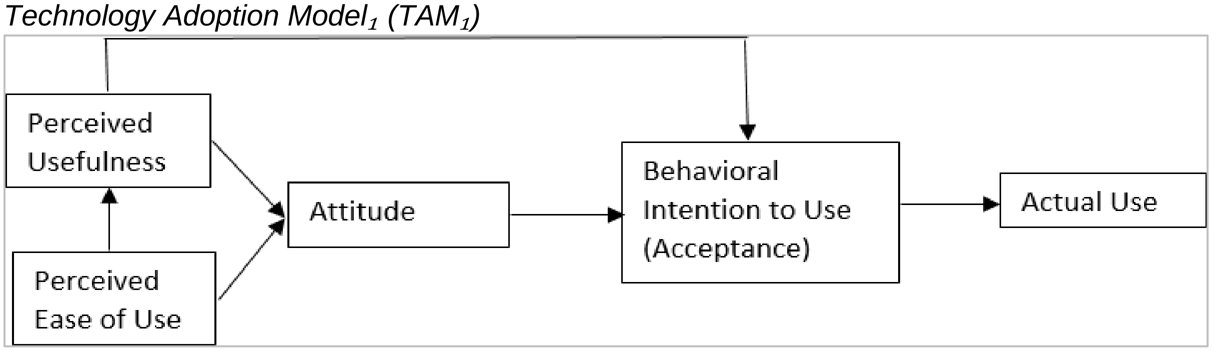
Several methods have been employed among farmers in Africa to encourage the adoption of technologies; there have been mixed outcomes from such interventions. Within East and Central Africa, around 50% of technologies recommended by extension agents were adopted (Odame et al., 2011). However, in Uganda, despite nearly 40% of households using improved agricultural inputs between 2005 and 2016 to boost productivity, there was a decline in output (Hill et al., 2018). Several theories, including the Unified Theory of Acceptance and Use of Technology (UTAUT), have been proposed by researchers like Ajibade (2018), Fonseka et al., (2020), Koul (2017), Lai (2017), Sadeck (2022) and Shehzad et al., (2021) to understand better and predict technology adoption.

Technology Adoption Model (TAM_1)

The Technology Adoption Model (TAM_1), established by Davis in 1986 during his doctoral studies, is based on the theory of reasoned action. This model, as highlighted by Koul (2017), Ajibade (2018), Lai (2017), Ogrezeanu (2015), Taherahoost (2018), and Ajibade (2018), predicts individuals' decisions to embrace new technologies. Lai (2017) particularly emphasises that TAM_1 is a valuable tool for studying technology adoption as it enables researchers to predict adoption and explore factors influencing it, going beyond just perceived benefits and compatibility for consumers. This model is illustrated in Figure 2 below.

Figure 2

Technology Adoption Model$_1$ (TAM_1)



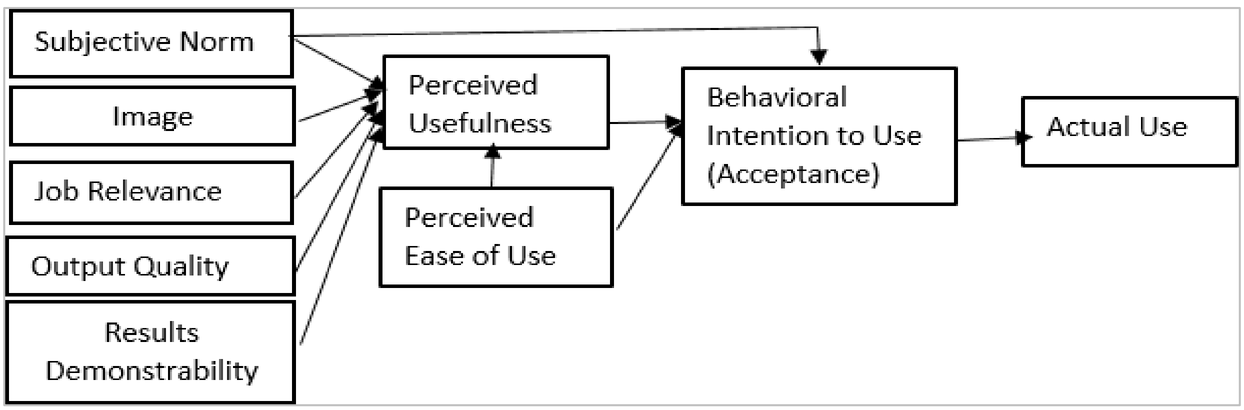
Source Lai (2017); Koul (2017); Ogrezeanu (2015); Taherahoost (2018); and Ajibade (2018)

Technology Adoption Model$_2$ (TAM$_2$)

TAM$_2$ was introduced as an adaptation of the original TAM in 2000, as highlighted by Lai (2017), Koul (2017), Ajibade (2018), Taherahoost (2018), Fonseka et al., (2020), and Venkatesh and Davis (2000), not only predict decision-making but also considers factors influencing technology adoption. These factors include the intention to use the technology and perceptions of its benefits, as illustrated in Figure 3 below.

Figure 3

Technology Adoption Model$_2$ (TAM$_2$)



Source Lai (2017); Koul (2017); Ogrezeanu (2015); Taherahoost (2018); and Ajibade (2018)

This study utilised the Technology Adoption Model (TAM$_1$) to determine whether end users would accept the technology to be tested. TAM$_1$ enabled the researcher to identify and address gaps that could hinder the adoption of my innovation. According to Lai (2017), TAM$_1$ allowed for predictions of adoption and analysis of factors contributing to adoption. The model was particularly suitable for technology adoption because it can analyse various factors and gaps.

Science Communication models

As defined by (Kessler, 2022), Science Communication encompasses discussions related to science, its processes, and research outcomes. Institutions and agencies that conduct research play a crucial role in applying the science communication model as the vehicle responsible for conveying scientific matters to the public. Kappel (2019) highlighted that the purposes of Science Communication include gaining public support, building confidence, securing social approval, and ensuring democratic correctness. Kappel (2019) emphasised the need for clear, objective formulation for effective Science Communication. Fischhoff (2018) suggests that the primary goal of scientific communication is to facilitate technology recipients to make decisions from an informed point of view. Reincke et al. (2020) also advocate for empowering scientists to communicate scientifically to enhance their proficiency in engaging with stakeholders on relevant issues.

Kessler et al. (2022), Metcalfe (2019), Reincke et al. (2020), and Tibasaga and Zawedde (2018) have identified three scientific communication models: the model of deficiency, the model using dialogue, and the model involving participants' interaction.

The Model of Deficiency

The deficiency model operates on the premise that the public has inadequate information on specific issues, information or technology, and scientists provide information intending to influence behaviour in a particular situation, as noted by Metacafe (2019), Kessler et al. (2022), and Reincke et al. (2020).

The study employed the deficit model of science communication, assuming that the community was unaware of the tamarind harvester and needed it to enhance fruit quality, safety, and livelihoods. This approach was termed the "Knowledge Deficit Science Communication Model" (KDSCM).

The Tamarind Tree

The tamarind tree is prevalent in Northern and Eastern Uganda, characterised by its tall stature and broad trunk. However, its branches become smaller and weaker as they spread out, posing challenges for harvesting all the fruits from the tree. Figure 4 below shows the height of the Tamarind tree from the ground;

Figure 4

Researcher Standing Under a Tamarind Tree

Source: Author. (2022)

Tamarind is extensively consumed in diets, and women sell the fruits for income, as Agea et al. (2014) highlighted. Akankwasa et al. (2012) noted that in areas where tamarind grows naturally, as much as 74% of household income comes from selling these fruits, indicating significant commercial potential (Figure 5).

Figure 5

Women Selling Tamarind Fruits on the Roadside in Northern Uganda

Source: Author. (2022)

The tamarind picker technology (Prosfrupika) aims to harvest fruits from the tamarind tree, a tropical African plant known scientifically as *Tamarindus indica L.,* renowned for its fruits. These fruits contain approximately 30% sticky, edible pulp and are a prevalent ingredient in culinary dishes in regions where the tree naturally grows. The tree is abundant in Uganda, mostly in the Northern and Eastern regions of the country, as noted by Massette et al. (2015), and several products can be produced from the fruits, as evidenced in a study conducted by Massette et al. (2015) which included the researcher.

Existing technology adoption models have not significantly increased adoption rates, and traditional methods like print media, radios, and televisions may need more consistent practical demonstrations for effective learning and adoption. The study suggested that training students with a science communication model can establish early connections between theory and practice, benefiting society. By utilising the science communication model and leveraging family ties, technology adoption among women can be effectively enhanced. This research aimed to support policy development involving students as promoters of new technologies. Ultimately, it aims to boost both the quantity and quality of harvested tamarind fruits, leading to increased economic gains for women.

The study piggybacked on holidays as an opportunity for students to have prime time to introduce new skills and technologies to their families and friends. Given that tamarind, a growing commercial crop, matures during the holiday season and is primarily harvested and handled by students, the study serves as a perfect testing ground for the model. The model operates on the premise that students, spending quality holiday time with their families, can effectively share and correct any technology-related mistakes made by their parents, a task more challenging for occasional extension workers. The study utilised prosfrupika as a means to test its hypothesis.

The Tamarind Picker (Prosfrupika)

The Tamarind Picker was made from readily available local materials to ensure cost-effectiveness for community members. While three distinct types were created, participants had the freedom to modify them, with these alterations being documented. The goal was to familiarise adopters with the tool's usage, application, and local manufacturing methods. The Knowledge Deficit Science Communication Model (KDSCM) was utilised to assess the adoption of prosfrupika through science communication.

a. The sickle is attached using bits of wire, as its sharp serrated edge, as seen in Figure 6, may cut other material.

b. The fabricated edge has holes where nails can be used to attach to a stick, as illustrated in Figure 7 below;

c. The old bicycle part can be attached to the bag using the stripes of old tyres and a stick (Figure 8).

Figure 6

Prosfrupika Made Using a Sickle

Source: Author. (2023)

Figure 7

Prosfrupika Is Made from Fabricated Metal

Source: Author. (2023)

Figure 8

Prosfrupika Is Made from Old Bicycle Parts

Source: Author. (2023)

The prosfrupika was designed to retrieve tamarind fruits from trees without the need for climbing. While its primary purpose was to ease tamarind picking, it could harvest other fruits, such as mangoes, oranges, and avocados. Additionally, the prosfrupika allows individuals to climb trees and access fruits from branches that are typically out of reach. Different models of the prosfrupika are shown in Figure 9 below.

Figure 9

Different Fruits Being Harvested with Varying Models of the Prosfrupika

Source: Author. (2023)

The tamarind is harvested by positioning a bag and cutting edge with a stick onto the fruits. Applying a pulling force cuts the fruit's stem, causing it to drop into the bag. One should be careful to make the bag manageable; an additional container or tarpaulin should be set nearby for collecting the harvested fruits.

Main objective/ purpose

Aim of study

The study sought to create and evaluate a science communication model aimed at boosting technology adoption. Specifically, secondary school students were trained to introduce innovations to their female parents. The Knowledge Deficit Science Communication Model (KDSCM) trained students using a science communication technique as a skit to encourage women in the Apach and Kwania districts of Northern Uganda to adopt prosfrupika. The research aimed to examine how the Knowledge Deficit Science Communication Model (KDSCM) impacts technology adoption among Ugandan women. It involved training secondary students aged 18-20 as promoters of the prosfrupika. The primary hypothesis states: "Using the KDSCM with students as promoters does not affect women's adoption of the technology." The study's objectives were: (i) assess the influence of the students on the adoption of the prosfrupika, (ii) evaluate the role of the gender of student's gender in influencing the adoption of the prosfrupika by their mothers/female guardians, and (iii) gauge the perceived ease of using the prosfrupika by the women.

Rationale

The goal of this study is to determine whether the influence of a knowledge deficit science communication model using students as purveyors of technology adoption can influence the adoption of fruit pickers (Prosfrupika) by women in the northern part of Uganda.

Household incomes still need to be higher in developing countries due to the minimal adoption of technologies by smallholder farmers, which usually results in losses due to poor quality, limited quantities of harvest owing to inadequate tools, and poor post-harvest handling. Smallholder farmers are usually unaware of emerging agronomic and harvesting techniques that could ease their processes and increase the volume of their production and harvests, so they rely on handpicking, shaking and breaking tree branches to harvest fruits. Several stakeholders have attempted to improve agricultural productivity in developing countries but have yet to have minimal results owing to poor adoption by smallholder farmers in developing countries. Among the attempts used to increase agricultural technology adoption are farmer-to-farmer models, the use of extension services, and communication in the public media, among others. Although innovations have been introduced to farmers, some are costly or unavailable within the farmer communities, negatively impacting the adoption rates for such technologies. Therefore, this study delved into the application of a science communication model of storytelling by students to disseminate the tamarind fruit picker (Prosfrupika) to women in the study area. The assumption taken here is that the new innovative method of picking tamarind fruits from a tree may improve the quality and safety of the fruits as well as the quantity harvested as it is able to reach unreachable parts of the tamarind tree. Overall, the incomes of households that trade in tamarind will be increased, leading to better livelihood outcomes.

Justification of Study Setting

Tamarind is extensively consumed in diets in northern and eastern Uganda, and women use it as a source of income from the sale of fruits and juice made from these fruits. Close to 74% of the income in the areas where tamarind is found is from the sale of these fruits, indicating that it has a high commercial potential. Furthermore, a study by Massette et al. in 2015 involving the researcher revealed that several products can be produced using tamarind fruits. Not only is that but in my observation, the harvesting of the tamarind fruit still rudimentary in the form of climbing the trees and shaking the branches, leading to little harvests. The fact that tamarind fruit grows abundantly in Northern and Eastern Uganda and is a source of livelihood for many women, and given the challenge of harvesting its fruits, the choice of the two districts of Apac and Kwania in the Lango sub-regions of Uganda was most suitable for this study as it would give a large sample population to justify the use of the new fruit picking technology.

Additionally, the tree's structure is such that the higher it grows, the softer the brunches and climbing may lead to accidents like broken limbs from falls. Besides the issues mentioned above, despite using several avenues, including radios, televisions, print media, and extension work by different actors to disseminate new technologies. The adoption of these technologies remained minimal, with farmers sticking to their rudimentary production and harvesting methods.

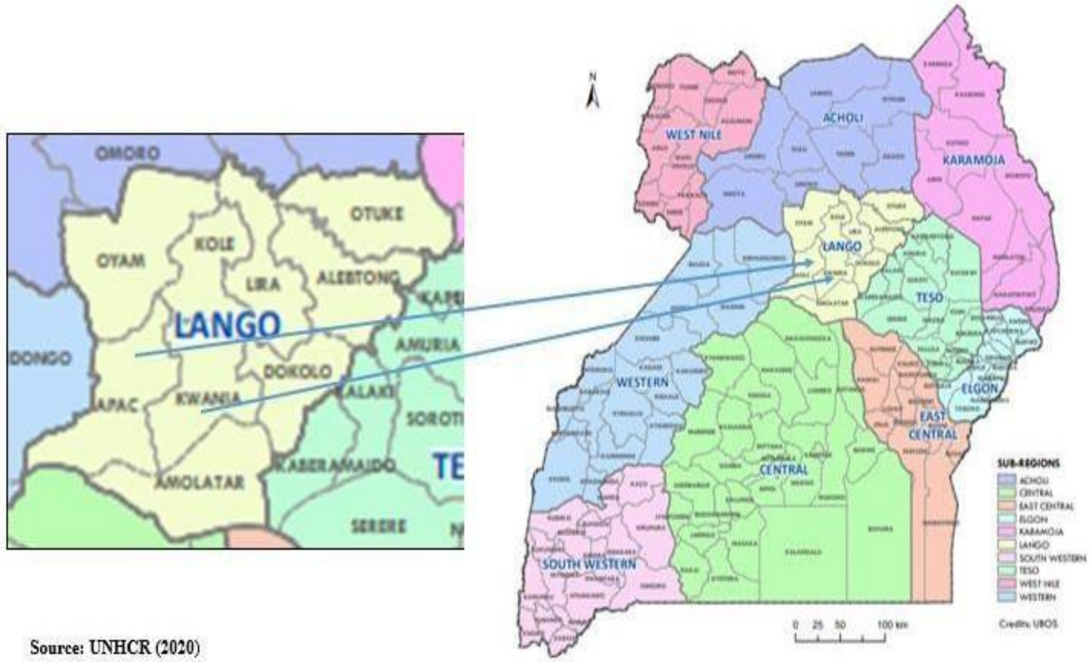
Methodology

Study Area

The research employed a quasi-experimental quantitative research method, and the selected study area included the Apac and Kwania districts in northern Uganda (Figure 10).

Figure 10

Map of Uganda Showing the Study Location



Source: UNHCR (2020)

Semi-structured questionnaires were employed for data collection after a pre-test followed by a training session for the students to impart skills and knowledge on the application and making of the prosfrupika. Using locally available materials in their community, the students learnt the skills of making several versions of the prosfrupika, as this would make their mothers and female guardians adopt the technology more easily. 267 students in total, from classes senior 3, 4 and 5 aged 18-20 were selected to take part in the research. The students were trained in two groups, a control group and group A trained using the Three E-Model (Osseweijer, 2006), which entailed them acting a skit as a technique for scientific communication while group B was trained in a conventional way as a control to determine the effect of the model of scientific communication. A practical demonstration session was held to impart skills on the making of the prosfrupika to the students, and it was tested on a tamarind tree in the school. Where there was no tamarind tree, the prosfrupika was tested on other fruit trees like mango trees and citrus fruit trees. The experiment of using the prosfrupika on other trees provided more information on the suitability of the fruit picker for use on other fruit trees. All the recruited participants were allowed to ask questions and participate in the practical sessions to ensure everyone learnt something.

Sampling techniques

Out of the 267 secondary school students who participated in this training, 20% of their mothers and female guardians were followed up to find out whether the students had influenced them to adopt the prosfrupika. The follow-up was done for a total of 53 mothers and female guardians aged between 35-55 years. To determine the population size for the research, information was obtained from the statistical abstract of 2020 of the Bureau of Statistics in Uganda (UBOS 2020) and the census of the National housing population (UBOS 2014. The study population is summarised in Table 2 below.

Table 1

Summary of Study Population

	Students (18-20 years)		Women	Total/District	Total Population/District
	Female	Male	(35-55 years)	(Students)	
Apac	14,490	14,180	15,570	28,670	44,240
Kwania	18,490	17,840	18,820	36,330	55,150
Total	32,980	32,020	34,390	65,000	99,390

Source: Author. (2023)

Data Collection

Statistical information was collected using semi-structured questionnaires, and the students and mothers had a set of questionnaires targeting their role in the research. Being educated and able to read and write, the students responded to the questions individually. At the same time, the researcher assisted the mothers and other female guardians who could not write to answer the questions on the questionnaires. The design of the questionnaires was based on the research questions and set research assumptions. Both English versions and those translated into the local language were available to the participants. However, they all preferred to use the English version. To collect the statistical information from the participants, the researcher interfaced with them at school and within the community.

To ensure no regulations and school rules were contravened, the researcher sought permission from the school authorities to allow students to participate in the training. The students participated outside class hours and during the weekend. The Head teachers selected teachers to assist the researcher in selecting and mobilising the students to participate in the research.

Using the telephone contacts listed in the student forms, the mothers and female guardians were contacted and visited they were invited to a designated place in close proximity to their places of abode to enable the researcher collect data from them. Of the women who gathered to respond to the questionnaires, those who claimed to have mad the prosfrupika were visited so that they could demonstrate the use of the prosfrupika and determine whether any modifications were made to the tool. Similar procedures were followed for obtaining consent forms and administering questionnaires as with the students. Participants and their mothers and female guardians capable of reading and writing completed forms themselves, while others received assistance from the researcher.

Ethical Consideration

During the engagement, the researcher introduced herself to the participants and shared the objectives and expected outcomes. Ethical considerations were explained, emphasising that participants were free to opt out of the study. Students filled out consent forms indicating their agreement to participate. Subsequently, students received questionnaires, with guidance provided to ensure understanding and appropriate responses. Questionnaires were numbered to maintain student anonymity.

Variables

The research employed two variables, scientific communication and adoption of technology by the mothers and female guardians, where the former was the independent variable and the latter the dependent variable. The independent variable influenced the dependent variable by training students with scientific communication on the process of making a prosfrupika and its use to pick fruits from trees, and they were expected to influence their mothers and female guardians by transferring this information to them.

Data Analysis

Analyses of a statistical nature were applied to either confirm or dispute the research hypothesis that was set at the beginning of the study.

Primary characteristics such as mean, median, mode, standard deviation, and range were analysed using descriptive statistics. Inferential statistics were utilised to generalise findings to a broader populace from which the participants were selected, ultimately determining whether the study's hypothesis was supported or nullified. Additionally, correlational analysis was performed to assess the associations linking independent and dependent variables, thereby confirming the impact of the former on the latter.

Results

Testing Hypothesis One using the 5-point Likert Scale

To determine the influence of students on the adoption of the prosfrupika by the women in the study area, a 5-point Likert scale (1- strongly agree, 2-agree, 3-neutral, 4-disagree, 5-Strongly disagree) was employed.

Of the 53 women who participated in this research, 78.57% strongly disagreed that the students trained on the Knowledge Deficit Science Communication Model influenced their adoption of the prosfrupika. In contrast, 3.57% neither agreed nor disagreed on the influence of the students on their adoption, as illustrated in Table 2.

Tables 3 and 4 above indicate the p-value defined as the statistical value of 0.469 rather than 0.05. This result shows no strong evidence contrary to the void hypothesis, which allows us to agree with the research's null hypothesis.

Table 2

Has the Use of Students Influenced You to Adopt New Technologies?

Scale	Frequency	Valid Percent	Cumulative Percent
1	0	0	0
2	5	17.86	17.86
3	1	3.57	21.43
4	0	0	21.43
5	22	78.57	100.0
Total	28	100.0	

Table 3

*Use of Tamarind Picker * Group Cross-Tabulation*

Use Tamarind Picker and count % within use of Tamarind Picker.			Group		Total
			Treatment	Control	
Use Tamarind Picker	Treatment	Count	1	0	1
		% within Use Tamarind Picker	100.0%	0.0%	100.0%
	Control	Count	13	7	20
		% within Use Tamarind Picker	65.0%	35.0%	100.0%
Total		Count	14	7	21
		% within Use Tamarind Picker	66.7%	33.3%	100.0%

Table 4

Chi-Square Tests

Statistical tool	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.155[a]	1	.283		
Continuity Correction	.002	1	.961		
Likelihood Ratio	1.539	1	.215		
Fisher's Exact Test				.476	.476
Linear-by-Linear Association	1.100	1	.294		
N of Valid Cases	21				

a. 50% (2 cells) were expected to show a value of less than five, and (50.0%) expected a count of less than 5. The least amount expected was 0.33.
b. These results were calculated for a 2 x 2 table.

Testing Hypothesis Two using the chi-square

Table 5

*Sex of Student * Use of Tamarind Picker Cross-Tabulation*

Sex of Student * Use Tamarind Picker Cross Tabulation

Sex of student and count % within the sex			Use Tamarind Picker		Total
			Yes	No	
Sex of student	Male	Count	1	9	10
		% within Sex	10.0%	90.0%	100.0%
	Female	Count	0	11	11
		% within Sex	0.0%	100.0%	100.0%
	Total	Count	1	20	21
		% within Sex	4.8%	95.2%	100.0%

Table 6

Chi-Square Tests

Statistical tool	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.155^{a}	1	.283		
Continuity Correction	.002	1	.961		
Likelihood Ratio	1.539	1	.215		
Fisher's Exact Test				.476	.476
Linear-by-Linear Association	1.100	1	.294		
N of Valid Cases	21				

Chi-Square Tests

a. A count of 50% (2 cells) was expected to have a value lower than 5, with the least expected count of 0.48.
b. Calculated for a 2 x 2 table only

The interrelationships between the sex of the students trained using the Knowledge Deficit Science Communication Model and the application and adoption of the prosfrupika were determined by utilising the Chi-square for hypothesis two, as indicated in Tables 5 and 6 above. The results show that χ (1) = 1.155, *p* = 0.283, signifying a null relationship between the adoption of the prosfrupika by the women in the study and the sex of the students. These results indicate that the male and female students transferred the technology equally.

Testing Hypothesis Three using the 5-point Likert Scale

Perceived Effectiveness of ease of use of Tamarind Picker

For the determination of the degree of perception of the application of the prosfrupika, a 5-point Likert scale (1- strongly agree, 2-agree, 3-neutral, 4-disagree, 5-strongly disagree) was utilised. The results of the analysis indicate that 40.74% of the participants were in strong agreement that the prosfrupika was simple, whereas 55.56% stated the application of the prosfrupika was challenging, and 3.70% were neutral in their perception of the simplicity of the technology as shown in Table 7 below.

Table 7

Likert Scale of Perceived Usefulness of the Tamarind Picker

Likert Scale	Frequency	Valid Percent	Cumulative Percent
1	11	40.74	40.74
2	15	3.70	44.44
3	1	55.56	100.00
4	0	0	100.00
5	0	0	100.00
Total	**27**	**100.00**	

Descriptive Statistics

Student grouping

Figure 11 shows the distribution of students into a control and treatment group.

The students in the treatment group were trained using a skit as a science communication model and methodology, while their counterparts received conventional training. Figure 12 below shows the distribution of the students according to their age.

Class distribution of students

Figure 13 shows the distribution of students who took part in the study according to their classes.

Figure 11

Distribution in Groups of Treatment and Control

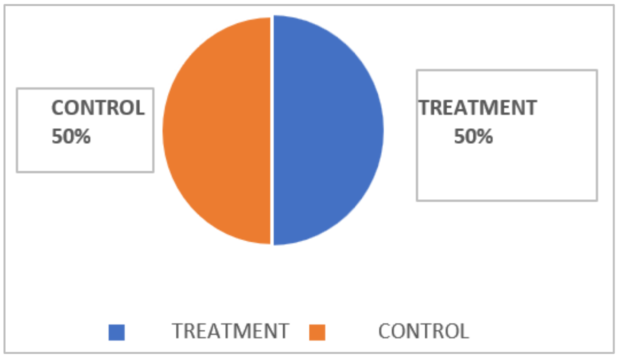


Figure 12

Age Distribution of Students

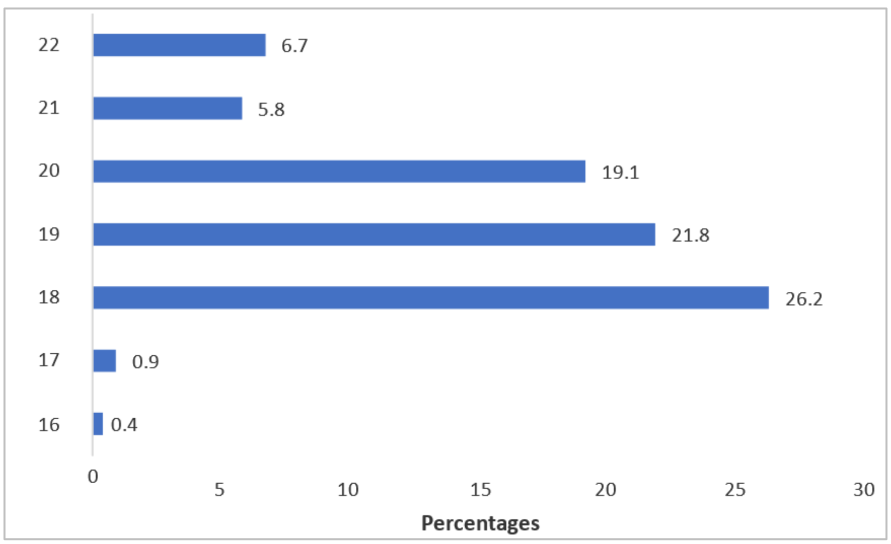
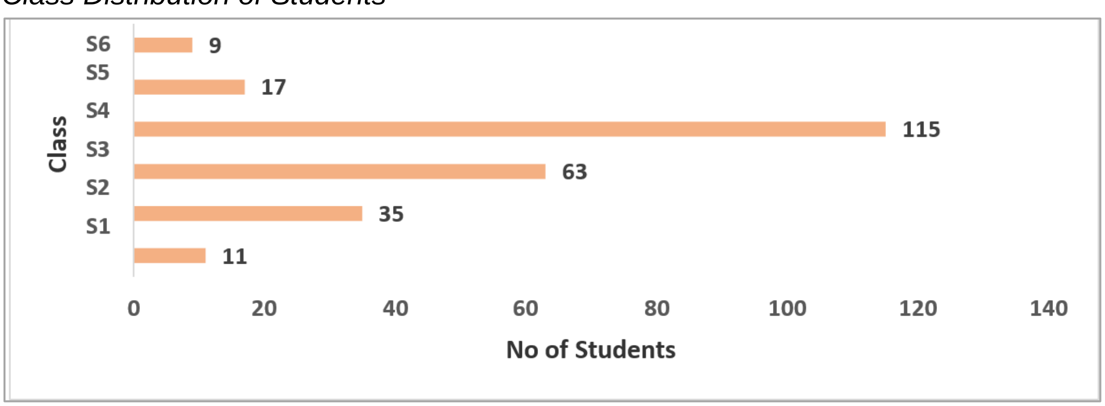


Figure 13

Class Distribution of Students



Summary of results

From the data analysis above, out of the students interviewed (N=258), the distribution of students was 57.4 % in the Apac district and 42.6 % in the Kwania district; 50% were from the control group, and 50 %were from the treatment. The highest number of students were of age 18, represented 59%; the gender of the students interviewed was 53.9%, representing male and 43.0 female; S4 was the class that presented the highest number of respondents.

Descriptive Data for Women

Level of Education

Table 8 below shows the level of education of the mothers/female guardians of the students who took part in the study. This was a level two interview specifically to determine the students' influence on their adoption.

Table 8

Respondent Education Level (N=57)

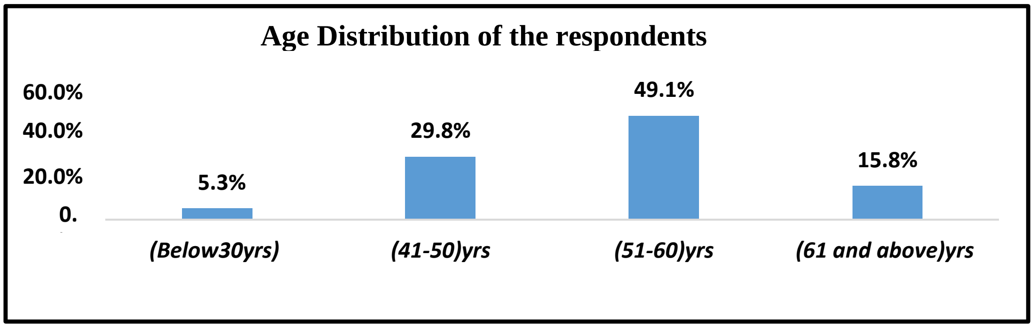
	Frequency	Percentage
Degree	1	1.8
None	7	12.3
P3	1	1.8
P4	2	3.5
P5	4	7.6
P6	5	8
P7	30	52.6
S2	1	1.8
S3	1	1.8
S4	5	8.8
Total	**57**	**100**

Age of respondents

Figure 14 shows the age of the mothers/female guardians of the students who took part in the Study.

Figure 14

The Age Group of Respondents (N=57)



Class distribution

Table 9 below shows the distribution of the students (Children of the respondents) in various classes.

Table 9

Class Distribution of Children of Respondents (N=57)

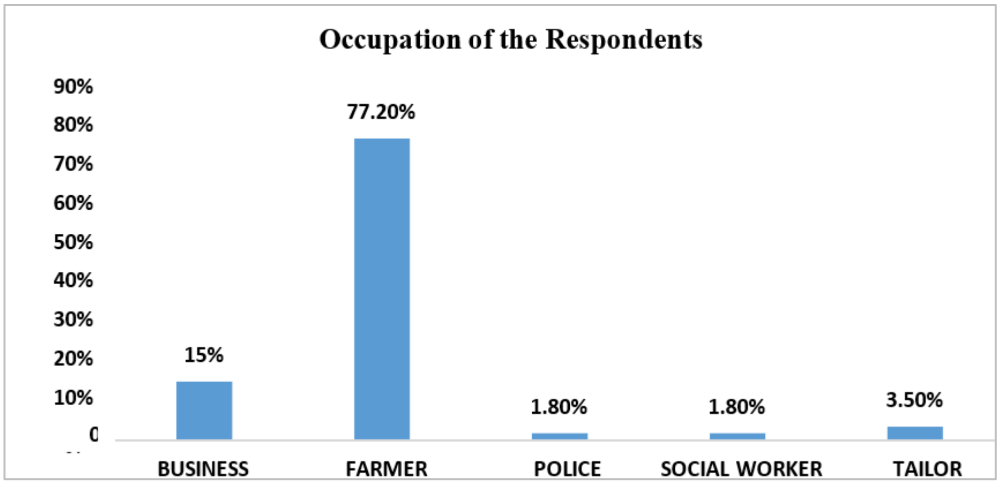
	Frequency	Per cent
S1	3	5.3
S2	12	21.1
S3	11	19.3
S4	28	49.1
S5	2	3.5
S6	1	1.8
Total	57	100.0

Occupation of respondents

Figure 15 below shows the occupation of the respondents. The mothers/female guardians of the students who took part in the study were mainly farmers, with a few other professions identified, as indicated in Figure 15 above.

Figure 15

Occupation of Respondents



Number of children of respondents
Table 10: Number of Children (N=56)

The number of children that the respondents had are summarised in Table 10 below.

Table 10

Number of Children of Respondents (N=56)

Number of children	Frequency	Valid Percent
1	1	1.8
3	5	8.9
4	6	10.7
5	7	12.5
6	9	16.1
7	12	21.4
8	9	16.1
9	5	8.9
10	1	1.8
11	1	1.8
Total	56	100.0

The figures and tables above present the demographics of the respondents who participated in the research. The researcher interviewed 57 women from the districts of Apac and Kwanza. As illustrated in Figure 1, 66.7 % were from Apac, and 33.3% were from Kwania. The majority of the respondents were from age group 3 (51-60), representing 49.1%, as shown in Figure 1. Farming was the highest occupation, representing 77.2% (Figure 3). The majority of respondents reported that they stopped in P7, which was the level of education with the biggest proportion of 52.6% (Table 1). 21.4% (Table 2) of the women interviewed reported having seven children, and the highest reported class of attendance of the children was S4, representing 49.1%.

Adoption status

Regression statistics

Table 10

*Sex of Student * Use of Tamarind Picker*

Sex of student and count % within the sex.			Use Tamarind Picker		Total
			Yes	No	
Sex of student	Male	Count	1	9	10
		% within Sex	10.0%	90.0%	100.0%
	Female	Count	0	11	11
		% within Sex	0.0%	100.0%	100.0%
Total		Count	1	20	21
		% within Sex	4.8%	95.2%	100.0%

Table 11

Chi-Square Test

Statistical tool	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.155[a]	1	.283		
Continuity Correction	.002	1	.961		
Likelihood Ratio	1.539	1	.215		
Fisher's Exact Test				.476	.476
Linear-by-Linear Association	1.100	1	.294		
N of Valid Cases	21				

c. 50.0% (2 cells) were expected to have a value smaller than 5.0, while the least value expected was 0.48.

d. The results were calculated for a 2 x 2 table only

The results were analysed using the Chi-square test to establish hypothesis two, and the test was intended to investigate how the sex of the students and the use of the tamarind picker interrelate. The results are indicated in Tables 11 and 12 above. The results indicate that χ (1) = 1.155, p = 0.283, which shows no statistically significant relationship between the adoption of the prosfrupika and the sex of the students who took part in the research.

Discussions

Objective one of this study was to determine the influence of the KDSCM on the adoption of the Prosfrupika by the women in the study area, and from the results of the study, the null hypothesis proved true. This hypothesis stated that the school students trained using the Knowledge Deficit Science Communication Model did not significantly influence the adoption of the prosfrupika by their mothers and female guardians. It is therefore assumed that the low adoption of this prosfrupika can be ascribed to their inherent risk and preference to maintain their relationships with informers, which has an emotional effect on their being open to new technologies.

Objective two of the study was to evaluate the role of gender in the adoption of the prosfrupika by the women in the study area, and the null proved true that the gender of the students used as purveyors of the prosfrupika and its adoption by their mothers and female guardians were not associated in any way. Neither the male nor the female students had more influence on the adoption of the Prosfrupika by their mothers/female guardians. This means that both sexes equally disseminated the application of the prosfrupika to their mothers and female guardians. However, Van Muijlwijk (2018) found that despite similarities in motivations for adopting new agricultural technologies between genders, female farmers in developing countries tend to adopt at lower rates than males. This aligns with the current study's findings, indicating that the gender of the students did not significantly influence female parents of students to adopt the tamarind picker technology.

Moreover, Van Muijlwijk (2018) not only assessed gender disparities in technology adoption and knowledge rates but also delved into the underlying motivating factors. The study emphasises understanding men's and women's roles in social and agricultural information networks by examining primary drivers of technology adoption segmented by gender. To bridge the gap between actual and potential yields, targeting specific gender groups, either women or men, in agricultural extension services based on these insights could be beneficial, as recommended by Van Muijlwijk (2018).

The third objective of this study was to establish the level of perceived simplicity of the technology. The study results indicate that the mothers and female guardians of the students who participated in the study did not perceive that the prosfrupika was simple to use. Instead, they stated that they had challenges in using it. This result is in tandem with the third void hypothesis, which assumed that the women would find that the application of the prosfrupika was not simple. However, Oluwamayokun et al. (2022) highlighted that for farmers to adopt new agricultural innovations, factors like technology accessibility and awareness are crucial. While having information is essential, it does not guarantee adoption; additional insights regarding the technology's relevance and benefits are necessary. Overall, the literature underscores that ease of use significantly influences farmers' perceptions of technology. Consequently, the perceived ease of using the prosfrupika among women challenges the validity of the null hypothesis.

New Knowledge

This study aimed at using the prosfrupika to harvest tamarind fruits from the tamarind trees; however, some schools did not have these trees within their premises, so other fruit trees were used to demonstrate their use. This experiment showed that the prosfrupika could be used to harvest other fruits like mangoes, oranges and lemons in addition to tamarind fruits. The practicability of this new knowledge is that farmers can use it to harvest other fruits as well, which will improve the quality and quantity of fruits harvested and increase household incomes. Some of the students also improvised other designs of the prosfrupika using tree branches instead of metals, which could be more applicable in communities where metal parts may not be common. This also indicates that students and community members are able to improvise for new technologies using items that they can easily find.

Conclusion

Overall, the research results indicate that the three hypotheses set at the beginning of the study were null. For the study's first objective, the results indicate that the Knowledge Deficit Science Communication Model was not influential in the adoption of the prosfrupika by the women in the study area as stated by the null hypothesis one set initially. The second null hypothesis stated that the sex of the students being used as purveyors of the technology did not have a significant influence on the adoption of the prosfrupika by their mothers/female guardians. Therefore, the results of the study indicate that both the male and female students had an equal influence on the women adopting the prosfrupika. Likewise, the third null hypothesis predicted that the women would not deem the prosfrupika as being simple in its application, and the results indicated that the women found challenges in the application of the prosfrupika.

Author Note

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Assessing the Impact of Waste Management Challenges on Pupils' Learning in Selected Public Schools in Kitwe District, Zambia

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Abstract

The purpose of the study was to examine the impact of waste management on pupils' learning. Waste management is collecting, transporting, and disposing of waste through justifiable means (Amasuomo & Baird, 2016). The study sampled five (5) public schools purposively including their surrounding communities and the public health department of the Kitwe City Council [KCC]… However, some participants, including teachers, pupils and community members, were randomly selected. The study was motivated by the heaps of waste arbitrarily dumped near and around some schools that depicted deficiencies in waste management.

Indiscriminate waste disposal causes many challenges that affect teaching and learning and lowers the health standards of individuals. The study discovered many challenges, including uncollected garbage, which contributed to filthy surroundings, germ transmission, floods and other vices. Human-to-human contamination was possible, especially since children sometimes play with and pick items from the waste. Blocked drainages caused floods, which made pupils' access to school difficult. Many more challenges were reported. The study recommended enhanced sensitisation and education programs to increase awareness and knowledge of the challenges of environmental waste management and their impact on pupils' learning and Increased community cooperation with the city councils to emphasise, oversee and enforce by-laws that would prevent incessant waste disposal in schools and other institutions (Nakamba, 2024).

Keywords: Impact, challenges, environmental waste, management, learning.

Introduction

Amasuomo and Baird (2016: 94) described "waste management as a process whereby wastes are collected, transported and disposed of in the best possible way of limiting its harmful effects. Thus, the aim of waste management is not only to protect humans from eminent harm but also to protect the environment from damage. Therefore, the process of resource conservation includes the prioritisation of the recycling agenda (ibid.). In other words, the impact of waste management continues to grow significantly, affecting the entire globe (Paul & Soren, 2018). Consequently, waste management is labelled one of the major public health concerns worldwide leading to declining environmental health conditions (Zulu, 2019 in Sambo, Muchindu, Nyambe & Yamauchi, 2020: p.2).

The impacts of waste management may include some of the following: littering, abandoned garbage heaps and indiscriminate dumping of waste, which have the potential to impact human health, contaminate the environment and upset the socio-economic development (Sakanyi & Kooma, 2022). For instance, "plenty of domestic and industrial waste lie uncollected indiscriminately, especially in the major urban and peri-urban areas as limited financial capacity and lack of trained manpower, technologies and equipment have made it impossible for the local authorities to fulfil their obligations concerning solid waste management" (ibid. p.1). Therefore, "the uncontrolled waste disposal and the poorly managed intermediate decomposition products contaminate the air, water and soil resources while other related adverse effects include the attraction of rodents and vector insects which do not only feed on the waste but also shelter" (ibid.).

The incessant disposal of waste in different schools' surroundings motivated the study because the researcher wanted to determine the impact of indiscriminate waste on pupils' learning in selected public schools of Kitwe district, Zambia. The study, thus, was directed by objectives such as to; "examine the challenges of environmental waste management that affect pupils' learning" and "investigate the extent inadequate awareness of the challenges of environmental waste management affect pupils' learning in selected public schools in Kitwe district…" (Nakamba, 2024: p. 12).

Literature Review

The Challenges of Environmental Waste Management

Inconsistencies in waste management have global implications with ever-increasing challenges of varying magnitude for cities worldwide (ElSaid & Aghezzaf, 2017; Sun et al., 2018). For example, the "challenges of developing cities are practices that include mixed waste, open dumping and uncontrolled dumpsites including the upward trend of the municipal solid waste generation" (Sambo et al., 2020). The most likely cause of the challenges was the attitude of most community members, which contributed to the soaring solid waste production and the inefficient service capacity, equivalent to the significance of the problem (Sakanyi & Kooma, 2022).

Consequently, there were reports from some scholars that "the waste collection rate in Zambia was meagre. For example, in 2019, Chongwe municipal council was at 34%, Lusaka at 45%, while Livingstone and Ndola were at 57% and 49% respectively" (Simwaba, 2019: p. 24). On average, the reportedly low collection rate only amounts to less than 50% of the anticipated. Nevertheless, compared to the rate at which domestic waste was being produced, there was not much progress because even the little collected was not properly treated and disposed of to lessen the possible harm (Sambo et al., 2020).

There are many challenges; for example, Kalenda (2019) reported about the ineffectiveness of the waste management process, which he allegedly associated with unqualified human resources involved in collection and disposal. The findings of Kalenda's study in Mumbwa district, Zambia, could also be true for other districts, especially since waste collection involves unskilled community-based enterprises. Additionally, because there were no designated dumpsites in the communities and the alleged misuse of financial resources, the problem was far from being solved (ibid). However, there was a need to avert these by engaging trained workforces, purchasing modern machinery and having proper structures for waste management, including the active participation of all stakeholders (ibid.).

Complexities of Unhygienic Waste Dumping Practices

The complications of waste disposal practices in the waste management chain are very cardinal despite needing more attention (Nakamba, 2024). In the same vein, there were reports of increasing unhygienic conditions related to waste disposal, which include indiscriminate disposal, uncontrolled burning and burying of waste willfully. At the same time, the vices pose severe risks to both human life and the well-being of the environment (Sakanyi & Kooma, 2022). For example, black carbon produced during open burning is both a pollutant that is very toxic to human health and a concern for global climate (ibid.). Best Practices (2020) underscored the dangers associated with living near dumpsites, as they were susceptible to illnesses such as malaria, dengue, and the Zika virus (ibid.).

Therefore, the indiscriminate dumping of domestic waste is a hazardous condition that contributes to lifelong infections, pollution, and injury, mainly due to the likelihood of scavengers and rodents escalating the problem. Among the most vulnerable to contamination are children because they often play and search for items to resell from the debris (Sakanyi & Kooma, 2022). Furthermore, Mwiinga (2014) reported that waste that lay uncollected in the Choma district of Zambia, which he reckoned was among the city's major problems at that time. Similar challenges of open dumping were still quite visible for districts such as Chililabombwe, Chongwe, Mumbwa, Ndola, Kitwe, Lusaka and other towns in Zambia where studies have been done recently. For instance, massive waste heaps resulting from a lack of sound dumping sites were intruding on some school playgrounds in the Kitwe district. However, it needed to be clarified whether the challenges could be due to either a total absence of the waste management system or just a breakdown (Nakamba, 2024).

In a related development, Kalenda (2019) defined the gravity of the challenge as a time bomb not only for Mumbwa but also for other towns like Lusaka and townships of the likes of

Chawama, Mandevu, Kanyama where waste management challenges were so deep-rooted to the extent that these townships were now declared hotspots for cholera every rain season. Likewise, UNEP and ISWA (2015) in Best Practices (2020, p.3) alleged that "at least 2 billion people live in areas that lacked waste collection and relied on uncontrolled dumpsites." Consequently, if left unchecked, the environment and human health remain under duress until lasting solutions are found.

Waste Management Challenges and Related Health Risks

The unsanitary conditions created due to the persistent indiscriminate dumping of waste increase the possibility of epidemics. The problem worsens because of the assumed lack of awareness of the related risks among the members of the community. According to Kumar et al. (2017), 90% of waste in India was supposedly dumped indiscriminately, a situation which triggered several negative effects beyond public health. For instance, the fears include the degradation of the environment and the stress on the socio-economic status of the nation (ibid.). In other words, Kumar et al. (2017) seem to suggest that the challenges of solid waste management extend beyond India's borders. Some of the outstanding health challenges reported by Kumar et al. (2017) were "nose and throat infections, breathing difficulties, inflammation, bacterial infections, anaemia, reduced immunity, allergies, asthma …" (ibid: p7).

Other interrelated problems commonly mentioned included stenches, particularly in the hot and wet seasons when average temperatures were very high. Additional public health problems that intensify in humid weather include intestinal-related infections like cholera, typhoid and dysentery; epidemics mainly surfaced in most densely populated areas (Sambo et al., 2020). Furthermore, there were reports of risks of germ transmission and the spread of diseases through trajectories such as houseflies and mosquitoes. Human contact with the waste was another possible way of contracting germs. For instance, as pupils pass through waste to and from school, including handling it during the cleaning of their school surroundings without protective wear, they are exposed to infection (Nakamba, 2024).

Exposure to solid waste has critical health implications caused by microorganisms. Dadgostar (2019) lamented that "the viciousness of infections and the resistance of microbes which, he believed, delayed the healing of diseases increasing the rate of mortality and morbidity with consequent economic consequences." Similarly, it is common in Zambia for cholera not only to break out but also to claim many lives and stress the nation's financial reserves. For example, the number of cholera cases recorded in 2016 was not less than 1000 in Lusaka, the capital city of Zambia alone (Kalenda, 2019). Cholera cases continue growing drastically every year, such that the latest figures recorded from October 2023 through to February 2024 escalated above 17,000 countrywide. They claimed hundreds of lives, with Lusaka still recording thousands (Zambia National Broadcasting Corporation, 26th February 2024). The epidemic delayed the opening of schools, colleges and universities for almost one month. Thus, the local surveillance teams, including international groups like the World Health Organisation [WHO] and Japan International Corporation Agency [JICA] … tried everything possible to halt the disease, but it was not easy. In other words, disease control can be an expensive and stressful exercise with negative impacts on the socio-economic development agenda.

The Effect of Monetary and Practical Deficits on Environmental Waste Management

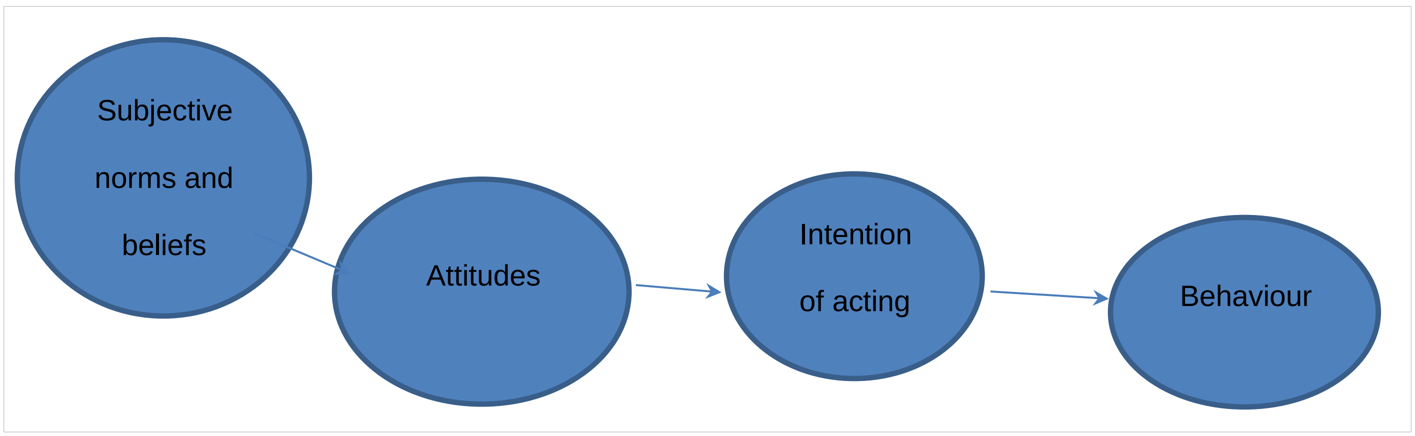
Financial resource shortfalls were among the constraints attributed to the deficiencies in waste management. Hence, Baptiste et al. (2021) described the insufficiencies of vehicles, personnel, and containers because there were no taxes to raise revenue specifically to manage waste. Nonetheless, most scholars alleged that communities were, in most cases, reluctant to pay for waste collection (Simwaba, 2019). Consequently, Some researchers contend the situation was a crisis of global concern because there is usually no permanent solution to environmental problems (Twumasi, 2017, p.2). Despite the aforementioned, Kodua and Anaman (2020) wondered why people continued to act indifferently by dumping solid waste onto open public spaces as though they did not understand the implications. This behaviour creates gaps for further research. However, a change of mindset and behaviour toward waste management was important.

Theory

This study adopted more than one theory, one of which was the theory of reasoned action [TRA], further termed the normative belief that provides some insights into human behaviour and attitude (Akintunde, 2017). The TRA described human behaviour as a process based on the assumption that behavioural intentions were directly aligned with people's attitudes, as depicted below:

Figure 1

Theory of Reasoned /Responsible Action



Note. Adapted from theories and concepts for human behaviour in environmental preservation by Akintunde, E., 2017, p. 124.

Other theories include Bandura's social learning theory and the theory of planned behaviour. A better understanding of the theories was very helpful in fostering behaviour that promotes success in waste management. For example, understanding that improper waste disposal by a few individuals coupled with inadequate management would create a problem for everyone; hence, mindset change was fundamental. At least most recommendations by earlier scholars underscore the benefits of reducing, reusing, recycling, and recovery, which seem to yield some positive results. However, some lapses, including the remoteness exhibited in implementing the strategies, signal the difficulties in Zambia.

Inadequate Waste Policies and Regulations

Harir et al. (2015: p. 3) commended the enforcement of appropriate legislation and policies for improving solid waste management in the United Kingdom [UK]. The report "observed that adequate legislation and enforcement enhanced solid waste management in London city and cited carbon purchased credit incentives discouraged carbon releases into the atmosphere while generator pay fees presumably helped to regulate solid waste generation" (ibid). Therefore, the claim implies adequate environmental law enforcement was a relevant mechanism for controlling waste generation and achieving efficient waste to energy [WTE] practices (Harir et al., 2015). However, regardless of the anticipated sustainability, developing countries such as Zambia may not achieve similar enactment easily because of the slow socio-economic growth and the long-bemoaned rigidity in attitude change (Nakamba, 2024).

Similarly, some countries prescribe regulations for handling waste through Municipal Solid Waste Handling Rules, which include proper storage of waste at their sites (Paul & Soren, 2018). However, the attitude has had a very negative influence on the laid-down regulations because reports of many studies reveal an element of disregard for the environment among the members of the public. For instance, people's behaviour does not seem to match the purported awareness of the dangers of improper waste management, such as sicknesses. In other words, the behavioural practices exhibited did not correspond with the knowledge people portrayed they had (Yoada et al., 2014). However, further challenges identified included the local government's failure to enforce bylaws and regulations, including the implementation and mobilisation of adequate funds proportionate to the service demand at hand (ibid.).

Twumasi (2017) identified and posited that what aggravates the waste management challenges is not only the rate of urbanisation but also the governance and institutional technical hitches; among them, the inadequacies and ineffectiveness of managing waste. Moreover, almost all the failures related to waste management, such as uncontrolled dumping, were allegedly concomitant with poor regulations, including inadequate checks on adherence to the set regulations (Baptiste et al., 2021). In order to achieve a progressive future, the adoption of solutions recommended by different scholars was an amicable milestone in the long-awaited solutions to the challenges of waste management.

Methodology

The researcher used the mixed research method concurrently, which combined the qualitative and the quantitative approaches. Johnson & Christensen (2014) and Nakamba (2024) stressed the benefits of using the mixed research approach. Schools that participated in the study were recruited purposively because they were among the known cases, those struggling with waste management challenges, considering that not all schools in the Kitwe district faced the alleged challenges. According to Tichapondwa (2013: p.126), "Purposive sampling involves what we may consider to be hand-picking of certain groups or individuals to include in the sample because of some defining characteristics that make them holders of specific data." Purposive sampling was, thus, ideal for selecting individuals with unique characteristics, such as ward councillors, ward development committee members and public health workers. These were given due consideration as potential holders of the data for the study because of their job descriptions since the power of purposeful sampling lay in selecting information-rich cases for in-depth study" (ibid.).

Besides, the researcher selected teachers, pupils, and community members using probability sampling and the simple random sampling technique to give all possible participants equal chances of participation. Five (5) schools participated in the study, including the surrounding communities. A total of one hundred (100) participants were selected, and these comprised thirty (30) teachers, thirty (30) pupils, twenty-four (24) community members, five (5) ward councillors, eight (8) Ward Development Committee members and three (3) public health workers from Kitwe

City Council (Nakamba, 2024: p. 109). The researcher's choice of a sample was based on the belief that the expected sample may be more accurate than the total study population due to the anticipated representativeness (Tichapondwa, 2013 in Nakamba, 2024). The population size mainly determines the sample size because a sample is expected to be a true reflection of the population from which it was drawn. However, the concept is by no means guaranteed (Tichapondwa, 2013).

The researcher used structured, printed, self-administered questionnaires, and these were distributed to participants immediately permission was obtained from the gatekeepers, and targeted participants were given some time to respond (Nakamba, 2024). Self-administered questionnaires were used to collect quantitative data, and the 5-scale Likert type of response was used to measure the extent of the challenges, and these were: 1. Very low extent, 2. Low extent, 3. Neutral, 4. High extent, and 5. Very high extent (ibid.). The participants were given the freedom to respond to the questionnaire in the absence of the researcher so that there was no coercion from the researcher. All the procedures for administering questionnaires were upheld because the questionnaire was self-explanatory on ethics and signing of consent forms attached to the questionnaire. Further advantages of the standardised questionnaire included its guaranteed consistency in scoring and compilation of responses, which eases the data analysis (ibid.).

Interviews with a few individual participants were conducted on agreed dates and times, including focus group discussions with groups of 5 or 6 participants. The researcher gave assurance to participants before proceeding with the interviews and group discussion, such as confidentiality, participants' rights to participate or not, and withdrawal from the study at any time. All participants signed informed consent forms to participate in the discussion and demonstrated their willingness to participate in the study. Children below 18 years, precisely the 16- and 17-year-olds, had their guardians sign guardian-informed consent before participating in the discussion. The researcher collected qualitative data through interviews and focus groups since the participants responded both to multiple-choice and open-ended questions, as they were expected to explain some of their responses and provide detailed and meaningful data (Nakamba, 2024).

In the data analysis process, the researcher sorted the data and numbered it according to the participants' groups of the research problem. Thus, coding is understood to be the process of assigning numerals or other symbols to answers so that responses could be put into limited categories or classes for every data item (Kothari & Garg, 2020, p. 123). Coding the data into definite categories helps the researcher not only in data handling but also in understanding what is being studied well. For instance, as part of coding, values were assigned numbers such as can be seen for sex: 1 and 2 represented Male - 1 and Female – 2 … in other words, data analysis includes the classification of different values, meaning that the collected data can be classified phenomena following their common characteristics (Kothari & Garg, 2020). Data coding, in other words, helps researchers reduce the bulkiness of data collected, familiarise themselves with emerging patterns and subjects, and make good sense of them.

Results

Quantitative data collected using numeric values was coded and entered on an Excel worksheet. It was then analysed using Excel and STATA, which further interpreted the data into tables and figures depending on the researcher's preference. The researcher performed a regression analysis to check the statistical significance of the findings at a pre-determined significance level of 0.05 to test the null hypothesis below.

H01: There is no significant differentiation in the mean rating of waste management extent to which challenges of environmental waste management affect pupils' learning

Decision Rule: If the p-value is less than the chosen significance level of 0.05, we reject the null hypothesis (Johnson & Christensen, 2014: p.). However, we can see that the p-value of 0.749 is greater than 0.05. Since the p-value is greater than 0.05, we failed to reject the null hypothesis. Based on the available data and the chosen significance level, there is not enough evidence to conclude that the extent of the challenges of waste management has a statistically significant effect on waste management extent (Nakamba, 2024: p. 171).

Table 1

Regression of Waste Management Extent and Extent of the Challenges

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regress wastemanagementinvestmentexten extentofthechallenges
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Source	SS	df	MS
Model	.093173313	1	.093173313
Residual	34.9312169	39	.895672229
Total	35.0243902	40	.875609756

Number of obs =	41
F(1, 39) =	0.10
Prob > F =	0.7488
R-squared =	0.0027
Adj R-squared =	-0.0229
Root MSE =	.9464

wastemanag~n	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
extentofth~s	-.0502646	.1558442	-0.32	0.749	-.3654892	.2649601
_cons	3.965608	.5926878	6.69	0.000	2.766784	5.164433

Note. Adapted from assessing the extent the challenges of environmental waste management affect pupils' learning in Kitwe district by Nakamba, J., 2024, p. 171

H02: There is no significant differentiation in the mean ratings of waste management extent and the extent to which inadequate awareness of the challenges of environmental waste management affects pupils' learning.

In the regression analysis of waste management extent and extent of inadequate awareness, the coefficient (Coef.) for the extent of inadequate awareness was -0.016129 a P-value (P-value) of 0.924 and a t-value of -0.10. Since the p-value is greater than 0.05, we failed to reject the null hypothesis. This suggests that there was not enough evidence to conclude that the extent of awareness on the waste management has a statistically significant effect on waste management extent (Nakamba, 2024, p. 182). The researcher further wanted to understand the level of satisfaction with waste disposal behaviour in their respective locations, and the responses are displayed in Table 3.

Table 2

Regression of Waste Management Extent and Extent of Inadequate Awareness

regress wastemanagementextent extentofinadequateawareness

Source	SS	df	MS
Model	.008261212	1	.008261212
Residual	35.016129	39	.897849462
Total	35.0243902	40	.875609756

Number of obs	=	41
F(1, 39)	=	0.01
Prob > F	=	0.9241
R-squared	=	0.0002
Adj R-squared	=	-0.0254
Root MSE	=	.94755

wastemanag~t	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
extentofin~s	-.016129	.1681466	-0.10	0.924	-.3562377	.3239797
_cons	3.83871	.6247474	6.14	0.000	2.575039	5.102381

Note. Adapted from assessing the extent the challenges of environmental waste management affect pupils' learning in Kitwe district by Nakamba, J., 2024, p. 182

Table 3

The Extent of Satisfaction with Environmental Waste Disposal Practices

	Frequency	Percent	Valid Percent	Cumulative
Valid Very dissatisfied	4	9.8%	9.8%	9.8%
Not Satisfied	20	48.8%	48.8%	58.5%
Neutral	12	29.3%	29.3%	87.8%
Satisfied	5	12.2%	12.2%	100.0%
Total	41	100.0%		

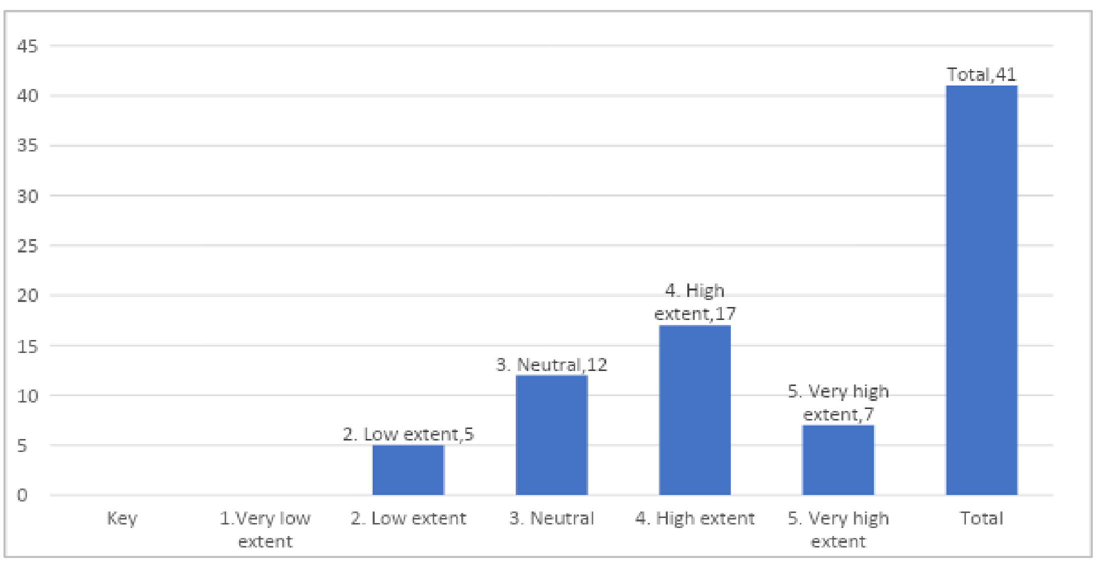
Note. Adapted from assessing the extent the challenges of environmental waste management affect pupils' learning in Kitwe district, by Nakamba, J., 2024, p. 189

The table illustrates the participants' views on the extent of satisfaction with the waste disposal practices in their areas. The general outlook of the responses seems to indicate that those who were not satisfied were more than those who were satisfied because, out of the fortyone (41) participants who responded to the questionnaire, four (4) were very dissatisfied, twenty (20) not satisfied, respectively. The total for dissatisfaction was thus twenty-four (24), translating into fifty-eight-point five per cent (58.5%). The participants who could neither show whether satisfied or not were twelve (12), translating into twenty-nine-point three per cent (29.3%), while those who were satisfied were only five (5), which is twelve-point two percent (12.2%). From the statistics, we can conclude that the culture of waste disposal was not good, so it was displeasing to most of the participants. The aforementioned seems to correspond to the report presented by Best Practices (2020), which asserts that more than 2 billion people lived in places that did not have the best waste management systems and thus only depended on haphazard dumping.

RQ 1: What is the extent to which the challenges of environmental waste management affect pupils' learning? Figure 2 below presents the responses.

Figure 2

Responses on the Extent of Challenges of EWM



Note. Adapted from assessing the extent the challenges of environmental waste management affect pupils' learning in Kitwe district, by Nakamba, J., 2024, p.161

Figure 2 shows the findings of the study in response to question one, which shows how the participants responded to show the extent to which the challenges of environmental waste management affect pupils' learning in selected schools in Kitwe district. Interpretation: 1. Very low extent, 2. Low extent, 3. Neutral extent, 4. High extent, and 5. Very high extent. None of the respondents said the extent was very low zero (0), to a low extent five (5), the neutral respondents were twelve (12), high extent seventeen (17) and very high extent seven (7)" (Nakamba, 2024). Qualitative data was collected using interview and focus group discussion schedules. The qualitative data was analysed thematically.

Discussion

The study's findings revealed that the impact of waste management on pupils' learning included:

Uncollected Garbage

Some participants alleged that uncollected garbage contributed to filthy and unhealthy environments as they claimed different kinds of waste lay indiscriminately. There were reports of plastics, papers and other lighter materials scattered by the wind toward school buildings and even inside the school premises. Therefore, due to filthiness, some schools reportedly needed to access facilities such as the playing fields. In view of this, management sometimes failed to clean the playgrounds thoroughly because the facilities were too porous, so boundary fences did not secure the playgrounds. The uncontrolled waste disposal worsened the risk of intrusion among other community activities.

Despite the school managers' willpower to ensure that schools were clean, the decomposition of uncollected waste caused bad odours that made learning uncomfortable. Additionally, some respondents reported that houseflies and mosquitoes left them very susceptible to disease contraction, which would have an impact on learning. Because of the failure to collect waste adequately, responsible persons and organisations in the vicinity of some schools, large heaps of waste not only make the schools look gloomy but also create unsanitary conditions unhealthy for learning. In some instances, some areas become very impassable, especially during the rainy season; this assertion was in line with paths leading to schools where pupils allegedly waded in the muddy wastewaters to reach school.

One of the participants further reported that uncollected waste reduced outdoor activities, referring to how much pupils' learning was confined because of the garbage in the sports fields that restricted outdoor activities. This explains how much sports activities and practical lessons in Physical Education and Sports subjects suffered because of the challenges underscored. Another respondent was in pain to clarify what some school managers were doing to mitigate the problem of space as he said, "It is not easy; we depend on fenced premises which have not been littered." Therefore, the situation was bad, especially since the certainty of the premises being borrowed would not be guaranteed because owners had their programmes.

Since waste disposed of indiscriminately lay uncollected, the spread of diseases was apparently rampant, which caused some pupils to fear that flies from the waste could easily cause them diarrhoea because there was a high possibility of food contamination and accelerated chances of cholera epidemics and other intestinal related illnesses common in the rainy season. Although diarrhoea seemed to be one of the most pronounced concerns among pupils' responses, they also complained of widespread malaria attacks. Sickness was considered a deterrent to effective learning because both teachers and pupils who fell sick would not be able to attend school consistently. Therefore, they were a bother to learning. These findings seem to tally with Ghanaian scholars Kodua & Anamana's (2020: p.3) findings who reported, the severity of the challenges of poor environmental sanitation contributed to about 70% of the out-patients department cases However, we recommend more studies be conducted to affirm these facts and help arrest the situation (Nakamba, 2024).

Transmission of Germs

Another common challenge mentioned by participants in the locations of the study (schools) was land contamination, which, they said, caused problems for them. For instance, pupils were concerned that passing through waste as they moved to and from school exposed them to risks of diseases due to contamination. In situations where pupils struggled to reach school due to waste on the paths, some respondents displayed concern over pupils of young ages wading on the waste. Of course, other likely means of contracting germs concerned pupils of a tender age who were sometimes enticed to pick items for play or reuse which could prove dangerous to them. There were, therefore, possibilities of either children being poisoned or facilitating germ transmission from the bottles, tins to foodstuffs. Furthermore, person-to-person contact was also possible when a person whose body was contaminated polluted others through body contact.

Cholera bacteria spread in a like manner. Poisoning was also possible; for example, one parent lamented as she explained how her early-grade child who picked a contaminated bottle believed to have been used to store a dangerous chemical, precisely doom, panicked to rush the boy to the hospital where she allegedly suffered for more than a week nursing the boy. In other words, she was lucky the child survived, or else he could have died.

Blocked Drainages

Waste that was disposed of indiscriminately and left uncollected was a recipe for blocked drainages. Some of the waste was disposed of in the drainages, while rains also washed away some of the waste and deposited it in the drainages, causing blockages. Blocked drainages had a likelihood of causing wastewater to overflow the banks and cause some concerns, such as life-threatening hazards; this is another challenge that some schools face. Additionally, the study discovered that obstruction of gutters, pipes and drainages left waste lying on public highways, causing damage to the beauty of the environment. In some cases, younger pupils faced challenges reaching school because the drainages were entire, making it difficult to cross on rainy school days, affecting learning.

Garbage Burning and Its Chocking Effects

Another issue of public concern raised by most participants was that of communities burning the waste dumped near the school indiscriminately. The findings of the study revealed that uncontrolled waste burning was one of the major causes of air pollution (Figure 3), which not only made the environment dirty but also caused choking. This was so evident that heaps of garbage were seen emitting smoke even as the researcher collected data. Instead of ensuring the incessant waste was collected and dumped in legitimate or designated dumping sites, some unknown persons lit the heaps of garbage, and the smoke was blowing in different directions, including towards the school (Nakamba, 2024). The respondents disapproved of the smoke's side effects from burning garbage, which they said choked them. Further challenges include blurred vision, eyesores, headaches, flu, tuberculosis, asthma, bronchitis and general difficulties in breathing, including skin irritation, all resulting from waste burning. Some participants further affirmed that choking affected pupils' learning in many ways, as manifested in the already mentioned challenges.

Figure 3

Picture of Burning Waste Next to the School

Note. Adapted from assessing the extent the challenges of environmental waste management affect pupils' learning in Kitwe district, by Nakamba, J., 2024, p. 179

Pollution

The term pollution is one of the most widely used concepts with a variety of meanings. However, in this study, pollution means making the environment dirty. In other words, the smoke emitted during the burning of garbage contaminates the environment in surrounding areas. Pollution causes profound health implications such as eye and skin irritation, blurred vision, choking, headaches, flu and chest infections, which may cause breathing problems such as bronchitis, asthma and general restlessness in some people. In some residential areas, garbage burning was too much and an ongoing tendency with serious implications. Hence, teachers, pupils, and other people often have no option but to brave the smoke on their way to and from school.

Further challenges revealed were that during the rainy season, soil leaching leads to underground water contamination that is likely to affect human health. Besides, WHO (2020) acknowledges groundwater and surface water pollution as they suggest that failure to remove waste from undesignated places pollutes the living environment. Additionally, disposable facemasks, medical and biohazardous waste, antibacterial soaps, gels and other single-use items were among items rated to have increased pollution on land and water (ibid.). Nevertheless, these were among the waste disposed of openly near and around schools. Furthermore, during the times that waste has to be collected, regardless of the low frequency of collection, which we may describe to be very uneven, noise from trucks and loaders also affects pupils' learning. Hence, some pupils complained of noise pollution, yet all seemed normal to be responsible despite the long-term negative implications.

Inadequate Awareness

From the findings of the study, the attitude of throwing waste indiscriminately alongside non-compliance to paying compulsory waste management charges was attributed to low awareness of the impact environmental waste management challenges have on community members. For instance, resentment towards compliance with waste management subscriptions, including failure to comply with other etiquette, were both associated with the need for more awareness. Thus, one respondent described inadequate awareness and resistance to adapt to change as signs of ignorance. However, ignorance should not be a scapegoat for failure to observe sustainable environmental principles. It was prudent that citizens lived responsibly while valuing their environment, especially institutions such as schools that service them (Nakamba, 2024). Thus, the study recommended that environmental education be given due consideration to improve awareness and a better understanding of environmental management, including the challenges involved as a matter of practice. The researcher further proposed that the Government of the Republic of Zambia, through the Ministry of Education, should prioritise the national policy changes by proposing the inclusion in the enactment of children's rights suggestions to protect pupils from clearing the waste dumped in school premises as the process is abusive to children. Furthermore, teachers' integrity also needs to be protected as they work with pupils lest they be found wanting.

The impact of Waste Management Challenges on Pupils' Learning Time

The challenges of environmental waste management affect pupils' learning in many ways. For example, some pupils recounted how time for learning was sometimes infringed upon. Some cited examples of when they were engaged in cleaning the surroundings littered with different waste materials during learning time so that they cleaned the surroundings. The pupils' complaints should not be understood as resentment because they understand the beauty of living in favourable environments. Yet, their concern was the garbage's physical characteristics, which they described as hazardous with a likelihood of instigating some health challenges, especially since no proper protective wear was provided during the cleaning.

In other words, some pupils have considered the working process of clearing waste as intimidation. Hence, in one school, some participants were quick to mention how some of the pupils opted to absent themselves from school to avoid clearing the waste. In other words, some purportedly ended up hating school because whenever they reported late for school, committed any offence, or for other reasons, they were punished to clear the waste accumulated in the school surroundings. The process irritated some, who resorted to staying away from school. In addition to the abovementioned, some respondents reported that whenever pupils and teachers were affected by ill-health, they were likely to fail to attend school, thus disturbing the learning.

Conclusion

The study discovered that numerous waste management challenges had an impact on pupils' learning, including improper dumping of waste, pollution, contamination, and blocked drainage. The schools affected reportedly appeared dirty both outside and inside. Respondents were quick to name body irritations, flu, headaches, poor eye vision, eye irritation, bronchitis and other breath-related health challenges like having an impact on learning because whenever pupils were unwell, they would not be able to learn. Therefore, the impact of waste management challenges on pupils' learning was high. Of course, there were many more challenges in addition to the ones mentioned. However, most often, it would be quite difficult to realise that they were due to deficiencies in environmental waste management unless more studies were carried out to ascertain other possible causes.

Consequently, some respondents proposed that a better understanding of the challenges was an important factor in improving the standards of cleanliness and a mindset change. Thus, the study recommended that Kitwe City Council [KCC] should consider designating sites for waste dumping, encouraging the use of biodegradable plastic bags and enhancing the schedule for waste collection. Additionally, the KCC, in collaboration with other stakeholders, enhances awareness and health education programs to boost stakeholders' knowledge of the impact environmental waste management challenges have on pupils' learning. There should be heightened community collaboration with the Kitwe City Council to emphasise, administer and put into effect legislation to discourage incessant waste disposal in schools and their surroundings.

The study recommended further, that future researchers should consider comparing the rate of sickness in the schools affected by waste management challenges that have an impact on pupils' learning with the unaffected schools. Moreover, scholars should consider evaluating the common illnesses and their underlying causes in the affected schools by comparing them with those that are not affected (Nakamba, 2024). In other words, it is important to build positive societal norms that would encourage paying for solid waste collection in people's respective homes and promote healthy environments for pupils' learning.

Author Note

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IFRS Adoption and Earnings Management in Ghana

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Abstract

This study evaluates the impact of adopting International Financial Reporting Standards (IFRS) on Ghanaian earnings management practices. IFRS, a global trend intended to promote the openness of financial reporting, is analysed in relation to return on assets and firm size, which are financial metrics that ascertain their impact on earnings management. The study uses a sizeable sample of thirty non-financial firms using their financial records from 2018 and 2020 on the Ghana Stock Exchange and the Alternative stock market. This study employs correlation analyses and multiple regression analyses to examine the data and test the hypotheses. The findings demonstrated a negative relationship (this inverse relationship indicates that the variables move in opposite directions) between earnings management and IFRS adoption, which aligns with academic research emphasising IFRS's positive benefits on financial reporting transparency. The study finds a statistically significant relationship between return on assets and earnings management, which supports early assumptions. Moreover, a negative correlation is shown between an organisation's size and earnings management, but a statistically significant relationship exists.

Keywords: Discretionary accruals, earnings management, firm size, IFRS adoption, return on asset.

Introduction

The global adoption of International Financial Reporting Standards (IFRS) aims to enhance the consistency and comparability of financial reporting across different countries (Nobes, 2014). Ghana formally adopted IFRS on January 1, 2007, in an effort to align its financial reporting practices with international standards, thereby enhancing transparency and uniformity (Duah, 2022; Mbawuni, 2019, Duah, 2022). Despite this shift, the impact of IFRS adoption on earnings management practices remains a critical area of inquiry, particularly in the context of developing economies like Ghana.

Background

The International Financial Reporting Standards (IFRS) are a set of accounting standards developed by the International Accounting Standards Board (IASB) to bring transparency, accountability, and efficiency to financial markets worldwide. These standards provide a global framework for public companies to prepare and disclose their financial statements, promoting consistency and comparability across international boundaries (IFRS Foundation, 2020).

The adoption of IFRS has been a significant milestone for many countries, facilitating cross-border investment and economic integration. Globally, adopting IFRS is seen as a means to improve the quality of financial reporting, enhance the comparability of financial statements, and increase transparency (El-Helaly et al., 2020). Developing countries, in particular, stand to benefit from IFRS adoption as it can attract foreign investment by providing reliable financial information that meets international standards (Jones & Smith, 2020).

Earnings management is the manipulation of company management’s financial statements to achieve specific financial outcomes. This practice can distort a company’s true financial performance and position, thereby misleading investors and other stakeholders (Jones & Smith, 2020). Earnings management has significant implications, as it can undermine the credibility of financial reports and the efficiency of capital markets. The adoption of IFRS is expected to mitigate earnings management practices by enforcing stringent disclosure requirements and promoting higher-quality financial reporting (El-Helaly et al., 2020).

Studies that have been carried out in the past years around the world have examined the complex effects of the adoption of IFRS on financial reporting methods (Nobes, 2014; Mbawuni, 2019; Duah, 2022; El-Helaly et al., 2020; Atanasovski & Trpeska, 2019). The adoption of this reporting framework has a good effect on the comparability of financial statements among international enterprises, which promotes cross-border investment and decision-making, according to research by Cataldi, (2019). This is consistent with the main objective of IFRS, which is to establish a standard language for financial reporting (IASB, 2020).

Scholars have delved into the difficulties of adopting IFRS in recent years. A paper by El-Helaly et al. (2020) examines the intricacies resulting from institutional variances and cultural differences in the application of IFRS in various nations. This emphasises the necessity of taking into account regional contextual elements that could influence how successfully IFRS are adopted, reiterating the need for a nuanced strategy made by Adibah et al. (2013) in their study carried out in an Asian setting.

In keeping with international trends, Ghana, a country in West Africa, has actively adopted IFRS. A recent study by Inusah, and Dwommor, (2017) examines the experiences and difficulties faced by Ghanaian businesses throughout the adoption of IFRS. The research highlights how crucial it is to comprehend developing nations' unique circumstances and traits while implementing IFRS.

Agyei-Mensah (2013) examined how the adoption of IFRS affects corporate behaviour in Ghana and offered insights into the variables that affect the effective application of IFRS in Ghana. The report emphasises how important institutional support and regulatory agencies are to the successful implementation of IFRS. Mbawuni (2019) adds to the conversation on the dynamic landscape of IFRS adoption by examining how the adoption of IFRS has affected Ghana's financial reporting quality. The results provide insight into the possible advantages and difficulties of moving toward IFRS standards in a developing nation.

These recent studies highlight the significance of considering both the global and local aspects as the international financial community continues to struggle with the challenges of adopting IFRS. While international harmonisation is the goal of IFRS, recognition of various cultural, institutional, and economic aspects is necessary for its successful implementation.

Global financial reporting has changed significantly as a result of the extensive adoption of IFRS. According to El-Helaly et al. (2020), IFRS acts as a common language for business transactions, promoting comparability and comprehension of financial data across borders. The adoption of IFRS has become necessary due to a growth in worldwide trade and shareholding, particularly for businesses with multinational operations (Jones & Smith, 2020). The Institute of Chartered Accountants (Ghana) has endorsed IFRS as the nation's national accounting standard since January 1, 2007, demonstrating the country's commitment to IFRS as it gradually replaces national accounting standards (Obuobi, 2016; Mbawuni, 2019). The relationship between Ghana's adoption of IFRS and earnings management is an intricate and significant topic. Concerns about corporate financial reporting arise from earnings management, which deliberately manipulates financial figures. Ghana's financial data reporting and management are anticipated to change because of the implementation of IFRS, a global accounting standard (Atanasovski & Trpeska, 2019). However, more research must be done to ascertain the extent to which this shift has affected Ghana's earnings management methods. When IFRS is adopted, it becomes even more important to comprehend the nuances of earnings management.

According to a study by Dechow et al. (2019), adopting international accounting standards may complicate financial reporting and make it more advantageous for businesses to manage their earnings. The adoption of IFRS may impact how financial information is recognised, measured, and disclosed, which may affect how businesses manage their reported earnings.

Jones and Smith (2020) stress the significance of closely examining earnings management strategies after the implementation of IFRS. According to the study, the adoption of IFRS may change the dynamics of profit management, impacting both the prevalence of manipulation and the underlying reasons behind it.

Examining how businesses manage the new reporting environment and whether this adoption affects their approach to profit management becomes essential as Ghana aligns its financial reporting standards with IFRS. The study also intends to add to the body of literature by examining the complex link that exists in the Ghanaian corporate landscape between the adoption of IFRS, earnings management, return on assets (ROA), and business size.

Both domestically and internationally, many studies have been done on earnings management. Therefore, a clear conflicting result exists between Ghana's earnings management techniques and the specific framework of IFRS adoption. There needs to be more empirical data on the dynamics of profit management in emerging markets, particularly those whose financial reporting quality enhances financial statement compatibility switch to IFRS. Most research has been conducted on developed economies. Further, research on earnings management strategies in Ghanaian companies adopting IFRS frequently needs to incorporate firm-specific parameters such as ROA and firm size fully.

Wang and Campbell's (2018) study emphasises the need for additional research on how the adoption of IFRS affects the quality of earnings in emerging nations. Their results highlight the significance of context-specific research by showing that the connection between IFRS and profit quality may differ across various economic conditions. This emphasises how important it is to investigate the particulars of IFRS implementation and profits management strategies in the Ghanaian environment, taking into account the opportunities and constraints that enterprises in this developing market confront. The focus on IFRS-adopting enterprises in Ghana is justified by the way that IFRS adoption transforms financial reporting procedures and the absence of thorough studies conducted in the Ghanaian context.

Ghana's determination to align its accounting standards with global standards offers a favourable opportunity to examine the ways in which this shift affects earnings management tactics. A recent study by Adibah et al., (2013) highlights how crucial it is to consider the local environment when analysing how the implementation of IFRS has affected financial reporting practices. Their study, which was carried out in an Asian setting, implies that elements unique to a given country may influence how IFRS adoption affects earnings management. Therefore, comprehending how the adoption of IFRS would affect earnings management in Ghana necessitates a customised strategy that takes into account the distinctive features of the Ghanaian corporate environment.

Furthermore, as Ghana presents itself as a desirable place to invest, regulators, policymakers, and investors must comprehend how businesses operating in this market handle their earnings under IFRS. The study intends to add to the small body of literature that supports academic discourse and policymakers' decision-making in Ghanaian corporate environments. This offers fresh perspectives on earnings management in the Ghanaian context, particularly in light of IFRS. This research is academically significant. The research intends to improve the current body of knowledge on financial reporting behaviours in emerging nations by investigating the links between IFRS adoption, Return on Assets (ROA), Firm Size, and earnings management techniques.

Significance of the Study

This research will contribute to a deeper understanding of the effectiveness of IFRS adoption in improving the quality of financial reporting in Ghana. By analysing the extent to which IFRS adoption influences earnings management practices, this study will provide empirical evidence on whether IFRS standards lead to more transparent and reliable financial statements.

This understanding is crucial for assessing the success of IFRS implementation in enhancing the credibility of financial information and fostering investor confidence in Ghanaian firms.

The findings of this study have significant implications for policymakers, regulators, and practitioners in Ghana and similar developing economies. For policymakers, the research can inform decisions on the continued support and enhancement of IFRS adoption policies. Regulators can use the insights to develop more effective oversight mechanisms to ensure compliance with IFRS standards, thereby reducing opportunities for earnings management. Practitioners, including accountants and auditors, can benefit from understanding how IFRS impacts financial reporting quality and adjust their practices accordingly to uphold high ethical standards and improve the integrity of financial reporting.

Additionally, this research will make a valuable contribution to the academic literature on financial reporting and earnings management in developing economies. Most existing studies focus on developed countries, leaving a gap in the literature regarding the impact of IFRS in less developed contexts. By providing empirical data from Ghana, this study will add to the body of knowledge on the role of international accounting standards in improving financial transparency and reducing manipulative financial practices in emerging markets. This can pave the way for future research exploring similar issues in other developing countries, facilitating a broader understanding of the global impact of IFRS adoption.

Literature Review

The worldwide integration of financial reporting standards aims to provide consistency and comparability in financial reporting procedures across nations (Nobes, 2014). In line with this development, Ghana formally embraced IFRS on January 1st, 2007, demonstrating the country's resolve to align its financial reporting procedures with global norms to improve uniformity and transparency (Mbawuni, 2019). The shift was brought about by Ghana's companies becoming increasingly integrated into the world economy (Obuobi, 2016). Despite this change, research on how IFRS has affected financial reporting practices—especially regarding earnings management—remains fascinating.

Whether lawful or opportunistic, earnings management is the intentional manipulation of financial statistics to accomplish various goals (Jones & Smith, 2020). It is anticipated that the type and degree of earnings management will change as IFRS becomes more widely used. Mixed results have been obtained from research conducted in international contexts. For example, the adoption of IFRS in European countries has been linked to a decrease in earnings management, suggesting higher quality accounting reporting (Xu & Wang, 2021). On the other hand, Atanasovski and Trpeska (2019) contended that variables such as the corporate governance framework and regulatory environment could influence how IFRS adoption affects earnings management. Therefore, it is critical to investigate and ascertain the effect of IFRS on earnings management in Ghana's distinct business environment.

One important financial metric that shows how profitable a business is in relation to its assets is the return on assets (ROA). Conversely, the size of a firm is a key indicator of an organisation's scope and complexity. Understanding the dynamics of financial reporting processes requires an awareness of these elements. However, further research is needed to fully understand how IFRS adoption, earnings management, and two important financial metrics, ROA and firm size, interact in the Ghanaian environment.

This study aims to fill up some significant gaps and the conflicting results in the body of previous material. Although IFRS adoption and earnings management have been the subject of numerous international studies, little in-depth research has been done in the particular Ghanaian setting (Obuobi, 2016). By concentrating on Ghana's distinct business practices and regulatory frameworks, this study seeks to reduce this gap. Moreover, the material that has already been published has presented conflicting results about how the adoption of IFRS has affected earnings management (Ball, 2006; Daske et al., 2008). In order to shed light on these disparities, this study intends to investigate potential contingency factors in further detail, such as firm size and key financial indicators (ROA). This research centres on the interaction between IFRS adoption, earnings management, and important financial metrics in the Ghanaian environment, which has not yet been thoroughly examined. The following are the research objectives:

1. Investigate the impact of IFRS adoption on Earnings Management.
2. Analyse the relationship between Return on Assets (ROA) and Earnings Management.
3. Assess the relationship between Firm Size and Earnings Management.

International Financial Reporting Standards (IFRS)

The theory of Positive Accounting offers a foundation for comprehending the variables affecting financial reporting procedures. According to PAT, a company's self-interest and the contracting environment in which it operates have an impact on its accounting decisions. Within this framework, the study can presume that the introduction of IFRS as an internationally recognised accounting standard affects earnings management techniques. Companies may use IFRS to improve their access to financial markets and reputational capital, which could lead to less earnings management (Jones & Smith, 2020; El-Helaly et al., 2020).

The implementation of IFRS has been a global movement with the goal of bringing financial reporting methods closer to standardisation and comparability (Nobes, 2014). Ghana's commitment to promoting openness, raising the calibre of financial disclosures, and harmonising its financial reporting with international standards is reflected in its 2007 adoption of IFRS as the reporting framework (Mbawuni, 2019). Yet, academics are still interested in how the implementation of IFRS has affected financial reporting procedures, particularly with regard to earnings management.

In company financial reporting, earnings management is a common occurrence that includes purposeful manipulation of financial statements to accomplish a variety of goals (Jones

& Smith, 2020). Earnings management drives can be broadly classified as either legitimate or opportunistic (Roychowdhury, 2006). Legitimate earnings management is motivated by the desire to present a more accurate picture of the company's financial performance. In contrast, opportunistic earnings management involves managers manipulating financial results to meet personal goals. Scholarly research has examined the effects of IFRS implementation on earnings management. IFRS proponents contend that the principles-based framework improves financial transparency and decreases opportunistic earnings management (Xu & Wang, 2021), while critics argue that the impact of IFRS on earnings management is more subtle (Atanasovski & Trpeska, 2019). It is important to comprehend the dynamics of earnings management in the post-adoption phase in Ghana, where IFRS adoption took place in 2007.

Previous accounting and financial reporting research have thoroughly studied the effect of IFRS adoption on a range of financial outcomes, including discretionary accruals. Academics such as Jones and Smith (2020) have studied the effects of switching to IFRS and highlighted the global trend toward standardised accounting standards. El-Helaly et al. (2020) describe discretionary accruals as an essential element in the context of earnings management, signifying management's deliberate manipulation of financial accounts.

The relationship between the adoption of IFRS and discretionary accruals has been the subject of conflicting conclusions in previous research, especially in studies carried out in various international contexts. According to certain studies, like Jones and Smith (2020), the use of IFRS may lead to a decrease in earnings management techniques. This viewpoint is consistent with the Positive Accounting Theory (PAT), which postulates that internationally recognised accounting standards, such as IFRS, could improve transparency and lessen the tendency for opportunistic reporting (Burgstahler, & Dichev, 1997). On the other hand, other researchers have found contextual elements that could affect how IFRS adoption impacts earnings management. El-Helaly et al. (2020) found that different European nations saw varying effects on earnings management as a result of IFRS implementation, highlighting the significance of regional circumstances and institutional frameworks. These contradictory results emphasise the necessity of a careful analysis conducted in particular national situations.

The conceptual framework of this study, which draws on the literature, includes the hypothesis that adopting IFRS as a worldwide accounting standard may impact how businesses manage their profits. The conceptual justification is based on the idea that increased comparability and openness resulting from the implementation of IFRS lessens the incentives for discretionary accruals. Here is the deduced hypothesis;

Null Hypothesis (H_0): *The adoption of IFRS does not statistically affect earnings management.*

Alternative Hypothesis (H_1): *The adoption of IFRS has a statistically significant effect on earnings management.*

Return on Asset

According to the signalling hypothesis, companies with higher Return on Assets (ROA) could be less motivated to manipulate earnings since their impressive financial results provide investors with enlightening signals. From this angle, profitable businesses might place a higher priority on openness to keep investors satisfied and lessen the need to manipulate reported earnings. According to the income smoothing theory, companies with high ROA may manipulate their earnings over time to display a more consistent pattern of earnings. The goal here is to avoid indicating significant swings in performance, as this could cause unpredictability in the market and possibly unfavourable responses.

Healy's (1985) research presents the income smoothing hypothesis, highlighting the ways in which companies can manage their earnings to give the impression of stability. According to Watts (2003), companies with a high return on assets (ROA) may be inclined to manage earnings to prevent signal volatility. Dechow and Skinner (2000) discuss how highly profitable companies may manipulate their earnings to meet or exceed analyst expectations to support the signalling perspective further.

Empirical evidence establishing the relationship between ROA and earnings management is provided by studies such as Dechow et al. (1995). This research shows that companies with high ROA are linked to lower levels of earnings management, which is in line with the signalling concept. However, there needs to be more concrete data on the connection between ROA and earnings management in the Ghanaian context. Recent studies, like Sumaila, (2022), suggest that stronger financial performance, including higher ROA, is linked to better corporate governance practices in Ghana. This suggests a possible connection between transparent reporting and solid financial success. The study makes the following assumptions in light of worldwide factual data and theoretical perspectives:

Null Hypothesis ($H2_0$): *No statistically significant relationship exists between Return on Assets (ROA) and earnings management.*

Alternative Hypothesis ($H2_1$): *There is a statistically significant relationship between Return on Assets (ROA) and earnings management.*

Firm Size

According to the information asymmetry hypothesis, managers and external stakeholders may experience more information disparity with smaller businesses. Smaller businesses may use earnings management to announce good news and lessen ambiguity in an effort to reduce this disparity. On the other hand, larger companies, which are subject to more scrutiny and have more analysts and investors following them, might have more transparent reporting processes. According to the competitiveness hypothesis, larger companies manage their earnings to meet expectations and gain a competitive advantage due to more severe market competition and scrutiny. Conversely, smaller businesses, facing less competition, might inflate earnings to attract investors.

Recent research suggests that larger companies might have more efficient monitoring systems, reducing the need for earnings management (Xu & Wang, 2021). The auditing hypothesis contends that larger companies are subject to more thorough audits, which restricts their capacity to manipulate earnings (Jones & Smith, 2020). Nonetheless, it is argued that larger companies might use more advanced techniques to manage their profits (Atanasovski & Trpeska, 2019).

Global research demonstrates a connection between business size and earnings management, as evidenced by studies like those of Jones and Smith (2020) and El-Helaly et al. (2020). Jones and Smith (2020) found that smaller businesses are more likely to manipulate their earnings to achieve profitability targets. Though there is a need for more research specifically on Ghana, studies such as those by Sumaila, (2022) on corporate governance in Ghana suggest that smaller businesses may have stronger incentives to falsify revenues due to resource limitations and higher information asymmetry. The study hypothesises that in the context of Ghanaian companies,

Null Hypothesis ($H3_0$): There is no statistically significant relationship between firm size and earnings management.

Alternative Hypothesis ($H3_1$): A statistically significant relationship exists between firm size and earnings management.

Methodology

Sample Selection

The following standards were used to choose the study's sample: The sample consisted of businesses that had formally embraced International Financial Reporting Standards (IFRS). This guarantees that companies that have made the switch to global accounting standards will receive attention. Banking and insurance businesses should have been included in order to preserve sample homogeneity and consider industry-specific reporting standards. This ruling guarantees a more focused examination of non-financial businesses by acknowledging these industries' distinct legal frameworks and financial reporting standards. The sample comprises companies that are listed on the Ghana Stock Exchange, indicating their dedication to transparency through their involvement in the stock market.

Thirty (30) firms that met the given criteria were chosen from the Ghana Stock Exchange to participate in the data collection procedure. For the chosen companies, annual reports, including financial statements, were gathered for the years 2018 through 2020. From the yearly reports, pertinent financial information was taken out, including Return on Assets (ROA), Firm Size, and other important characteristics. The study spans three years, from 2018 to 2020, and offers a thorough look at how financial reporting procedures have changed over time. Quantitative analysis was used to gather data, including financial measurements and indicators, to evaluate links and trends regarding earnings management, IFRS adoption, ROA, and firm size.

Variable measurement

IFRS Adoption

This study's use of the IFRS Adoption Index methodology is consistent with accepted methods for evaluating the effects of International Financial Reporting Standards (IFRS). The study uses a scoring system (Daske et al., 2008) and divides checklist criteria into financial statement components, drawing on the work of Nobes (2014). The process of computing the aggregate scores for every category of financial statements and identifying the highest possible score exhibits a thorough methodology that aligns with the IFRS's guiding principles of transparency and comparability (Adibah et al., 2013). As in previous research (Daske et al., 2008), the use of a normalised IFRS Adoption Index makes cross-country comparisons more uniform. This methodological alignment guarantees an organised and structured assessment of compliance and financial reporting procedures, which adds to the current discussion on the implementation of IFRS.

Earnings management

It is consistent with a large body of research on accrual-based accounting manipulations to employ the Modified Jones Model for estimating earnings management, namely through Total Accruals (TA), Normal Accruals (NA), and Abnormal Accruals (AA). Researchers like Jones (1991) and Dechow et al. (1995) were among the first to analyse accruals in order to pinpoint earnings management practices. The non-cash portion of earnings is included in the TA calculation, which is consistent with other research highlighting the importance of accruals in financial reporting (Healy & Wahlen, 1999). Regression analysis is used to estimate NA, which agrees with Richardson et al. (2002) and McNichols (2002) that it is important to discriminate between manipulable and non-manipulable accruals. The resulting AA computation, which denotes potentially manipulated accruals, is consistent with the general body of research investigating aberrant accruals as a crucial sign of earnings management (Dechow et al., 2010; Teoh et al., 1998). The robustness of the study's approach in evaluating earnings management procedures is enhanced by this methodological framework, which is based on proven models and empirical data. Regression analysis is done to test alternate hypotheses put out at the start of the study.

$$DACCIT = \alpha + \beta 1 * IFRSAdopt + \beta 2 * SIZ\text{-}Firm + \beta 3 * ROA + \varepsilon i$$

DACCIT: Discretionary accruals.

α: Intercept (constant term).

β1 to β6: Coefficients associated with each independent variable.

IFRSAdpt: The level of IFRS adoption.

SIZ-Firm: Firm size.

ROA: Return on assets.

ε: Error term.

Table 1

Variables Measurement

Variable	Type	Measurement	Literature
DACCIT	Dependent	Modified Jones Model	Dechow et al., 1995; Jones, 1991
IFRSAdopt	Independent	Index (Presentation, Measurement, Disclosures, Recognition)	Kuo et al., (2014), Modugu Eboigbe (2017), Atanasovski Trpeska, (2019)
ROA	Independent	The radiation of Net Income to Total Assets	Dechow et al., 1995; McNichols, 2002
SIZ-Firm	Independent	Natural Logarithm of Total Assets or Revenue	Kothari et al., 2005

Note. Researcher's constructed table

Table 1 above provides a summary of the major variables used in the study, along with information on the types of variables, measurement techniques, and pertinent literature that supports these techniques. Every variable in the study has a specific function and helps to explore how the introduction of IFRS has affected Ghana's profit management. The study's results are robust and comparable since these variables were carefully chosen and measured in accordance with accepted practices in the academic literature.

Results

Table 2 provides descriptive statistics for the variables included in the analysis. With a range of -2336054.00 to 99664.00, the variable "DACCIT" exhibits significant variability. A significant dispersion of values around the mean is indicated by the mean value of -74376.00 and the noteworthy standard deviation of 372001.00. As opposed to this, the variable "IFRSAdopt" has a smaller range, ranging from 4.20 to 7.00, indicating less variation around its 5.87 mean and 1.07 standard deviation. With values ranging from -121.41 to 61.48, the variable "ROA," which stands for Return on Assets, exhibits notable diversity throughout the dataset. The sampled firms' financial performance varies, as evidenced by the mean ROA of 0.52 and standard deviation of 16.44. Moreover, the variable "SIZ-Firm" measures the size of the firm and has a range of 3.74 to 9.35. The distribution of business sizes within the sample is revealed by the estimated mean firm size of 6.69 with a standard deviation of 1.02.

Table 2

Descriptive Statistics

	N	Min\	Max	Mean	Std. Dev
DACCIT	90	-2336054.00	99664.00	-74376.00	372001.00
IFRSAdopt	90	4.20	7.00	5.87	1.07
ROA	90	-121.41	61.48	0.52	16.44
SIZ-Firm	90	3.74	9.35	6.69	1.02
Valid N (list wise)	90				

Note. Researcher's constructed table

The wide range in DACCIT values (-2,336,054 to 99,664) and the large standard deviation (372,001) indicate substantial variability in earnings management practices among the firms. The negative mean suggests that, on average, firms tend to understate earnings, possibly due to conservative reporting or loss management strategies. The wide range and high standard deviation in discretionary accruals indicate diverse firm earnings management strategies. Factors such as industry practices, management incentives, financial health, and external pressures may contribute to these differences

IFRSAdopt shows a smaller range (4.20 to 7.00) and a standard deviation of 1.07, indicating moderate variability in the extent of IFRS adoption among firms. This variability could be due to different implementation stages or varying compliance levels with IFRS standards. The variability in IFRS adoption scores may result from differences in how thoroughly firms have implemented IFRS standards. Factors such as firm resources, management commitment, and regulatory enforcement can influence the level of IFRS compliance.

The wide range in ROA (-121.41 to 61.48) and the substantial standard deviation (16.44) suggest significant differences in firm profitability. Negative ROA values indicate some firms are experiencing losses, which can drastically affect earnings management behaviours. The positive mean, albeit small (0.52), shows that overall, firms are marginally profitable. The substantial variability in ROA reflects the heterogeneous financial performance among firms. This could be due to differences in industry conditions, market competition, management efficiency, and operational risks.

The range of firm size (3.74 to 9.35) and standard deviation (1.07) indicate a moderate variability in the scale of operations among the firms. This variability reflects differences in resources, market reach, and operational complexity, which can influence earnings management practices. The range in firm size indicates that the sample includes both small and large firms. Firm size can affect the ability to manage earnings, as larger firms may have more sophisticated financial systems and greater scrutiny. In comparison, smaller firms might have more flexibility in financial reporting.

According to Pearson correlation coefficients, Table 3 provides a correlation matrix that thoroughly shows the connections between the dataset's important variables. A number of noteworthy conclusions are drawn from the examination of these correlations.

The first finding is a negative correlation (r = -0.115, p = 0.282) between "DACCIT" and "IFRSAdpt" (Index), which does not reach statistical significance. This suggests that there is not a strong linear relationship between the two variables. In contrast, there is a strong inverse association between "DACCIT" and company size, as seen by the considerable negative correlation "DACCIT" shows with "SIZ-Firm" (r = -0.500, p = 0.000). Nevertheless, there is a positive connection but no statistically significant one between "DACCIT" and "ROA" (r = 0.033, p = 0.755). A potential positive relationship between adopting International Financial Reporting Standards (IFRS) and Return on Assets (ROA) is further suggested by the marginally significant negative correlation that "IFRSAdpt" (Index) shows with "SIZ-Firm" (r = -0.175, p = 0.099) and the positively significant correlation that "ROA" (r = 0.252, p = 0.017) exhibits.

Table 3

Correlation Between DV and IVs

Variables	DACCIT	IFRSAdopt	SIZ-Firm	ROA
DACCIT	1			
IFRSAdopt	-0.115	1		
SIZ-Firm	-.500**	-0.175	1	
ROA	0.033	.252*	0.188	1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
Note. Researcher's constructed table

Furthermore, there is a positive, albeit marginally significant, association between "SIZ-Firm and "ROA" (r=0.188, p=0.076). Asterisks indicate the significance levels for each of the variables. These findings offer insights into the direction and intensity of linear associations between the variables. The findings highlight the complex relationships between organisational and financial measures and provide insightful information about possible trends and relationships in the dataset. The model shows strong correlations between "DACCIT" and the corresponding predictor variables in the regression analyses. "DACCIT" is substantially influenced by the combined impacts of "IFRSAdopt," "SIZ-Firm," and "ROA" ($F = 14.205$, $p < 0.001$). Firm size and IFRS adoption show negative correlations, whilst ROA shows a positive link.

The findings of the regression analysis, which looked at the link between the three predictor variables, "IFRSAdopt," "SIZ-Firm," and "ROA," and the dependent variable, "DACCIT," are shown in Table 4. With an R-squared value of 0.331, the whole model offers insightful information about the factors impacting "DACCIT." This means that the independent variables account for around 33.1% of the variability in "DACCIT." With the number of predictors in the model taken into consideration, the adjusted R-squared value of 0.308 offers a more precise evaluation of the model's explanatory power.

Table 4

Regression DV and the Predictor Variables

Variables	Co-efficient	T Stat	PValue	Tolen	VIF	R	R Square	Adjusted R Square
Constant	1.9153	5.7962	<0.001			0.576	0.331	0.308
IFRSAdopt	-94.4314	-2.886	0.005	0.881	1.135			
SIZ-Firm	-214.817	-6.356	<0.001	0.912	1.097			
ROA	4.7908	0.254	0.027	0.886	1.129			

Note. Researcher's constructed table

An average of 309,452,417.9530 is the standard error of the estimate, which shows the difference between the observed and expected values of "DACCIT." The F-statistic of 14.205 and the p-value of less than 0.001 in the ANOVA table support the overall relevance of the regression model and show that at least one of the predictors has a meaningful relationship with "DACCIT." About the coefficients, the intercept is 1.9153. Interestingly, a rise in "ROA" is correlated with a significant increase in "DACCIT" of about 4,790,796.187. Conversely, "SIZ-Firm" and "IFRSAdopt" show negative correlations with "DACCIT," indicating that larger firms and the implementation of International Financial Reporting Standards (IFRS) are associated with lower values of "DACCIT." According to the tolerance and variance inflation factor (VIF) values, multicollinearity is not a big concern in this model, which shows that the predictor variables offer distinct information on "DACCIT" without going overboard with redundancy.

Discussion

Relevant literature is incorporated into the discussion of each hypothesis, giving the findings a more comprehensive framework.

H1: There is a relationship between the adoption of IFRS (IFRSAdpt) and the management of earnings.

Previous research highlighting the beneficial impact of International Financial Reporting Standards (IFRS) on financial reporting transparency is consistent with the observed negative connection between the variables "IFRSAdopt" and earnings management ("DACCIT"). According to recent studies, the implementation of IFRS is associated with improved accounting quality, which lowers information asymmetry (Jones & Smith, 2020).

Additionally, the regression analysis's negative coefficient for "IFRSAdopt" is consistent with the conclusions made by El-Helaly et al. (2020), who contend that the application of international accounting standards raises the quality of financial reporting. This aligns with the idea that IFRS adoption promotes greater transparency in financial reporting methods and lessens opportunistic conduct. The regression analysis's findings support the first hypothesis that IFRS adoption will have a major direct influence on earnings management. Higher levels of IFRS adoption are generally linked to fewer earnings management strategies, according to the negative coefficient for "IFRSAdopt". The present findings align with theoretical constructs that emphasise the benefits of implementing IFRS on financial transparency and the reduction of opportunistic reporting practices. These results are consistent with earlier studies (Atanasovski & Trpeska, 2019; El-Helaly et al., 2020) that found reduced levels of earnings management as a result of the implementation of internationally recognised accounting standards like IFRS.

This study rejects the Null Hypothesis since the adoption of IFRS has a statistically significant effect on earnings management.

H2: There exists a relationship between Return on Assets (ROA) and earnings management:

The results of this study indicate a statistically significant relationship between Return on Assets (ROA) and earnings management, with a coefficient of 4.7908, a T-statistic of 0.254, and a P-value of 0.027. This finding suggests that firms with higher ROA are likely to engage in earnings management practices.

This result aligns with recent research in the field. For instance, El-Helaly et al. (2020) found that higher profitability, as measured by ROA, can be associated with increased earnings management, as firms with higher profitability have more discretionary power to manipulate earnings to meet certain financial benchmarks or smooth income. Similarly, Jones and Smith (2020) observed that managers of more profitable firms might engage in earnings management to maintain or enhance perceived financial performance.

On the other hand, some studies have suggested that higher profitability could reduce the incentives for earnings management due to lower financial distress and reduced pressure to meet external expectations (Atanasovski & Trpeska, 2019). However, our findings support the notion that the flexibility provided by higher profits can be used to manage earnings strategically.

This significant relationship between ROA and earnings management underscores the importance of monitoring profitable firms for potential earnings manipulation. It also adds to the body of knowledge indicating that profitability metrics should be carefully scrutinised in financial reporting to ensure the integrity and reliability of financial statements. This study rejects the null hypothesis since a statistically significant relationship exists between Return on Assets (ROA) and earnings management.

H3: There exists a relationship between firm size and earnings management

Recent researchers have proposed the information asymmetry theory, which is supported by the observed negative correlation between firm size ("SIZ-Firm") and earnings management ("DACCIT"). This theory states that larger companies have fewer incentives to engage in earnings management practices because they are subject to increased external scrutiny. This finding is consistent with recent studies by El-Helaly et al. (2020) and Jones & Smith (2020), which showed that larger companies are more effectively monitored, reducing the need for manipulating earnings.

The results of this study challenge the information asymmetry and competition hypotheses, implying that larger firms may adopt more transparent reporting practices due to increased scrutiny. This finding aligns with recent arguments that larger firms may possess more robust monitoring mechanisms, thereby reducing their reliance on earnings management (Atanasovski & Trpeska, 2019). The negative coefficient for "SIZ-Firm" (-214,816,629.313) indicates that larger firms, on average, exhibit lower levels of earnings management.

The analysis's findings are consistent with the body of research on IFRS adoption, bolstering the theory that fewer profit management strategies are used when IFRS is implemented (Xu & Wang, 2021). Likewise, signalling theory and earlier empirical data support the negative correlation between Return on Assets (ROA) and earnings management (Jones & Smith, 2020). Nonetheless, the surprising inverse link between business size and earnings management deviates from certain earlier research, emphasising the significance of taking particular contextual elements into account. These results advance our knowledge of the dynamics of earnings management in Ghana after the implementation of IFRS.

According to the findings, the adoption of IFRS has a favourable effect on the decrease in earnings management techniques, which is consistent with the worldwide trend toward unified accounting standards. Furthermore, the study challenges conventional wisdom by highlighting the complex relationship between firm size and earnings management and emphasises the necessity of context-specific research. Regulators, practitioners, and scholars who wish to comprehend how the implementation of IFRS has affected financial reporting methods in developing nations such as Ghana should take note of these observations. *There exists a statistically significant relationship between firm size and earnings management;* therefore, the *Null Hypothesis is rejected.*

Conclusion

In the context of Ghana, the current study examined the effects of firm size, return on assets (ROA), and adoption of international financial reporting standards (IFRS) on earnings management methods. The research produced a number of important observations with broad ramifications for different stakeholders. Interestingly, the study found a negative relationship between earnings management and IFRS adoption, indicating that regulatory organisations should strengthen their monitoring systems to follow IFRS standards consistently. In order to identify opportunities for improvement in the current adoption processes, the report proposed periodic reviews to analyse the impact of IFRS adoption on earnings management methods.

The study provides empirical evidence that there is a statistically significant relationship between Return on Assets (ROA) and earnings management among Ghanaian firms post-IFRS adoption. Specifically, higher ROA is associated with an increased likelihood of earnings management practices. This finding is consistent with recent research suggesting that profitable firms may have greater discretionary power to manage earnings to meet financial benchmarks or smooth income (Jones & Smith, 2020; El-Helaly et al., 2020).

Moreover, the study provides strong empirical evidence of a negative relationship between firm size and earnings management in Ghanaian firms post-IFRS adoption. This implies that larger firms are less likely to engage in earnings management practices, potentially due to increased scrutiny and more robust monitoring mechanisms. These findings are consistent with the information asymmetry theory and align with recent studies by Atanasovski & Trpeska (2019) and Jones & Smith (2020).

The results contribute to understanding how firm size influences financial reporting behaviour in the context of IFRS adoption. This study underscores the importance of considering firm size as a significant factor in the analysis of earnings management. Moreover, it highlights the necessity for context-specific research to grasp the dynamics at play in different economic environments fully.

The findings have practical implications for regulators, policymakers, and practitioners in Ghana and similar developing economies. Enhanced monitoring and regulatory frameworks could be particularly beneficial for smaller firms, which might be more prone to engaging in earnings management. Future research could further explore the interplay between firm size and other factors influencing earnings management, thereby providing a more comprehensive understanding of financial reporting practices in the post-IFRS adoption era.

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The Importance of Clinical Supervision for Guidance Teachers in Botswana Schools

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Abstract

Clinical supervision (CS) is an essential service in counselling, especially in school environments where Guidance teachers must provide counselling and ensure practical Guidance and Counselling (G&C). This paper was inspired by the unpublished doctoral thesis on "The Knowledge, Attitudes and Practices of Clinical Supervision among Counsellors in Botswana" (Wyllie, 2024). The study recruited 248 counsellors from different settings; 210 responded to the questionnaire, whilst 38 Clinical Supervisors responded to interviews—77.1% of participants identified as female and 22.9% as male. The study targeted practising counsellors aged 25-65 from 5 districts. 59.5% worked in public schools and 4.8 % in Private Schools, making up 64.3% of the study population. The study revealed that only 23.3% of the population accessed CS, 33.4% did not, and 43.3% were neutral.

Similarly, few indicated being trained, whilst most reported a lack of training (Wyllie, 2024). Botswana's educational system acknowledges counselling but still has to embrace CS. Guidance teachers in Botswana Schools play a significant role in the quality of education. Therefore, access to CS is crucial for effectively implementing the G&C programme. When the COVID-19 pandemic emerged, it not only created a global crisis for health systems but for mental health services and revealed the importance of CS in every environmental setting. However, in Botswana schools, the focus was on curbing the spread, and very little attention was given to CS for guidance teachers. This paper discusses the importance of CS and gives recommendations on the need to fund CS and for counsellor education review.

Keywords: Clinical supervision, guidance teachers, school counsellors, guidance and counselling, Botswana.

Introduction

The empirical literature on clinical supervision of mental health professionals, including guidance teachers in Botswana, is lacking (Wyllie, 2024). The Authors of this paper believe that clinical supervision (CS) is essential for counsellors and, most importantly, for Guidance teachers to function effectively in schools. The intervention is essential for building counsellors' confidence and enhancing their clinical skills. It can empower Guidance teachers to provide holistic psychosocial support for positive academic outcomes and improved quality of education (Weck et al., 2017; Mohamed, 2017; Glanz, 2017; Wyllie, 2024). Learners face various psychosocial challenges that may negatively impact their cognitive functioning and behaviour, resulting in poor academic performance. Often, children get exposed to adverse childhood experiences (ACEs) that leave them emotionally scarred. Hence, guidance teachers who receive CS will be better equipped to provide adequate psychosocial support.

During the developmental stages, children go through physiological and psychosocial changes accompanied by various tasks needing psycho-education and counselling. Erik Erikson's psychosocial development theory talks about the school-going age of "adolescence; 12-18 years" involving "Identity versus Role confusion", which is usually associated with self-identity crisis as they struggle to establish who they are between childhood and adulthood. This stage is accompanied by mood swings, emotional dysregulation, physiological changes and confusion (Erikson, 1959; Orenstein & Lewis, 2021). Then, the "Early adulthood age 19-40 involves intimacy versus isolation" accompanied by interpersonal relationships, learning to form meaningful relationships, love and be loved, and making friends. Failure to navigate this phase often leads to isolation (McLeod, 2023; Monteiro et al., 2014; Orenstein & Lewis, 2021; Syed & McLean, 2017; Erikson, 1959). Therefore, Guidance teachers need access to CS to help learners navigate these stages.

However, local literature is silent on the provision of clinical supervision for Guidance teachers in Botswana schools despite the education system's expectation for them to offer counselling to learners facing complex psychosocial challenges such as substance use disorders (SUD), various forms of abuse and other childhood mental health issues. Without the clinical supervision of guidance teachers, learners may be exposed to unethical practices and ineffective counselling services (Bedi et al., 2011; Chafouleas et al., 2002; Kutscha, 2020; Wyllie, 2024).

The appointment of Guidance teachers was implemented to advance the application of Botswana's Revised National Policy on Education ([RNPE, 1994]), emphasising the strengthening of Guidance and counselling in schools. To ensure the programme's effectiveness, it should have included clinical supervision of Guidance teachers (Crespi, 2003; Joshi & Sharma, 2020).

Literature Review

Clinical Supervision (CS) has received global attention in research and is considered necessary for the efficacy of counsellors (Gokhan & Atik, 2019). Crespi (2003, p.1) states, "Clinical supervision represents professional development opportunity for mental health professionals". Despite this view, CS practice has not gained popularity and support in public schools. Studies show that only a few counsellors and school psychologists receive clinical supervision (Crespi, 2003; Goldsmith, 2012). However, international literature also reveals that CS has attracted interest in mental health professionals in various countries in research and practice (Milne & Watkins, 2014).

The service is usually provided by a trained professional counsellor qualified in CS to offer such a service to other counsellors to function effectively as new approaches and techniques are constantly reviewed, improved or developed. It is part of continued professional development (Crespi, 2003; Goldsmith, 2012; Kutscha, 2020; Mohamed, 2017). In schools, counsellors and Guidance teachers encounter student cases beyond their capabilities and often experience transference and countertransference incidents needing clinical supervision (Morse et al., 2012; Joshi & Sharma, 2020; Turgoose & Maddox, 2017).

Without clinical supervision, counsellors may be susceptible to compassion fatigue that may manifest in impaired clinical decision-making, unethical judgments, disregarding of professional boundaries and inability to build an effective therapeutic alliance, which may lead to a lack of attunement to clients' needs, resulting in possible clients unhappiness and complaints (Harrison & Westwood, 2009; Chen et al., 2020). Literature (Galea et al., 2020; Rokach & Boulazreg, 2020) reveal that during trauma incidents, counsellors get exposed to compassion fatigue and possible burnout that require CS. Rokach and Boulazreg (2020) further opined that during COVID-19, school counsellors encountered overwhelming challenges that affected learners and colleagues, yet they had to provide support despite facing similar issues.

Guidance and Counselling in Botswana Schools

The Tswana culture has always had guidance and counselling offered traditionally through extended family members and community leaders. There were also traditional initiation schools for the young's socialisation that helped them transition into adulthood. Through such schools, young people attained gender roles training. They were coached and mentored to become better future parents, accountable individuals, and responsible citizens who fit well in their communities.

Communities were responsible for passing on good morals, values, customs and principles to the next generation through psycho-education and physical training, hence the African proverb that; “It takes a village to raise a child” (Suleiman et al. 2019; Muchado, 2018). To this fact, Muchado (2018, 2002) opined that culturally, Batswana engaged collectively in raising children through the extended family system whereby every older adult was considered a parent and contributed to guiding, correcting, disciplining and counselling the young.

Culture is dynamic; therefore, due to modernisation, a nuclear family emerged and became the sole unit for the socialisation of children. The socio-economic developments also led to changes in motherhood and women's roles in the family. They now had to work to support the family, and some raised children alone due to “missing/absent fathers”. An increase in wayward behaviour among children in schools and at home became an emerging and concerning issue that was evident in the disrespect for elders, teachers and parents, which necessitated Guidance and Counselling services in modern schools (Joshi & Sharma, 2020; Rokach & Boulazreg, 2020).

Research has proved that CS is critical to the effectiveness of counselling; its omission in the G&C may have contributed to the ineffective implementation of school counselling services. Hence, this paper argues for the importance of CS for Guidance teachers to strengthen learner support (Msimanga & Moeti, 2018; Muchado, 2018; Wyllie, 2024). According to Bentley (2021), Chen et al. (2020), and Merriman (2015), clinical supervision cares for the carers. It helps them become better helpers as it provides a clinical forum for self-evaluation, clinical feedback, and assessment of techniques and approaches in counselling.

Therefore, clinical supervision provision is essential in Botswana school counselling, where most guidance teachers are paraprofessionals (Msimanga & Moeti, 2018; Muchado, 2018; Stockton et al., 2010). With this in mind, the link between clinical supervision, Guidance teachers' responsibilities and competencies, and the successful implementation of G&C in the education system cannot be ignored.

Clinical Supervision

Many definitions of CS mainly point towards the functions and roles of ensuring ethical and quality counselling services and quality assurance. Hood and Milson (2021, p.5) define CS as a service that allows “scrutiny, curiosity, ethically and relationally for creating checks and safeguards for the practitioners and their clients.”

Singh (2023) views it as an essential service that creates a therapeutic setting for counsellors' feedback to enhance skills and acquire new ones, while Durhan (2019), Gokhan and Atik (2019), and Weck et al. (2017) concur in perceiving it as a trusting professional and clinical relationship meant to ensure client safety through counsellor professional mentorship and development.

Kilminster and Jolly (2000) assert that CS reduces burnout among counsellors and promotes professional self-awareness, clinical well-being and effective professional functioning. Milne (2007), on the other hand, defines it as a service between a more qualified counsellor and a less experienced counsellor to offer case-focused clinical support. Based on these definitions, it is inferred that CS functions as a quality assurance instrument to ensure counsellors' practical and ethical clinical competence and compliance. This aligns well with Perera-Diltz and Mason's (2012) and Durham's (2019) arguments that CS is important for counsellors' clinical support and evaluation of performance received from a qualified Clinical Supervisor. In the school context, Perera-Diltz and Mason (2012) opine that it is an intervention received by a school counsellor from a more experienced school counsellor.

Therefore, to better understand the significance of CS in a school setting, its benefits are briefly highlighted in line with the services and roles played by guidance teachers.

The Benefits of Clinical Supervision

Through the introduction of Guidance and Counselling in schools, the Ministry of Education and Skills Development (MOESD) acknowledged the existence of the complex psychosocial issues faced by learners and equally acknowledged the significance of guidance teachers in school mental health (Republic of Botswana, 1990, 1994, 1996, 2008, 2009; Mohamed, 2017; Wyllie, 2024), however, excluding clinical supervision handicapped the possibility of effective implementation of the G&C programme in schools.

This paper highlights the significance and link of Clinical Supervision to the successful implementation of Guidance and counselling services in schools. It articulates the benefits of the clinical supervision service to Guidance and counselling teachers, learners, and the core curriculum by discussing the services offered by Guidance teachers in the school context.

Services Provided by Guidance Teachers in Botswana Schools

Guidance teachers offer various services that could be mentally draining, such as counselling, psycho-education, career education, screening, student profiling, assessing learners' examination readiness, identifying needy and vulnerable learners, and liaising with the welfare department to provide learners' materials.

Under career guidance, completing learners are prepared for the world of work, and those who had dropped out of school due to teenage pregnancy are assisted to be assimilated or absorbed back into the school system. Guidance teachers also conduct student profiling and assess learners' personalities and compatibility with different professions through Job shadowing activities. In Primary schools, besides providing psychosocial support to learners, they are also expected to teach all the academic subjects, leaving them with very little time for school counselling (Republic of Botswana, 1990, 1996, 2008).

Despite these responsibilities, one Guidance teacher in a school usually receives referrals from the teaching and non-teaching staff and sometimes from parents experiencing behavioural problems with their children. They also have to establish why some learners' behaviour may have drastically changed negatively or why their academic performance suddenly declined and then provide counselling (Republic of Botswana, 1996). Where there is evidence of child neglect, extreme poverty and many other socio-economic issues that may impact learners' academic performance, the guidance teachers are expected to engage parents and social workers and come up with interventions toward addressing learners' psychosocial challenges.

The success of the Guidance and Counselling services in the school depends mainly on the Guidance teacher's effectiveness, innovativeness and collaboration with other key players such as parents, social workers, educational psychologists, child psychologists and village leaders (Republic of Botswana, 2010, 2011; Wyllie, 2024). However, most importantly, to prevent burnout and possibly becoming overwhelmed, their provision of clinical supervision is highly crucial as many of them are paraprofessionals and yet have to provide the following services:

Orientation Service

This service is usually organised for new students to help them adapt to the new school environment; in Botswana schools, it is conducted for newly admitted students to Junior or Senior secondary schools (Guidance and Counselling Division, 1990; The Republic of Botswana, 1996). The service helps to process students' anxieties and familiarise them with the school infrastructure, school rules and regulations, school administration, student leadership, the different academic subjects offered and extra-curricular sporting activities. Based on this orientation, students are placed into different classes according to their electives, majors, and sporting activities of interest. The orientation assists learners in adapting to the school culture.

In boarding schools, it helps them to cope with separation anxiety as many are away from their families, guardians and friends for the first time and often experience challenges making new friends.

Though some students have resilience, flexibility, and the ability to adapt quickly to change and new environments, others often struggle. Sometimes, the change may negatively impact their academics and behaviour, so Guidance teachers who receive CS will effectively help them smoothly transition emotionally, socially, mentally, and academically.

Information-giving Service

The Information Service provides essential information for learners to make informed decisions. It focuses on Personal, Social, Educational, and Vocational/Career guidance (Republic of Botswana, 1998, 1990; Aabobe et al., 2003). The service helps students with self-understanding and self-awareness and empowers them with people skills, self-concept, health-related issues and finance (Lindhard & Tlale, 1998). Students are also empowered about labour market trends; scholarship funding opportunities and awareness of the national human resources needs for the country's economic development.

Students are prepared for job interviews, how to create convincing curriculum vitae/resumes, ways to cope with the growing unemployment challenges and the national and international socio-economic changes (Republic of Botswana, 1996, p.23). Similarly, Guidance teachers invite various organisations to schools for career education fairs and boot camps to further empower and expose learners to different careers and create awareness about the training requirements for such professions. This service provides information to shape learners' career paths as they graduate from primary secondary education into tertiary (Republic of Botswana, 1990, 1996, 2007, 2008, 2009, 2010, 2011).

Screening and Assessment Service

The screening and assessment service provides essential information about the learner derived from student self-evaluation, peer evaluation, student academic performance, aptitude tests, and other screening and assessment forms. The screening process may identify reasons to suspect learning disabilities such as dyslexia, dysgraphia, and visual or hearing impairments (Ardoin, 2023; Republic of Botswana, 1996, 2011; Aabobe et al., 2003). Therefore, guidance teachers may refer learners with such cases to relevant and specific practitioners for further assessment and treatment, especially as learners' conditions are often misdiagnosed or mistaken for behavioural problems. For example, Attention-Deficit Hyperactivity Disorder (ADHD) is often perceived as naughtiness and Dysgraphia as laziness, clumsiness or carelessness (Ardoin, 2023).

Psychometric tools are used in this service, and guidance teachers often need to be qualified to administer them; hence, referrals to educational psychologists are necessary. The diagnostic assessment provides information to help with learners' placement in classes and appropriate institutions adequately equipped to handle the nature and degree of the disability or for the provision of necessary equipment and resources in the mainstream schools in line with the Ministry of Education and Skills Development (MoE&SD) Inclusive Education Policy recommendations (Republic of Botswana, 2010, 2011; UNESCO, 2023). Assessment results are also shared with subject teachers, parents and the Botswana Examination Council (BEC) for the provision of appropriate resources during the teaching, learning and examination period and for counsellors to help learners understand their strengths and limitations and accept that their disability is not inability (Ardoin, 2023).

Placement Service

Based on the assessment results, learners are placed into appropriate academic levels and guided through career paths compatible with their aptitude and personality. This helps learners' admission into suited educational and vocational fields, taking into account their interests, likes/dislikes, passions, aptitudes, talents, abilities and personalities. Guidance teachers also conduct Job shadowing (JS) and student profiling to provide necessary data; students are placed in different companies to learn about careers by "shadowing" an employee. The JS activity usually takes place on school vacation. Upon completion, students are expected to produce a detailed report on how the exercise may have influenced their perceptions and views of the specific career of interest and whether they are still keen on pursuing the career path on completion of their BGCSE and, if not, what areas of the particular career influenced their decision and made them feel that the job was not suited to their personality and interest (Aabobe et al., 2003; Lindhard & Tlale, 1998; Republic of Botswana, 1990, 2008).

Programme Evaluation and Research Service

This service primarily benefits Guidance teachers and the school Guidance and Counselling programme. The information unearthed through the service informs the School G&C department and other relevant departments of the Ministry of Education and Skills Development (MoESD) decisions.

Monitoring and evaluation exist to establish the quality of Guidance and Counselling implementation in schools. The annual review is usually based on Personal development plans (PDPs), annual performance plans, achievements of key performance indicators, goals, and objectives. The service assesses whether the plans were executed, and if not, what obstacles were encountered and what mitigating strategies were deployed.

Both formative and summative evaluations are conducted, and reports from the exercise help inform the school's G&C implementation. The reports are also shared with the Education Regional Operations office (Special Support Services), Ministry headquarters, and the Department of Educational Planning and Research Services (DEPRS).

Similarly, needs assessment and action research form part of the monitoring, evaluation, and research service to help provide client-centred learner support, as behaviour modification interventions and psychosocial support services offered through G&C can never be “one-size-fits-all” but client-centred approach (Wyllie, 2024).

Counselling Services in Schools

Learners face various psychosocial challenges, and when overwhelmed, it is normal for most of them to want to talk to someone non-judgemental who can facilitate the therapeutic process or simply just listen and be present without necessarily giving advice, but available to be a “sounding board” and help the client to process cognition, emotions and behaviours that follow or triggered the emotional dysregulation. However, often, students find it challenging to disclose their issues to parents and friends, hence the significance of this school counselling service (Monteiro et al., 2014).

McLeod (2013) defines counselling as an interdisciplinary intervention from different schools of thought that cuts across the discourses of theory, research and practice. Burks and Stefflre (1979) view it as a professional relationship between a trained counsellor and an individual (s) needing psychological help and go on to say that it is a face-to-face or person-to-person professional relationship even though sometimes there may be more people involved, such as in group counselling.

Through this service, the counsellor helps clients/students to understand their thoughts, how their cognition impacts their emotions and their behaviour, and helps them develop better-coping skills, set personal goals and engage in emotional processing through self-reflection, consequential thinking, emotional self-awareness and emotional self-expression, rational thinking, better decision-making, healthier mental wellness and meaningful relationships (Wyllie, 2024). Shephard (2015) opines that counselling is the skilful use of a professional relationship to help clients achieve self-understanding, self-acceptance, and well-balanced mental well-being.

The challenges addressed by Guidance teachers through school counselling are diverse and synonymous with the schooling environment, encompassing learning difficulties, personality issues, self-concept, self-esteem and socioeconomic issues (Aabobe et al., 2003; Glanz, 2017; Lindhard & Tlale, 1998; Monteiro et al., 2014; Suleiman et al., 2019). However, there may be issues beyond Guidance teachers' expertise and experience, requiring learners to be referred to other specialists.

Referral Service

This occurs when the Guidance teacher feels less competent or less qualified to help the student and refers the learner to a specialised clinician such as a SUD professional, clinical psychologist, child psychologist, educational psychologist or professional counsellor. In such situations, referrals are considered a collaboration and multidisciplinary approach towards helping the client rather than a weakness on the part of the school counsellor (Republic of Botswana, 1990, 2008; Wyllie, 2024). Olanrewaju and Suleiman (2019, p.81) argue that referral service “is the act of transferring an individual to another person or agency providing a different kind of assistance”. However, sometimes, such referrals are to someone in the same field, such as a professional/school counsellor with more experience. After referral, guidance teachers are expected to follow up.

Follow-up Service

The service helps establish if the learner accessed the services they were referred to, such as diagnostic assessment, visual or hearing impairment screening, SUD screening or medical evaluation for conditions that may interfere with their learning. The information derived is crucial for providing appropriate continued support. The service assesses improvements or lack thereof following referral and treatment. The information can also be obtained through client satisfaction survey feedback to determine whether psychosocial support services offered require modification or discontinuation because applying the same ineffective strategies and expecting different outcomes is inconsequential (Olanrewaju & Suleiman, 2019). Given the services and roles of the Guidance teachers in Botswana schools, it is essential to incorporate CS as part of counsellors continued professional development (CPD), and this is supported by the study findings on Knowledge, Attitude and Practices of clinical supervision among counsellors in Botswana by Wyllie (2024).

Methodology

Participants

We surveyed 210 practising counsellors from governmental and non-governmental institutions randomly selected from various environmental settings, from public and private schools, government and privately owned tertiary institutions, NGOs, and private practice. Thirty-eight supervisors responded to semi-structured interviews and were purposefully drawn from randomly selected governmental and non-governmental organisations in the country from purposively selected five districts out of the ten districts in the country.

The study targeted practising counsellors and clinical supervisors aged between 25 and 65 with at least three years of experience in counselling and supervision.

The study used probability and non-probability sampling (Tansey, 2007; Teddlie & Yu, 2007). The total study population sample was 248 counsellors. The quantitative data included 162 Females and 48 who identified as males, while the qualitative phase included seven males and 31 who identified as females participating in the interviews; none (0) indicated gender as "other."

Procedure and Instrumentation

An explanatory Sequential research design was adopted for the study. The instrument for quantitative data collection was self-developed and self-administered. It was first pilot-tested on 36 practising counsellors in Gaborone before utilisation. The instrument was developed in line with Andrade et al. (2020), Ajzen (2006), OECD (2012), and USAID (2011). Guidelines on developing KAP questionnaires and surveys as a suitable instrument for adaptation could not be found. Professional counsellors and experts in CS practice were engaged in verifying and validating the instrument involving language scrutiny and content validity. Items that appeared ambiguous were either rephrased or deleted if deemed irrelevant. The instrument was tested for validity and internal consistency using Cronbach's Alpha. The six variables met the expected Cronbach's Alpha value of .924, and the lowest was .728; therefore, the items and variables were considered reliable (Taber, 2016; Tenuche, 2018).

The study investigated the knowledge, attitudes and practices of clinical supervision by examining counsellors' level of access to CS, their knowledge of clinical supervision, attitudes, CS practices, guiding ethical principles and possible strategies for CS improvement. The questionnaire could be completed in about 15 to 20 minutes and focused on six variables: Knowledge, Access, Attitude, Practice, Guiding Principles and Strategies for improving CS. Participation in the study was voluntary and anonymous, with low or no risks for participants.

The study targeted practising counsellors and clinical supervisors from 5 districts who indicated their different mental health areas of expertise ranging from counselling psychology, clinical psychology, educational psychology, clinical social work, Guidance and Counselling, psychiatric nursing, school counselling/Guidance teachers, Marriage and Family Therapy to counsellor educators. Substantial data was collected using the quantitative method, and follow-up was done using a qualitative method for corroboration and validation of the numeric data. This was followed by a meta-analysis to merge results and establish convergence and divergence. Triangulation of theories, methods, data collection and data analysis procedures were made possible through the mixed method approach adopted for the study (Creswell, 2013; Tashakkori & Teddlie, 2010; Denzin, 2012).

Discussion

Administrative Issues

Following the introduction of the Guidance and Counselling programme in the education system, the implementation has been shrouded with reports of ineffective service in the schools that could be attributed to educational leadership and management styles, policy implementation bottlenecks, perceptions towards Guidance and Counselling, lack of staff training and possibly clinical supervision exclusion from the Guidance and counselling (G&C) programme (Muchado, 2002; Stockton et al., 2010; Wyllie, 2024). The study findings show that only (23.3%) of the respondents indicated having access to CS, whilst a small percentage reported being trained in the following areas: G&C (23.3%), early childhood education (3.3%), Humanities (12.4%) and (11.4%) in Primary Education; implying that (50.4%) of Guidance teachers who worked in schools lacked adequate competencies, knowledge and skills to function effectively hence the importance of having Clinical supervision in schools. Overall, the study revealed that only (23.3%) of the population accessed CS, (33.4%) did not, and (43.3%) were neutral on this issue of access (Wyllie, 2024).

Counselling Status Quo in Botswana

Guidance and Counselling is a non-examinable life skill “subject” offered in Botswana schools to empower learners. Literature shows that the programme experiences implementation challenges, and sometimes, the time allocated is “borrowed” by academic subject teachers to complete their syllabi and prepare learners for final examinations (Muchado, 2002; Stockton et al., 2010; Wyllie, 2024). The perceptions among general teachers are that it is a non-essential enrichment programme that is not essential to the core primary school curriculum. However, it is the foundation of successful academic performance as it helps learners with self-understanding, self-acceptance and study skills. However, this recent study reveals that (144, 68.5%) of counsellors positively viewed CS as enhancing counselling skills, (64.3%) were neutral, (2, 1.0%) disagreed, and only an insignificant percentage (1.0%) perceived CS negatively. Therefore, based on the data, the study established that counsellors and clinical supervisors had positive attitudes towards CS (Wyllie, 2024).

Lack of Recognition

Guidance teachers appear not to be receiving enough support for implementing the G&C; they lack support from school management and teaching counterparts, who perceive the programme as an insignificant time-waster and view Guidance teachers as getting paid for “doing nothing” since there are no examinations to be written.

Negative attitudes also emanate from the perceptions that G&C teachers are lenient on learners as they prefer behaviour modification strategies such as “Reality Therapy” to addressing learners’ negative behaviour instead of using corporal punishment (Bradley, 2014; Glasser, 1998; Wubbolding, 2011; Wyllie, 2024). However, Wyllie's (2024) study revealed that despite a lack of recognition and negative attitudes by subject teachers, counsellors have positive attitudes towards CS, for example; (68.5%) believed that CS enhances counselling skills, (97.7%) showed an interest in learning more about CS, and (71.5%) believed that it is a suitable intervention. This has implications for the responsiveness of Guidance teachers and the introduction of CS in schools.

Role Conflict

Counselling demands ethical compliance; therefore, guidance teachers must deal with the school management, which often expects them to disclose details of their sessions. These expectations leave Guidance teachers feeling pressured. Similarly, students often do not understand the concepts of “shared confidentiality” and “limitation of confidentiality”, whereby being minors, it may be necessary for the Guidance teacher to break confidentiality and disclose their issues to relevant authorities, school management and parents. This usually happens in cases of defilement, teenage pregnancy, drug use, drug possession or bullying of other students (Suleiman et al., 2019; Wyllie, 2024). Such situations often create ethical dilemmas for Guidance teachers and more reason for CS. As a result, learners may develop negative attitudes towards G&C services (Suleiman et al., 2019). Teachers also struggle with being G&C subject teachers and school counsellors. G&C subject teachers may reprimand, correct and punish; however, under the school counsellor “hat”, they are expected to be non-judgemental, empathetic and ethical. The situation often creates role confusion or conflict (Mohamed, 2017).

Ethics: Confidentiality Issues

Regardless of the environmental setting, counselling is an ethical service bound by confidentiality and privacy. Despite this fact, limitations to confidentiality exist and have to be clarified during the contracting phase to leave no room for confusion. Learners trust guidance teachers and expect them to adhere to confidentiality. However, in most schools, G&C teachers do not have therapy rooms and provide counselling in the staff room or any room they can find, often in book storage rooms adjacent to the classrooms with lessons in progress. It can be overheard in such situations, and ethical violations are possible; hence, guidance teachers need CS to function (Suleiman et al., 2019). This is the situation on the ground despite the study findings indicating that (97.2%) of counsellors believe that confidentiality by protecting clients' issues and secure records is essential in clinical practice, (1%) were neutral, and (1.9%) disagreed.

Similarly, only (29.5%) indicated being affiliated with a regulating body, (55.2%) reported not being affiliated with any counselling regulating body, and (15.2%) were neutral. In the same breath, (48.5%) reported using guiding principles from foreign regulating bodies, (11.9%) were neutral, and (39.5%) disagreed with using principles from foreign countries.

Limited Awareness of Clinical Supervision

Guidance teachers coordinate school Guidance activities to drive the ministry mandate of producing productive and responsible citizens. Therefore, the G&C teacher must create healthy relationships between key stakeholders to achieve this. This involves collaboration between the school, the community, and the student leadership (SRC).

This implies that the success of the G&C programme is dependent on effective collaboration and not on the guidance teacher alone (Suleiman et al., 2019). However, the authors of this paper believe that the Guidance teacher can function effectively to achieve the Ministry mandate if offered CS. This inference is based on the study findings indicating that only (54.7%) knew CS as a requirement in counselling, (37.6%) disagreed, and (7.6%) were neutral. Given this scenario, only (25.2%) reported being competent to address ethical dilemmas, (29.5%) indicated having the ability to apply theoretical knowledge to a client's real-life situation, (50%) said they lacked competence, (48.9%) indicated lacking the application of theoretical knowledge and (14.8%) were neutral about competence and (19.5%) about the theoretical application of knowledge respectively.

Lack of Training

Many guidance teachers in schools need more training in CS, and some need to be qualified for school counselling. Some schools have a large student population, making it impossible for them to be effectively assisted by one guidance teacher, whilst others operate with untrained guidance teachers. This may result in stress, burn-out and compassion fatigue, which require Clinical supervision. Consequently, Guidance teachers may be demotivated and ineffective since many are “para-professionals” who were promoted to the position of Senior Teacher 1 – G&C based on years of teaching experience and not on qualification or experience in school counselling, hence the importance of Clinical supervision for the guidance teachers in Botswana schools (Beaumont et al., 2016; Crespi, 2003; Olanrewaju & Suleiman, 2019; Perera-Diltz & Mason, 2012). The study indicated that (60.9%) of counsellors reported not being trained in CS, an insignificant percentage (28.6%) indicated being trained, and (10.5%) chose to remain neutral on this issue of training.

Lack of Funding for the Programme

The G&C services need more financial and material support, often evident from lack of resources, inadequate staffing, and lack of infrastructure and necessary resources, inadequate training and lack of clinical supervision. Regardless of the environmental setting, every counsellor needs CS to function. In schools, other activities receive funding whilst G&C, despite dealing with learners’ mental health, appears to be neglected; not having funds allocated or very little awarded, yet, according to Suleiman et al. (2019), “effective counselling demands adequate funding…”. Moreover, medical aid insurance companies do not cover Guidance teachers’ CS, which leaves them vulnerable to compassion fatigue, burnout and ineffective service delivery.

This speaks to the availability of resources, lack of counselling national guiding principles, lack of sound coordination and lack of national framework and licensure. Hence, the study showed that (97.1%) of the participants suggested creating CS awareness across mental health professions, (95.7%) recommended CS to be a mandatory requirement, (63.4%) felt that accreditation and licensure of practising counsellors were necessary, (56.7%) suggested training counsellors on CS, and this has implications on counsellor education curriculum. Only (3.4%)

disagreed with training, (40%) were neutral, (1.0%) disagreed with mandatory CS, (3.3%) were neutral, (1.5%) disagreed with accreditation, (35.2%) remained neutral, (1.0%) disagreed with creating awareness and (1.9%) were neutral. Based on the study findings, the authors make the following recommendations.

Recommendations

1. Funding and Staff Development Vote

Allocation of funds is crucial for the provision of CS of Guidance teachers. The staff development vote fund allocation could meet the CS needs as the Medical Aid Insurance companies do not cover CS for counsellors. Guidance teachers are left clinically vulnerable to burnout as school mental health service providers. This will increase CS access (23.3%) and reduce the (33.4%) lack of access, especially if medical aid companies start embracing CS as a mental health requirement for guidance teachers (Wyllie, 2024).

2. Group Clinical supervision

The ministry should consider outsourcing group CS for Guidance teachers once a term due to financial constraints given the post-COVID-19 impact, inflation, and the economic recession. The frequency could be revisited after economic recovery at the beginning and end of the school term as each term presents new challenges for the Guidance teacher.

3. Counsellor Education

There is a need to train Guidance teachers in school counselling, educational psychology, or Guidance and Counselling to ensure the effectiveness of the G&C programme. In-service training on how to provide peer-to-peer-inter-school supervision is a necessity. CS should be incorporated into the counsellor education curriculum or offered as a significant course (Mohamed, 2017; Singh, 2023).

4. School Management Style

The school's educational leadership and management influence the culture of a school, students' behaviour and academic performance. Transformational leadership that embraces student leadership, pastoral care support and Reality therapy may produce a culture of behavioural and academic excellence. Students' indiscipline is often associated with school leadership and management styles (Republic of Botswana, 2008; Suleiman et al., 2019).

5. Role Clarity and Clear Boundaries

Role distinction between Guidance subject teacher and Guidance teacher counsellor may not be easy for some to multi-task and shift between the "hats" of Counsellor, teacher and disciplinarian. Often, they are expected to be part of the school disciplinary committee, and misunderstandings exist about their role in such a committee. Their presence ensures that decisions consider the psychological impact on the learner and that discipline strategies are consistent with a misdemeanour to prevent students from being traumatised or given punishments with long-lasting physical and psychological effects. Though their presence may be perceived to harm the G&C, their absence may spell physical and psychological harm to learners. Therefore, Guidance teachers need to understand their role and what "hat" to wear in appropriate situations (Mohamed, 2017; Wyllie, 2024).

7. School Governance: Student Involvement through SRCs

Students respond negatively to what they consider undemocratic, injustice or unfair treatment. Often, such school environments trigger aggressive, reactive responses. Therefore, schools with excessive corporal punishment are usually perceived as psychosocially and physically unhealthy by both parents and learners. Moreover, where school rules are unequally applied, anger is often triggered, resulting in defiant behaviour and rebelliousness to challenge the perceived power control imbalance. Therefore, involving students in school governance may reduce fear, anxiety and rebelliousness. Students' involvement through SRCs may neutralise possible conflict and riots as they feel they own the decisions (Republic of Botswana, 2008).

6. Peer Approach to Counselling by Teens (PACT)

Various issues can trigger misbehaviour in schools; some learners may express learnt aggressive behaviour from home or the street, whilst others may have been abused and adopted abusive reactions towards resolving conflict. Some may not know better ways of expressing their seated anger and displace their pain inappropriately on others, whilst others may just be seeking attention or expressing disruptive behaviour due to the use of addictive substances. However, some misdemeanours may occur due to leaving learners alone and inactive during lessons, which creates an opportunity for misconduct. Students are comfortable disclosing problems to their peers. Therefore, Peer Approach Counselling by Teens (PACT) may effectively address their concerns.

7. Reality Therapy Approach to Students' Problems

The approach is based on the "Choice theory" by Glasser (1998), who opines that as children go through developmental stages, they will make mistakes as part of growing up. The therapy helps students identify and acknowledge their negative behaviour and assess alternative positive actions they could have taken (Bradley, 2014; Wubbolding, 2011; Wyllie, 2024). Guidance teachers should help learners understand that there are rules to live by in life, and whilst bad behaviour attracts punishment, positive behaviours attract positive reinforcement. G&C teachers should assist learners to realise that no one gets punished for good behaviour. Punishment of learners without them understanding and acknowledging why they deserve the punishment often yields repetition of the negative behaviour (Bradley, 2014; Morse et al., 2012; Wubbolding, 2011).

Conclusion

In this paper, the authors perceive Clinical supervision (CS) as necessary for the strategic operations of Guidance teachers in the Botswana education system. The success of the G&C programme in schools depends mainly on incorporating clinical supervision. The efficacy of Guidance teachers is underpinned by clinical supervision; lack of clinical support is inconsequential to learner support as Guidance teachers are susceptible to counsellor fatigue and poor performance. There is no doubt that the psychosocial challenges facing schools today are enormous and complex and need to be addressed by adequately equipped guidance teachers; hence, clinical supervision is essential for guidance teachers in Botswana Schools.

Author Note

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