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From the Desk of Editor in Chief

It gives me immense pleasure to present the July–December 2025 issue of Amity Business Review, which brings together a compelling collection of scholarly contributions addressing some of the most dynamic and evolving dimensions of business, finance, and policy in today's rapidly transforming landscape.

The papers featured in this issue explore diverse yet interconnected themes, ranging from the growing influence of digital financial ecosystems to institutional performance and policy-driven economic development. The study on The Rise of Finfluencers offers timely insights into how digital content creators are reshaping financial literacy and influencing retail investment behaviour. Similarly, Navigating Emerging Frontiers of Innovation and Sustainable Practices highlights the critical need for organizations to harmonize growth with sustainability imperatives. Complementing these perspectives, the research on Profitability Analysis provides valuable empirical insights into financial performance and sectoral resilience, while the analysis of Navaratna Central Public Sector Enterprises sheds light on public sector competitiveness in a changing economic environment. Further, the paper on Intellectual Property Rights underscores the pivotal role of innovation protection in fostering economic growth and enhancing global competitiveness.

Collectively, these contributions reflect rigorous research, practical relevance, and forward-looking perspectives. They not only enrich academic discourse but also offer meaningful insights for practitioners, policymakers, and researchers alike. I extend my sincere gratitude to all the authors for their valuable contributions and to the reviewers for their meticulous and insightful evaluations. We hope this issue stimulates thoughtful discussion, inspires further research, and contributes to informed decision-making in the fields of business and management.

Have an enjoyable and meaningful reading!

Prof. (Dr) Sanjeev Bansal

Editor-in-Chief

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Amity Business School, Amity University, Noida, Uttar Pradesh

Message from Editor

It gives us great pleasure to present the Volume 26, Issue No. 2, July–December 2025 of Amity Business Review (ABR). As we continue our journey into an increasingly dynamic and interconnected business landscape, scholarly engagement with emerging economic, technological and social transformations remains more crucial than ever. This issue brings together research that reflects the diversity and depth of current business thought. The contributions in this volume explore critical areas of financial innovation. Each article offers valuable theoretical insights as well as practical implications for educators, policymakers, and business leaders.

We invite readers to engage critically with the ideas presented in this volume. We hope this issue inspires continued research, dialogue and innovation within the academic and professional communities alike.

We look forward to your continued support and contributions in the years ahead.

Dr. Priyanka Agarwal

Editor

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Amity Business School, Amity University, Noida, Uttar Pradesh

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From Stability to Fluidity: A Review of Employee Engagement in the Liquid Workforce

Anjali Nath

Research Scholar Department of Commerce, Maharshi Dayanand University, Rohtak, Haryana, India

anjelgoswami61@gmail.com

Dr. Rekha Dhingra

Assistant Professor Department of Commerce, Maharshi Dayanand University, Rohtak, Haryana, India

rekha.comm@mdurohtak.ac.in

Abstract

The growing prevalence of the liquid workforce has challenged customary assumptions about employee engagement. The concept of engagement has become popular in modern workplace but there is lack of consensus regarding its drivers in fluid work arrangements. The present paper synthesizes the literature to fill this gap and identify how organizations can effectively respond to them. In this way, 36 Scopus-indexed studies were thoroughly reviewed and a thematic synthesis approach was used to fulfill the main objective. The findings presented the autonomy and flexibility, meaningful work, perceived organizational support, leadership and communication quality, and learning and skill development opportunities as the key drivers. The review offers practical guidance for organizations managing increasingly fluid work arrangements.

Keywords: *Liquid Workforce, Employee Engagement, Flexible Work Arrangements, Gig Work, Organizational Support*

1. Introduction

Modern work environment has become more demanding and employees also want flexibility in their jobs. Further, after Covid-19, this concept has gained

momentum at workplaces. In addition, meeting employees' expectations without harming business needs is a great challenge for the managers (Conradie & De Klerk, 2019). Therefore, managers are concerned that level of employees' engagement is

equally engaged in work as traditional work arrangements (Moalusi, 2021). There may be lack of physical supervision and have to trust their employees for the successful implementation of flexible work arrangements. The liquid workforce, characterized by flexible and dynamic work arrangements, has become increasingly prevalent in today's fast-paced business environment (Cascio & McEvoy, 2006). As a result, understanding employee engagement in this context is crucial for organizations to attract, retain, and motivate their talent (Kahn, 1990).

In addition, work engagement is observed as a motivational concept which pertains to how people interact to their jobs in terms of their bodies, minds, and emotions (Kahn, 1990; Rich et al., 2010). However, there is a growing body of research on employee engagement, there is a need for a comprehensive review of the literature to synthesize the existing knowledge and identify gaps for future research (Bakker & Leiter, 2010). Therefore, the current review aims to provide a critical examination of the current state of research on employee engagement in the liquid workforce,

highlighting the key themes, challenges, and opportunities for future research.

The liquid workforce presents both opportunities and challenges for employee engagement, including increased autonomy and flexibility, but also blurred boundaries between work and personal life (Goswami et al., 2025). Thus, a need arises to study the factors affecting employee engagement in liquid work arrangements and the effective mechanisms to enhance the engagement level as well as well-being (Saks, 2006). In this way, this review aims to make an understanding of the work arrangements and enlighten the development of evidence-based practices for promoting employee engagement in this context.

2. Research Methods

This paper followed a structured literature review approach (Denyer & Tranfield, 2009; Tranfield et al., 2003) to accomplish the said-objective.

2.1 Keywords Search

First, a search was initiated in the Scopus database with a combination of keywords, including "employee engagement," "work engagement", "job

engagement", "liquid workforce," "gig economy," "flexible work arrangements," and "remote work" with "AND, OR" Boolean operators. Time frame of literature was kept as from 2020-2026 to ensure that the review captures recent trends and developments in the field such as significant shifts in the global workforce due to the COVID-19 pandemic, surge in research on artificial intelligence and digital technologies' impact on employee engagement. Further, chosen timeframe allows for a comprehensive understanding of the evolving landscape of employee engagement in the liquid workforce.

2.2 Inclusion and Exclusion Criteria

Inclusion Criteria

- Documents examining employee engagement in the liquid workforce or related concepts, such as gig economy or flexible work arrangements.
- Subject Domain: Business, Management and Accounting
- Documents published in peer-reviewed journals.
- Only articles and Reviews were considered.
- Studies published in English language

Exclusion Criteria

- Documents that didn't focus on employee engagement or the liquid workforce.
- Documents that were published in non-peer-reviewed journals, conference proceedings or as book chapters.
- Documents published in languages other than English.

2.3 Study Selection Process

The initial search in the Scopus database yielded 264 papers and then filtered accordingly as per inclusion and exclusion criteria. The authors prioritized full-text papers to ensure a comprehensive understanding of the research findings and methodologies (Lin, 2009). As the authors believe that full-text papers are helpful in accurately presenting the authors' contributions, contextualize their research, and critically evaluate the evidence. Firstly, the authors screened the abstracts and thereafter, full-text papers were reviewed to minimize the risk of misinterpretation and ensure the accuracy of our findings. This way, 36 papers were finalized for the full-text review.

2.4 Analysis of Data

The information extracted from the studies includes: author(s), publication year, and findings related to employee engagement in the liquid workforce (Table A1). Thereafter, thematic analysis was conducted, which involved identifying and categorizing themes and patterns across the included studies.

The authors preferred a narrative synthesis approach to synthesize the findings. This involved summarizing and integrating the findings to identify common themes and patterns related to employee engagement in the liquid workforce. The synthesis was done in the light of research question and the inclusion criteria

2.5 Synthesis of Findings

Table A1. Employee Engagement Drivers in Liquid Workforce

Employee Engagement Drivers	How the Driver Manifests in the Liquid Workforce	Sources	Implications for Employee Engagement	Organizational Strategies

Autonomy & Flexibility	Control over work schedule, task execution, and work location in gig, freelance, and contract roles	Bondanini et al. (2025); Maity & Lee (2025); Wagan & Sidra (2025); Holt & Lang (2025); Kulal et al. (2025); Saraiva & Nogueiro (2025); Makowski et al. (2025); Ghonim et al. (2025); Monje-Amor (2024); Opoku et al. (2023); Weideman & Hofmeyr (2020)	Autonomy consistently emerges as a core engagement driver, enhancing intrinsic motivation and psychological ownership in fluid work arrangements	Adopt outcome-based performance systems; allow flexible scheduling with clear deliverables
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Meaningful Work & Purpose	Perceived significance and value of tasks despite temporary employment	van Zoonen et al. (2025); Kulal et al. (2025); Makowski et al. (2025); Luan et al. (2025); Costantini et al. (2025); Núñez-Sánchez et al. (2024); Boccoli et al. (2024); Monje-Amor (2024); Harunavamwe & Kanengoni (2023); Tworek et al. (2023); Opoku et al. (2023)	Meaningful work predicts emotional and cognitive engagement even in short-term and project-based roles	Communicate task impact; link project outcomes to organizational and societal goals
Perceived Job Stability	Psychological sense of continuity rather than formal employment security	Maity & Lee (2025); Saraiva & Nogueiro (2025)	Perceived insecurity reduces engagement and commitment in liquid workers	Provide transparent contract renewal pathways and project pipelines

Fair Compensation & Rewards	Pay equity, transparency, and timely payments	Saraiva & Nogueiro (2025); Makowski et al. (2025); Tsang et al. (2023)	Fair compensation enhances trust and sustained engagement	Ensure transparent pay structures and milestone-based incentives
Learning & Skill Development	Opportunities to build employability and career capital	Aulia & Lin (2025); Saraiva & Nogueiro (2025); Luan et al. (2025); Boccoli et al. (2024); Asfahani (2024); Tsang et al. (2023); Harunavamwe & Kanengoni (2023)	Learning opportunities act as a long-term engagement mechanism	Provide access to training platforms, certifications, and skill badges

Organizational Support & Inclusion	Feeling valued and included despite non-standard employment	Maheshwari et al. (2025); Maity & Lee (2025); van Zoonen et al. (2025); Goswami et al. (2025); Toscano et al. (2025); Boccoli et al. (2024); Opoku et al. (2023)	Perceived organizational support strongly predicts engagement and loyalty	Integrate liquid workers into communication, feedback, and recognition systems
Leadership & Communication Quality	Clarity, frequency, and fairness of interaction with managers and clients	Maheshwari et al. (2025); Wagan & Sidra (2025); van Zoonen et al. (2025); Makowski et al. (2025); Asfahani (2024); Monje-Amor (2024); Tsang et al. (2023); Tworek et al. (2023)	Effective leadership reduces ambiguity and enhances engagement	Train managers in inclusive and virtual leadership practices

Technological Enablement	Reliability and usability of digital platforms enabling work	Kumar et al. (2025); Bondanini et al. (2025); Maity & Lee (2025); Holt & Lang (2025); Lu et al. (2025); Boccoli et al. (2024); Harunavamwe & Kanengoni (2023)	Technology mediates engagement by shaping work experience quality	Invest in user-friendly digital tools and IT support
Work-Life Balance	Ability to manage workload across multiple gigs	Bondanini et al. (2025); Goswami et al. (2025); Luan et al. (2025); Monje-Amor (2024); Yadav et al. (2024); Harunavamwe & Kanengoni (2023)	Poor balance leads to burnout and disengagement	Encourage realistic workloads and respect non-working hours

Trust & Psychological Safety	Fair treatment, ethical contracts, and voice mechanisms	Kumar et al. (2025); Holt & Lang (2025); Lu et al. (2025); Makowski et al. (2025); Korsakienė et al. (2024); Tworek et al. (2023)	Trust acts as a key mediator of engagement in fluid employment	Establish transparent contracts, grievance redressal, and feedback channels
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(Source: Researcher's Compilation)

3. Findings

The synthesis of studies revealed a clear convergence around a set of core drivers of employee engagement in the liquid workforce, encompassing gig workers, freelancers, contract employees, and other non-standard forms of employment. It was observed that engagement in the liquid workforce is shaped less by structural job security and more by experiential, relational, and developmental factors.

3.1 Drivers of Employee Engagement

3.1.1 Autonomy and flexibility

Maity & Lee (2025) highlighted that employees have started taking interest in hybrid work cultures. In addition, Flexible arrangements increase job satisfaction and enhance their productivity (Maity & Lee, 2025). Liquid workforce has improved work-life balance (Wagan & Sidra, 2025). Further, a wealth of studies highlighted that timeline control, task execution, and work location enhances intrinsic motivation and psychological ownership (Holt & Lang, 2025; Kulal et al., 2025; Maity & Lee, 2025; Wagan & Sidra, 2025). Consequently, employees remain highly engaged. Kulal et al., (2025) found the positive relationship

between remote work settings and employee engagement as it provides more autonomy and flexibility to employees (Kulal et al., 2025).

3.1.2 Work-Life Balance

Modern organizations are familiar with the fact that both personal and professional needs of employees need to be accomplished (Hunsaker, 2021) where remote work offers the better solution (Goswami et al., 2025). Flexible work arrangements offer, employees enjoy greater autonomy and this flexibility boosts the engagement level. Employees can align their job responsibilities with personal needs. Consequently, employees remain satisfied and put efforts to improve their performance.

3.1.3 Organizational support and inclusion

This is one of the most critical drivers of employee engagement. Support from the organization where employees perceive fairness, recognition, and inclusion in communication and decision-making processes, level of engagement is high (Boccoli et al., 2024; Opoku et al., 2023). It can be said that engagement in fluid work

arrangements is strongly influenced by relational signals rather than contractual permanence (Toscano et al., 2025) because it acts as a psychological backup for formal workplace bond. Literature suggested that active participation of liquid employees in decision-making, feedback mechanisms and recognition embellish employees' connection with the work (Boccoli et al., 2024; Perry et al., 2023; van Zoonen et al., 2025)

3.1.4 Perceived Job Stability

Although it is less discussed, even job safety is a more important driver of employee engagement. In traditional work settings, job safety was decided as per the employment contracts and length of service. But in liquid work arrangements, psychological continuity matters rather than permanent employment (Maity & Lee, 2025; Saraiva & Nogueiro, 2025). Lack of precision in future work causes decrease in predictability. Insecurity is mitigated with offering indicators of stability; open dialogue regarding potential avenues, recurring contracts and forward planning schedules (Saraiva & Nogueiro, 2025).

3.1.5 Learning and Skill Development Opportunities

Flexible workers contemplate engagement as competency building and career capital, with access to training, certifications, and skill-building opportunities significantly renew dedication to invest effort and remain engaged (Aulia & Lin, 2025). In immersive and digital labor platforms, leadership and communication quality also play a critical role. Explicit guidelines, timely feedback, and respectful interactions with managers and clients are shown to reduce role ambiguity and foster trust.

3.1.6 Technological enablement

Literature indicates that reliability and transparency of technological infrastructure outlines engagement experiences (Bondanini et al., 2025; Kumar et al., 2025). Technology is not just a utility application but a driving force of the work environment. Accessible and efficient platforms streamline workflows that result in high engagement. On the contrary, fragile systems cause annoyance, ambivalence and disengagement (Holt & Lang, 2025; Lu et al., 2025).

3.1.7 Repositioning Engagement in the Fluid Workforce

The outcomes of this study entail strategic renewal of employee engagement from service-based construct to experience-driven state. Traditional engagement theories were mainly stressed upon job stability, organizational commitment, and bureaucratic management. However, the contemporary theories conceptualize engagement as a situational and experiential state rather than a stable attitudinal outcome tied to tenure (Bondanini et al., 2025; Maity & Lee, 2025). The liquid workforce context foregrounds autonomy, purpose, trust, and developmental value as primary engagement levers. Further, it is to be noted that liquid workers can remain highly engaged despite short-term or project-based contracts, provided that the work experience is perceived as meaningful, fair, and growth-oriented. Engagement is not related with the employment stability. In addition, the autonomy primacy and flexibility aligns with self-determination theory (Ryan & Deci, 2023). According to the theory, autonomy is an innate psychological nutrients driving intrinsic motivation.

Additionally, the study deprecates that autonomy without structure can lead to

chaos, role ambiguity and disengagement, stressing the importance of balanced autonomy supported by clear expectations and communication. Maintaining robust focus on organizational support and inclusion underscores a core contradiction in liquid work arrangements: while employment contracts may be transactional, but engagement prevails deeply relational. It negates organizations to consider its engagement strategies which systematically overlooked peripheral workforce from engagement, recognition, and feedback systems. Far from being social objective Inclusion serves is critical for preserving organizational commitments within in transient work environment. “Learning and skill development” serve as both a motivational and retention mechanism in the liquid workforce (Aulia & Lin, 2025). Gig workers frequently target professional competencies rather than organizational loyalty. Therefore, engagement is increasingly contingent on whether organizations contribute to workers’ long-term career trajectories, even in the absence of permanent employment.

Overall, the results accentuate the importance of leadership in liquid work

contexts. Leadership effectiveness is less about supervision and more about facilitation, clarity, and trust-building, particularly in digitally mediated environments. Similarly, technological infrastructure is not a neutral enabler but a decisive factor shaping engagement experiences, reinforcing the need for user-centric platform design.

4. Discussion

4.1 Theoretical Implications

The current study contributes in the way that presents employee engagement in the context of liquid workforce which can be effectively grasped through an experience-based and relational lens, rather than traditional employment-based frameworks. Therefore, integrative models are required that incorporate autonomy, perceived support, and career capital as central constructs. There is no one-size-fits-all strategy. Thus, strategies such as outcome-based performance management, inclusive communication systems, and continuous learning opportunities are critical for fostering engagement in non-standard work arrangements.

4.2 Managerial Implications

The current review suggested that managers should design work systems in equilibrium with autonomy with role clarity, using outcome-based performance expectations rather than close supervision. Further, precise articulation of the goals is the base for strengthening engagement. There is a need for inclusive practices such as integrating liquid workers into communication, feedback, and recognition systems enhance perceived organizational support and trust. Additionally, clarity, responsiveness, and ethical treatment rather than hierarchical control are essential to effective leadership. Moreover, job security is the need of hour. Therefore, providing access to learning and skill development opportunities strengthens engagement by supporting workers' long-term employability. In the end, user-friendly digital platforms and considering work-life balance are critical for sustaining engagement and preventing burnout in fluid work arrangements.

5. Conclusion

The results of review disclosed that liquid workforce is shaped by a distinct set

of drivers that differ substantively from those emphasized in traditional employment models. This study aims to explore the key drivers of engagement in the gig economy. Further, it suggests the ways an organization can effectively address them in increasingly fluid work arrangements. The key influential drivers identified were: autonomy and flexibility, meaningful work, perceived organizational support, leadership and communication quality, and learning and skill development opportunities. On the other hand, the established drivers for eg., formal job security are the peripherals and are reframed as psychological continuity instead of long-term employment guarantees. Hence, a fundamental shift is required in how engagement is formed and sustained in contemporary work arrangements. Additionally, trust, inclusion, and fair treatment act as critical mediators that transform flexible work arrangements into engaging work experiences. Technological enablement and work-life balance further shape engagement by influencing daily interactions and the sustainability of effort over time.

The study advances engagement theory by positioning engagement in the

liquid workforce as a dynamic, experience-based state rather than a stable attitudinal outcome tied to organizational tenure. The findings suggested that there is need to develop organizational strategies to sustain engagement among liquid workers that go beyond contractual incentives and focus on meaningful, supportive, and development-oriented work experiences.

6. Limitations

There are several limitations observed in this study. First, amount of studies reviewed are very small (n=36). Therefore, there is lack of comprehensive research on liquid workforce engagement. Next, there are differences in conceptualization and assessment of engagement which restricts congruity. Further, the concentration of studies in particular sectors may affect generalizability. At the end, there is a need to empirically validate the proposed framework suggested in this review through future longitudinal and multi-context studies.

7. Future Research Directions

This review suggests avenues for future research also. First, longitudinal studies are required to study the evolution of

engagement in liquid workforce. In addition, cultural and situational factors should also be examined. It will be helpful in comparison across countries and industries which will enhance understanding the role of institutional factors in shaping engagement and its outcomes. Further, some constructs like; trust, psychological safety and perceived organizational support need to be tested as mediators while learning opportunities and technological sophistication may moderate the strength of engagement relationships. Moreover, the outcome variables other than performance such as; well-being and burnout etc. require attention of researchers. Even work engagement should be studied for both positive and negative effects in liquid engagement for a more balanced perspective. Next, role of digital platforms and algorithmic management can be tested in the context of engagement in liquid workforce.

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Enhancing Well-Being and Job Satisfaction of Contract Laborers: Examining the Role of Workplace Safety and Safety Training

Shruti Kashyap

MBA Student, ICFAI University, Raipur
shruti.kashyap2001@gmail.com

Dr. Pratibha Barik

Assistant Professor, ICFAI University, Raipur
pratibhabarik@iuraipur.edu.in

Dr. Archi Dubey

Assistant Professor, ICFAI University, Raipur
archidubey@iuraipur.edu.in

Abstract

The study aims to investigate the composite influence of workplace safety practices and safety training on physical stress and workload and job satisfaction. A descriptive survey design and simple random sampling technique was adopted for this study. A self-structured questionnaire was used for the data collection, and a total of 137 contract labours working at Dalmia Cement Northeast Ltd., Umrangso, Assam responded to the questionnaire. The results of the study indicate a significant linear relationship among workplace safety practices, safety training, physical stress and workload and job satisfaction. Work-place safety practices are statistically significant predictor of physical stress and workload and job satisfaction of contract labours, as well as safety training has significant association with physical stress and workload and enhance the job satisfaction of contact labours. The study reveals a significant linear relationship among work-place safety practices, safety training, physical stress and workload and job satisfaction, hence these factors need to be adequately taken care to improve employee motivation, reduce attrition and increase job satisfaction among contract labours in cement factories. Despite the increasing global attention on the welfare of contract workers, many organizations still pay limited attention to occupational safety practices for contract labourers. Thus, the research finding contributes to the body of knowledge regarding work-place safety practices and safety training can significantly reduce stress and workload while enhancing job satisfaction among contract labours working in cement factories in India.

Key words: Contract labours, workplace safety, safety training, physical stress, workload, job satisfaction

Introduction

Companies increasingly depend on contract labour to achieve operational flexibility, reduce costs, and access specialized skills. In India, the employment of contract labour is governed by the Contract Labour (Regulation and Abolition) Act, 1970. Despite this regulatory framework, issues to work conditions, job security, safety, training, and welfare of contract workers continue to persist. These concerns are especially significant in heavy industries where work is physically demanding and involves higher occupational risks. Contract workers (CWs) belong to the unorganized sector as they have less bargaining power, have inadequate social security coverage and are engaged in hazardous occupations which could endanger their health and safety (Karibasamma & Alur, 2019).

Further, the cement industry is one of the sectors where contract labour constitutes a substantial share of the workforce. Contract workers are commonly engaged in activities such as mining, material handling, maintenance, logistics, and plant operations. The CWs mostly earn minimum statutory wages, except in few cases they receive higher wages for skilled work. In a report from the cement and white goods companies have highlighted that the practice such as deduction of token money from CW's wages by contractors (Das & Pandey, 2004).

In this context, the present study on Contract Labour Management at Dalmia Cement

Northeast Ltd., Umrangso, Assam seeks to examine existing labour management practices with a specific focus on workplace safety, safety training, workload management, and job satisfaction of contract workers. The study aims to identify key challenges faced by CW's and assess the effectiveness of current management practices. The research questions are:

- i. Does workplace safety and safety training practices reduce the physical stress and workload.
- ii. Does workplace safety and safety training practices enhance the job satisfaction.

Literature Review and Hypothesis development

Chattopadhyay (2017) highlighted the rapid expansion of contract labour in sectors such as construction, mining, manufacturing, and services (Chinedum et al., 2019). Occupational safety concerns were emphasized by Jackson and Quinlan (2024), indicated consistently higher injury and fatality rates among contract workers compared to permanent employees and contract labour legislation in India and it was observed that despite longstanding regulatory measures, exploitation of contract labour persists, reflecting gaps in enforcement and industrial relations practices (Mitchell et al., 2014; Barik and Sahoo, 2025). This risk can be reduced with appropriate occupational safety measures

and training programs (Aryal, Parish & Rohlman, 2019).

Workplace Safety (WPS)

Safety climate refers to the shared perceptions and expectations held by an employees about the safety in their organization (Neal, Griffin, & Hart, 2000). Hazardous work environments have adverse effect both on individuals and organizations (Beus, McCord, & Zohar, 2016; Barik, 2020). The authors highlighted the evolution of workplace safety from a focus on physical accident prevention to a multidimensional approach incorporating psychological well-being, leadership, organizational safety culture, effective training, communication, and technological advancements (Chukwuma et al., 2025). Various study highlighted that effective safety practices enhance employee engagement, performance, and overall organizational efficiency. Further, workplace safety, health, and occupational wellness programs significantly improve employee engagement, job satisfaction, productivity, and reduce absenteeism (Juba, 2024; Ishwarya, 2023). Additionally, the researchers have identified biological, ergonomic, psychosocial, and organizational risks, linking unsafe conditions to stress, burnout, and reduced job satisfaction (Adamopoulos and Syrou, 2022; Antonio de Lucas Ancillo et al., 2021).

Physical stress and workload (PSW)

Several research have examined the association between workload, stress,

well-being, and performance across different occupational settings. Apart from this both physical and mental workloads negatively affects performance while positively influencing burnout (Ruga et al., 2022; Mohzana et al., 2023). Additionally, the supportive assistive technologies reduce physical strain and promotes sustainable work performance (Baldassarre et al., 2022). Bratberg et al. (2020) examined the health effects of reduced workload, improved health outcomes and reduced sickness absence. Researchers emphasize the critical role of workload management, ergonomic interventions, and psychological resilience in reducing stress, improving health, and enhancing performance across occupations. Further employees' perception of safe and comfortable work environment is critical as a supportive and comfortable work environment positively enhance organizational performance (Biron & Bamberger, 2012). The hypothesis proposed is:

H1: Workplace safety has significant effect on physical stress and workload

H2: Workplace safety has significant effect on Job satisfaction

Safety Training (ST)

Recent scholarly work highlights the evolving role of safety training, technology, and organizational factors in improving workplace health and safety outcomes. Scorgie et al. (2024) evaluated the effectiveness of virtual reality (VR)-based safety training, VR-based safety training

significantly enhanced learning outcomes, knowledge retention, hazard identification, and learner engagement compared to conventional approaches. Cheung et al. (2024) explored organizational readiness for adopting immersive technologies such as VR and AR in construction safety training. Bes and Strzałkowski (2024) emphasized the importance of safety training in improving occupational health and safety through enhanced knowledge, attitudes, and practices. The study found that safety behavior positively influenced safety performance, with safety climate acting as a partial mediator and safety training strengthening this relationship (Sukamani et al., 2021). The findings provide empirical evidence of the critical role of safety training in enhancing workplace safety performance.

Job Satisfaction (JS)

Job satisfaction is defined as the degree to which a worker experiences favourable emotion and a sense of fulfilment towards his or her job (Locke, 1969). Further, socially responsible organizational practices encourage voluntary employee behaviors and positive work attitudes (Bui et al. 2025) and the study reinforces the role of work conditions in shaping job satisfaction. Radwan et al. (2022) workplace violence has been directly linked to increased burnout, reduce job satisfaction, compromise safety and high occurrence of adverse events (Hayes et al., 1998). Additionally, various indicated that environmental workplace conditions such as

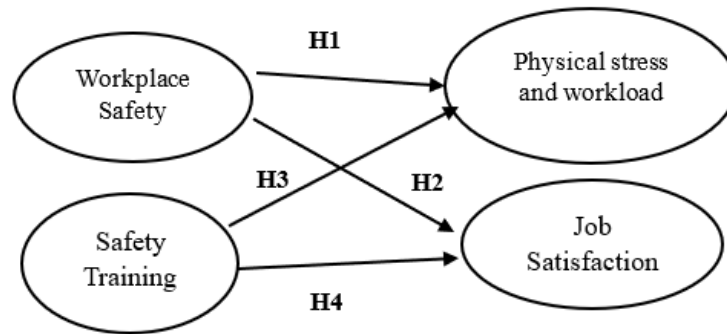
noise, lighting and temperature, influence employee health, attitudes, behaviours, satisfaction, and performance (Bakotić & Babić, 2013; Ji et al., 2018).

Satisfied employee shows strong organizational commitment, adherence to safety procedures and higher productivity (Ayim Gyekye, 2005). Further, employees who perceive high level of job insecurity, anxiety and stress tends to reduce safety motivation (Probst, 2002) and compliance, which contributes to a higher incidence of workplace accidents (Siu et al., 2004). Employees who view their organisations as supportive and are satisfied with existing organisation structures, they are more likely to believe that the organization values their safety and overall well-being (Ayim Gyekye, 2005). Further, safety training and employee competency indirectly contribute to employee satisfaction by enhancing employee participation (Bayram, 2019). Highly satisfied employees with job training practices holds positive perception of knowledge sharing practices (Buonomo et al., 2022; Barik et al., 2025). workers under high job stress will reduce safety participation to a greater degree than safety compliance (Kiani et al., 2012). Hence developing a strong safety culture can lead to improved safety performance (Karimpour, Jahani, & Shirali, 2020). The proposed hypothesis are:

H3: Safety training has significant effect on physical stress and work load

H4: Safety training has significant effect on Job satisfaction.

Figure.1. Conceptual Model



By: Researcher

The Regression Model

- $Y_{(PSW)} = \beta_0 + \beta_1 X_1$
- $Y_{(JS)} = \beta_0 + \beta_1 X_1$
- $Y_{(PSW)} = \beta_0 + \beta_1 X_2$
- $Y_{(JS)} = \beta_0 + \beta_1 X_2$
- $X_1 = \text{Workplace Safety}$
- $X_2 = \text{Safety Training}$
- $Y_{(PSW)} = \text{Physical stress and workload}$
- $Y_{(JS)} = \text{Job Satisfaction}$

Methodology

Participants

The sample size for the study was 137 respondents which is sufficient for the deriving findings in a descriptive research settings. The chosen workers are a sampling of contract workers working in cement factory. This sample provides useful and realistic information regarding the perception of contract labourers on key issues such as workplace safety, health support system, physical strain, labour rights, training effectiveness and overall job satisfaction.

The study used structured questionnaire to collect the data for workplace safety, physical stress and workload and job satisfaction from the contract laborers working at Dalmia Cement Northeast Ltd. Umrangso. A total of 166 contractual labour working inside the mine were randomly selected for the survey and the workers who were willing to participate in the survey yielded 137 valid questionnaires. All the scales were implemented from literature (Neal & Griffin, 2000; Hart & Staveland, 1988; Smith, Kendall, & Hulin, 1969). All construct items were measured using five-point Likert scales ranging from “strongly agree” to “strongly disagree”.

Measurements and descriptive statistics.

Workplace safety (WPS) was assessed using 8 items, safety training (ST) with 4 items, physical stress and workload (PSW) with 6 items, and job satisfaction (JS) with 4 items. The reliability analysis indicated that all constructs were reliable, with Cronbach's alpha values exceeding 0.70 (Nunnally, 1978). The exception was safety training, which had a Cronbach's alpha of 0.67, indicating moderate internal consistency but still considered acceptable (Griethuijsen et al., 2014). Furthermore, the correlations among the variables were statistically significant (see Table 1).

Table. 1: Reliability Analysis

S. N o.	Items	Cronbach's Alpha if Item Deleted
	Workplace safety (0.70)	
1	Emergency support and first-aid facilities are readily available in case of accidents or injuries at the plant.	.654
2	The company effectively listens to and addresses workers' safety concerns.	.612
3	Adequate safety precautions are implemented while working in hazardous areas.	.597
4	Hot work permits are properly issued and approved before any welding or cutting activities begin.	.599
5	Work at height activities are adequately supervised to ensure safety compliance.	.689
6	A valid permit-to-work system is strictly followed before starting any high-risk job.	.660
7	Materials are stored, handled, and transported using appropriate equipment and safe methods.	.666

8	All electrical installations are inspected and maintained regularly to ensure safe operation	.670
	Safety Training (0.67)	
1	All workers receive safety induction training before entering the plant.	.638
2	Safety training is provided in a language and format that workers can easily understand.	.497
3	Job-specific safety training is conducted before assigning contractual workers to any task.	.673
4	Contractual workers are trained in the correct use of personal protective equipment (PPE).	.566
	Physical stress and work load (0.87)	
1	Work tasks are designed to minimize physical strain on workers.	.849
2	Adequate manpower is provided to prevent excessive workload on workers.	.854
3	Mechanical aids or equipment are used to reduce manual handling and physical stress.	.838
4	Work schedules allow sufficient rest breaks to prevent fatigue.	.849
5	Job rotation is implemented to avoid repetitive strain and overexertion	.854
6	Supervisors actively monitor workloads to ensure workers are not overburdened.	.838
	Job Satisfaction (0.82)	
1	The working conditions at the company are comfortable and suitable.	.854
2	I feel secure when carrying out my job duties at the workplace.	.715
3	I feel satisfied with my job.	.787
4	I am satisfied with the wages and benefits, I receive.	.725

Data Analysis

Statistical analyses of the data were done with SPSS. The study used the workplace

safety and safety training as independent variable and physical stress and workload and job satisfaction as dependent variable.

Simple regression analysis was conducted to analyse the data.

Result and Discussion

The means, standard deviations and correlations for the four variables WPS, RPS, ST and JS (See table.2). The Table.2. correlation matrix reveals the variables are positively related with each other.

Table.2. Descriptive Statistics and Correlations Between WPS, RPS, ST and JS

Mean, standard deviation and correlation of all measures						
Factor	M	SD	1	2	3	4
WPS	2.98	0.65	(0.70)			
RPS	3.13	0.91	0.766**	(0.87)		
ST	2.91	0.81	0.696**	0.743**	(0.67)	
JS	3.24	1.12	0.382**	0.308**	0.590**	(0.82)

Notes. WPS-work-place safety, PSW-Physical Stress and Workload, ST- Safety Training, JS- Job Satisfaction; N = 137; **p < 0 .01

Relationship between WPS(IV) and RPS and JS(DV)

The findings from the regression analysis confirm H1, demonstrating a statistically significant positive association between workplace safety and the reduction of physical stress ($\beta = 1.069$, $p < 0.01$). Additionally, workplace safety explains 58.7% of the variance in physical stress reduction and workload. The result further confirms H2, revealing a significant positive

relationship between workplace safety and job satisfaction ($\beta=0.658$, $p<0.01$). However, workplace safety explains only 14.6% of the variance in job satisfaction (See table.3.)

The result of the regression model:

- $Y_{(PSW)} = -0.60 + 1.069(WPS)$
- $Y_{(JS)} = 1.237 + 0.658 (WPS)$

Table.3. Regression Coefficient

	Physical Stress and Workload	Job Satisfaction
(Constant)	-0.60	1.237*
Workplace Safety	1.069*	0.658*

R^2	0.587	0.146
Adj R^2	0.584	0.140

* $p < 0.01$

Relationship between WPS and RPS and JS

The regression results supports H3, indicating a significant positive association between safety training and physical stress and workload ($\beta=0.835$, $p<0.01$). Further, safety training explains 55.1% of the variance in physical stress and workload. Additionally, the results confirm H4, revealing a significant positive association

Table.4. Regression Coefficient

between safety training and job satisfaction ($\beta=0.819$, $p<0.01$) and further safety training explains 34.8% of the variance in job satisfaction (see table.4.). The result of the regression model:

- $Y_{(RPS)} = -0.699 + 0.835(ST)$
- $Y_{(JS)} = 0.854 + 0.819 (ST)$

	Physical Stress and Workload	Job Satisfaction
(Constant)	0.699*	0.854*
Safety Training	0.835*	0.819*
R^2	0.551	0.348
Adj R^2	0.548	0.343

* $p < 0.01$

Discussion

The primary aim of this research was to examine the relationship between work-place safety, physical stress and work load and job satisfaction. Additionally, the study investigated the effect of safety training programs on physical stress and workload and job satisfaction. The result

indicated the significant positive relationship between work-place safety, which reduces physical stress and workload among contract labours, while contributing to higher levels of job satisfaction, consistent with the findings of Anasi (2020). Furthermore, safety training was found to have a positive association with physical stress, workload, and job satisfaction. Specifically, the

implementation of safety training programs effectively lowers employees' physical stress and workload, while simultaneously enhancing their job satisfaction (El-Sherbeeney, Alsetoohy, Sheikhsouk, Liu, & Abou Kamar, 2024).

Implication

The study shows that workplace safety practices and safety training significantly reduce physical stress and workload. For contract laborers, who often perform physically demanding and repetitive tasks, this means fewer work-related injuries, fatigue, and strain, contributing directly to their health and well-being. Apart from this an improved safety measures and training programs create a safer, more supportive work environment. For contract laborers, this translates into greater job satisfaction, as they feel valued, protected, and confident in their ability to perform tasks safely. The study provides a guideline to policymakers by providing an evidence to enforce stricter occupational safety and health regulations, particularly for contract laborers who are often exposed to higher physical risks.

Limitation

The empirical findings primarily reflect the occupational risks faced by contract laborers working in a cement factory, and thus may not be generalizable to other industries or permanent employees who may experience different workplace conditions and stressors. The study's sample size is relatively small, which may limit the statistical power of the analyses and the robustness of the findings.

Additionally, the research focused on only four variables—workplace safety, safety training, physical stress and workload, and job satisfaction—leaving out other potentially influential factors such as organizational culture, management practices, psychosocial stressors, or personal coping strategies. These limitations suggest that while the study provides important initial insights into the role of safety and training for contract laborers, future research should include larger, more diverse samples and additional variables to capture a more comprehensive understanding of workplace well-being and satisfaction.

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Impact of Small and Medium Scale Enterprises Development on Economic Growth in Nigeria

AJAGBE Surajdeen Tunde

Department of Finance, Faculty of Management Sciences, Al-Hikmah University, Ilorin, Nigeria
tundesuraj@gmail.com

ABDULAZEEZ Taofeeq

Department of Finance, Faculty of Management Sciences, Al-Hikmah University, Ilorin, Nigeria
olammylekanadbulazeez8@gmail.com

HANAFI Hikmat

Department of Finance, Faculty of Management Sciences, Al-Hikmah University, Ilorin, Nigeria
hikmah97@gmail.com

Abstract

In Nigeria, several intervention programs have been set up to offer specialized or long-term funding for the development of SMEs. That being said, it's crucial to recognize that SMEs have faced difficulties including loan nonpayment and missed goals. Thus, the purpose of this study is to investigate how SME development has affected Nigeria's economic growth between 1986 and 2023. Time series data, a secondary source of information gathered from the CBN statistical bulletin, is used in the study. Descriptive statistics, correlation analysis, multiple regressions, and the Augmented Dickey-Fuller (ADF) test for stationarity (unit root test) were among the statistical methods used in the investigation. With a p-value of 0.3339, the outcome shows that SMEOUT is not significant. The empirical results show that the expansion of Nigeria's gross domestic product (GDP) has been significantly fueled by SME financing. In particular, the study shows that the primary engine of economic growth—which raises the RGDP—is the sales turnover of SMEs. Furthermore, the statistical analysis demonstrates that a rise in SME funding is linked to an increase in the RGDP of the nation. The results essentially highlight how crucial it is to provide SMEs with financial support in order to promote economic growth in Nigeria. SMEs should concentrate on raising sales turnover and productive output. As a result, the study suggested that SMEs concentrate on raising their sales turnover and productive output. To increase their capacity to support economic growth, SMEs must make prudent investments, launch new ventures, and use efficient management techniques. Marketing ideas, goods, products, and services to consumers should be SMEs' top priority.

Keywords: SMEturnover, SMEouput, RGDP, growth, economic

Introduction

Small and Medium-sized Enterprises (SMEs) are recognized as vital engines of economic growth, impacting both developed and developing economies across rural and urban regions. Governments worldwide actively seek to cultivate a thriving SME sector by fostering a supportive environment and implementing incentives. This emphasis reflects the growing prominence of SMEs in global economic development discussions. Data from the World Bank (2020) underscores the significance of SMEs in the European Union. Notably, SMEs comprise a staggering 99% of the estimated 19.3 million enterprises, contributing a substantial 65 million jobs. This exemplifies the significant employment generation capacity of SMEs. Similar trends are observed across Africa and Asia, where SMEs represent a large share of businesses, provide substantial employment opportunities, and have been credited with contributing to the economic success of these regions (Okijie & Effiong, 2024).

In Nigeria, micro and small-sized enterprises reign supreme, accounting for roughly 70% of all businesses according to official data

[Ogbu & Ugwu, 2023]. This vibrant private sector, dominated by SMEs, contributes a significant 40% to the nation's Gross National Income. The impact of SMEs extends far beyond Nigeria's borders. Their growth and development have been a cornerstone of progress in numerous countries, including developed nations like the United States, China, and India. Studies show that SMEs can comprise over 90% of all businesses in a nation, generating over 65% of employment opportunities [Ikpor et al., 2017].

On a global scale, SMEs constitute a remarkable 95% of all registered businesses, solidifying their position as the cornerstone of the world's economy [Chukwuka & Imide, 2023]. The European Union exemplifies this dominance, with a staggering 99.8% of businesses falling under the SME category. These businesses employ a workforce of around 76 million people, contributing a significant 67.4% to the EU's total employment in 2020 [Chukwuka & Imide, 2023]. Nigeria's economic landscape in the 1970s and early 1980s heavily influenced its industrialization approach. The post-war rehabilitation program spurred the establishment of numerous

capital-intensive industries. These large-scale enterprises relied on imported heavy machinery and technical expertise, significantly draining Nigeria's foreign exchange reserves.

However, the lackluster performance of these large-scale ventures prompted a shift in government policy. Recognizing the need for self-reliance and sustainable economic growth, the government began promoting and supporting Small and Medium-Scale Enterprises (SMEs) as a strategic solution. Notably, Nigeria's third National Development Plan explicitly emphasized the development and promotion of small-scale industries as a key driver of job creation. The crucial role of SMEs in fostering sustainable economic growth is undeniable (Doaca & Siriteanu, 2023). Their ability to generate employment with minimal capital requirements makes them particularly attractive in developing economies. Additionally, SMEs contribute significantly to the production of goods and services, reduce income inequality, and nurture the human capital needed for future industrialization.

In Nigeria, challenging economic conditions during the past decades exposed the

limitations of large-scale enterprises. This led to a strategic shift towards promoting SMEs. The Nigerian government has actively pursued the development of Small and Medium-Sized Enterprises (SMEs) through a comprehensive set of microfinance agencies and intervention schemes (Adeosun & Shittu, 2022). These initiatives include well-established institutions like the Nigerian Industrial Development Bank and the Bank of Industry, alongside programs focused on specific sectors like the Rural Banking Initiative and the Agricultural Credit Guarantee Scheme Fund.

Furthermore, Olowookere et al. (2021) highlight the Central Bank of Nigeria's commitment to SME growth through targeted schemes. These include financial instruments like the Refinancing and Rediscounting Facility, the Small and Medium Industries Equity Investment Scheme, and the NIRSAL Microfinance Bank, all designed to address the specific challenges SMEs face in accessing funding. However, SMEs in Nigeria continue to confront difficulties in spite of their efforts. These obstacles include banks' unwillingness to make loans because of

untrustworthy borrower data, shoddy bookkeeping procedures, inadequate accounting standards, a lack of operational transparency, and challenges enforcing loan agreements (Azubuike et al., 2018). High loan diversion rates, the idea that SMEs are hazardous businesses, the lack of collateral security, and the incapacity to carry out feasibility studies are some further barriers. Environmental variables and the intrinsic qualities of small- and medium-sized businesses both have an impact on these difficulties (Ikon-Micheal & Chika, 2018).

The persistence of these issues has detrimental effects on the nation's unemployment rates, per capita income, and standard of living in addition to impeding the growth of SMEs. The government's endeavors and initiatives are praiseworthy; nonetheless, in order to promote the long-term expansion of SMEs and optimize their economic contributions in Nigeria, it is imperative to recognize and tackle these enduring obstacles. It is evident that SME expansion globally has an ambiguous effect on overall economic growth, notwithstanding the government's discussed efforts and interventions. But it's crucial to understand that this approach comes with a

number of difficulties. In light of this, the purpose of this research is to evaluate the impact of SME development on Nigeria's economic growth. While examining the effect of SME output on economic growth in Nigeria is one of the specific goals, another is to look into the effect of SME turnover on the same.

Literature Review

The small and Medium Scale Enterprises

The definition of a Small and Medium-Sized Enterprise (SME) is not set in stone. It can vary significantly across countries, reflecting their unique economic structures and development priorities (Ikpor et al., 2017). For instance, a business categorized as "small" in a developed nation like Japan, Germany, or the United States might be considered "medium" or even "large" within a developing economy like Nigeria. Small and Medium Enterprises (SMEs) are a broad category of companies that operate throughout the nation in a variety of sectors, according to Ikpor et al. (2017). They comprise local agricultural tool makers, coffee shop proprietors, tailors, iron fabricators, roadside mechanics, small transportation companies, internet cafés,

small engineering or software organizations, and medium-sized auto part manufacturers.

Nigerian SMEs exhibit a remarkable range in terms of market focus, location, and scale. Some cater primarily to the domestic market, while others engage in exporting goods and services internationally. They thrive in both rural and urban settings, operating at regional, national, or even global levels. Notably, SME ownership transcends socioeconomic boundaries, with individuals from diverse backgrounds, ranging from low to high income, leading these businesses. This inherent diversity reflects the absence of a universally accepted definition for SMEs. In Nigeria, the Small and Medium Industries Equity Investment Scheme (SMIEIS) of 1998 provides a specific definition based on capital outlay. Under this scheme, SMEs are businesses with a total investment (excluding land costs) ranging from ₦1.5 million to ₦200 million.

Furthermore, a SME is defined by Nigeria's National Council on Industry as a business that employs between 10 and 300 people at most (Ogunmuyiwa & Okunleye, 2019). These disparate definitions draw attention to

the contextual nature of SME classification and the various standards applied in various nations to ascertain the breadth and size of SMEs. Small and medium-sized enterprises (SMEs) are defined as businesses that invest a maximum of two million naira or five million naira in capital, including the cost of landed property. As a result, the definition of SMEs varies depending on the type of business activity and the locations of the companies (Adanlawo et al., 2021). A diverse range of companies functioning in several economic domains are included in the SME sector.

Ikpor et al. (2017) assert that a strong and concentrated emphasis on the expansion and development of SMEs is a successful approach to advancing economic progress and industrialization. Economic growth is thought to be possible through SMEs (Adebayo et al., 2020). By increasing the production of goods and services and raising people's standards of living, SMEs can contribute more to economic growth. This is the goal of their development, maintenance, and support. The influence of SME development techniques has been little in Nigeria's economy, despite their success in many industrialized nations. According to

Ikpor et al. (2017), this can be explained by the menial and ineffective duties that Nigeria's macroeconomic policymakers gave the SME sector.

Nigeria's Economy and Gross Domestic Product (GDP)

Economic growth hinges on the efficient use of resources and expanded production capacity, ultimately leading to income redistribution within a nation (Okijie & Effiong, 2024). However, achieving this is often a complex endeavor. Nigeria, unfortunately, finds itself caught in a "low-growth equilibrium trap" (CBN, 2023). This signifies a situation where various interconnected factors are hindering progress and making sustained economic growth a challenging feat. Economic growth is the long-term rise in the ability to provide a wide range of economic commodities to the people (Tom et al., 2016). Technology is driving this progress, which calls for changes in institutions and ideologies. The process of growth in developed, advanced nations is commonly referred to as economic growth, whereas the dynamics of growth in developing, low-income nations are referred to as economic development. According to his argument, development is likely to

happen wherever there is growth, and vice versa. The fundamental problems that impede progress—such as poor infrastructure, political unpredictability, corruption, insufficient access to capital, a lack of diversification, and skill shortages in the labor force, particularly in Nigeria—must be addressed in order to achieve long-term economic growth and development.

SME output

A large amount of Nigeria's economic output is produced by SMEs. Roughly 48% of the GDP (gross domestic product) of the nation is contributed by SMEs (NBS, 2020). This demonstrates how significantly SMEs affect Nigeria's overall economic success. Nigerian SMEs are growing at a healthy rate, and this expansion is being ascribed to a number of factors, including easier access to capital, supportive legislation, and a rise in entrepreneurship (Ojo & Ojo, 2021). Beyond their GDP contribution, SMEs contribute to value addition and employment creation across a range of economic sectors (Ogbuabor et al., 2020). Further, SMEs frequently offer products and services catered to certain market niches, enhancing local economic growth, reducing poverty,

and improving quality of life in these areas (Adeyemi & Akinlabi, 2022).

SMEs turnover

One of the most important measures of SMEs' financial health and a useful way to understand how they fit into the commercial scene is their turnover. SMEs make up about half of all industrial jobs in the nation and have a major impact on turnover (SMEDAN, 2021). This emphasizes how crucial SMEs are to boosting economic activity and creating jobs. Yakubu et al. (2022) analyzed Nigerian SMEs' turnover performance and revealed a sign of consistent growth. The expansion was ascribed by the study to various sources, including favorable government policies, greater domestic demand, and technical advancements. SMEs' turnover occurs both nationally and within particular industries. For example, SMEs are essential to rural development and food security in the agriculture industry.

Akinlo et al. (2023) study highlighted the significance of SME turnover in the agriculture industry and noted how it affects value chain development and income generation. It is imperative to recognize, therefore, that SME turnover in Nigeria is

not without its problems and varies depending on the industry and geographical area. Turnover performance can be impacted by variables like unstable markets, poor infrastructure, and restricted access to financing. To promote SME turnover and solve these issues, focused interventions are required, such as increased access to financing and capacity-building initiatives (Adebayo et al., 2024).

Interest rate

Since interest rates influence the cost of borrowing, they directly impact SMEs' ability to receive finance. Businesses must pay more to borrow money when interest rates are high, which can put a strain on their finances and impede their ability to grow. Conversely, reduced interest rates can make it easier for SMEs to get finance at reasonable rates, which will free them up to make investments in growth, innovation, and employment creation. Lower interest rates have a favorable impact on financing for SMEs and, in turn, economic growth, especially in nations with strong credit markets and financial institutions (Beck et al., 2021).

High interest rates are a major roadblock for SMEs seeking affordable financing,

hindering their ability to reach their full growth potential (CBN, 2022). Recognizing this challenge, the Central Bank of Nigeria (CBN) has implemented policies aimed at lowering interest rates and increasing access to credit for SMEs. It is critical to understand that SME growth and economic outcomes cannot be fully explained by interest rates alone. In addition, other elements including the business environment, infrastructure, and market accessibility are quite important.

Inflation

One important macroeconomic aspect that affects SMEs and overall economic growth is inflation. The influence of inflation on production costs, customer purchasing power, and business planning is a direct concern for small and medium-sized enterprises (SMEs). Consumers' purchasing power is diminished by high inflation, which may lower demand for SME goods and services. Furthermore, growing input costs for labor and raw materials might reduce SMEs' profit margins and restrict their capacity to grow and make investments. While high inflation rates have a negative impact on economic performance, particularly for SMEs, moderate inflation

rates can encourage investment in innovative activities and productivity growth.

High rates of inflation might make SMEs less competitive since they find it difficult to control costs and modify their prices. In order to combat inflation, the Central Bank of Nigeria (CBN) has put in place fiscal and monetary policy changes. But the continued presence of inflationary pressures presents difficulties for SMEs, necessitating flexible tactics and encouraging laws (CBN, 2022).

Empirical Review

Inegbedion et al. (2024) looked at the connection between Nigerian SME competitiveness and job generation. Using a standardized questionnaire, the researchers collected data from 93 respondents from SMEs in a cross-sectional survey. We used structural equation modeling to examine the information gathered. The study's conclusions showed that there are strong correlations between employment creation and both product innovation and product differentiation. It was suggested that employment was impacted by SME competitiveness, which includes elements like product differentiation, innovation, and imitation.

Onyeka and Awe (2023) looked at the connection between SMEs and the creation of jobs in Nigeria. The research used time-series data from 1981 to 2021 and the analytical technique was the Autoregressive Distributed Lag Model. The study's conclusions showed a strong and positive correlation between GDP growth rate (GDPg), employment creation, and small- and medium-scale output (SMEO). This implies that job prospects rise in tandem with increases in GDPg and SMEO. The study did discover, however, a negligible relationship between SMEs and poverty reduction (POVR). It's interesting to note that the study found a negative correlation in Nigeria between the creation of jobs and income. It was suggested that in order to include informal SMEs in tax collecting initiatives, the government should set up procedures to guarantee their registration.

Chukwuka and Imide (2023) investigated the ability of Nigeria's Delta State's small and medium-sized businesses (SMEs) to draw in foreign direct investment (FDI). Data was collected using a survey design, and 200 employees from the selected SMEs in Delta State were picked using a straightforward random selection procedure.

Using the Cochran (1977) statistical technique, 120 respondents from the management, middle, and lower cadre of the chosen industrial businesses were chosen as the sample size. The results of the study verified that SMEs in Delta State had the ability to draw foreign direct investment. Encouragement of foreign direct investment in Delta State is suggested by equitable income distribution, which lowers labor migration from rural to urban areas.

Ogbu and Ugwu (2023) investigated how Nigeria's Enugu State Metropolis's small and medium-sized enterprises (SMEs) affected the region's economic growth. The study's goal was to evaluate the contributions made by SMEs to the region's economic development using three metrics: increased standard of living, wealth creation, and employment creation. 136 respondents were randomly selected using the accidental sampling approach from eight SME outfits to make up the sample population. The instrument for gathering data was a structured questionnaire. The Chi-Square Statistic was utilized to evaluate the hypotheses. The study's conclusions showed that SMEs significantly lower the

unemployment rate by creating jobs, which is a good contribution.

Adeosun and Shittu (2022) looked at the connection between the expansion of the Nigerian economy and entrepreneurship via small-to medium-sized businesses (SMEs). The study focused on macro-level variables such registered SMEs, nominal gross domestic product, employment, total labor force, and population, utilizing secondary data from 1990 to 2016. To evaluate long-term correlations, the researchers used quantitative analytical tools such as the Johansen co-integration test and the error correction model (ECM). The study found that the number of micro, small, and medium-sized firms increased did not result in a greater contribution to economic development than did already-existing businesses. It was suggested that in order for SMEs to continue to be a major driver of economic growth and job creation, they should receive additional investment.

Adebayo et al. (2022) evaluated how Nigeria's small and medium-sized enterprises (SMEs) affected the country's economic expansion. We made use of secondary data from the World Bank Group, Index Mundi, and the Central Bank of

Nigeria Statistical Bulletin, among other sources. The study used correlation as its research design and concentrated on income growth, employment creation, and poverty reduction as indicators of economic growth. One way to gauge the activity of SMEs was to look at their contribution to economic growth. Data analysis was done using Ordinary Least Square (OLS) methodology. According to the study's findings, SMEs directly affect the creation of jobs; they account for 72% of the fluctuation in this phenomenon.

Olowookere et al. (2021) study examines the connection between sustained economic growth in Nigeria from 1992 to 2019 and finance for SMEs. The study used the Fully Modified Ordinary Least Square and Granger causality methodologies for data analysis, as well as a variety of pre-estimation tests, including unit root and cointegration analysis. The study found that the broad money supply and GDP growth rate had a negligible inverse relationship. The GDP growth rate and the loans made by commercial banks to SMEs were favorably and strongly correlated. Additionally, the total credit extended by commercial banks to the private sector and gross fixed capital

formation showed a negligible positive correlation with the GDP growth rate. The report suggested that loans from commercial banks to SMEs be promoted.

Adanlawo et al. (2021) used Schumpeter's theory to support their investigation of the effects of small and medium-sized firms (SMEs) on the creation of jobs and the welfare of Nigerians. Combining descriptive and interpretive components, the study used a survey method in conjunction with a quantitative research strategy. In Lagos state, 126 registered SMEs were randomly sampled, and three local governments-the Lagos mainland, Shomolu, and Agege-were purposefully chosen. The SME operators completed 110 of the surveys that were given to them, yielding an 87.3% retrieval rate. The gathered data was analyzed using descriptive statistics, and tests of hypotheses were conducted with interpretive analysis and the chi-square method. The study's conclusions demonstrated the important role SMEs play in affecting people's welfare, especially when it comes to creating jobs. It is advised that regular government-sponsored programs be offered. Ahmed (2020) carried out research on the contribution of small and medium-sized

businesses (SMEs) to economic expansion and job creation in Somalia. The study used a quantitative method and a descriptive research design to look at a number of different variables. Purposive or judgmental sampling was used to choose a sample size of 201 individuals. As a technique for gathering data, the researcher created a questionnaire that was sent using the Google Forms Survey app. Excel 2010 and SPSS (Statistical Package for the Social Sciences) Version 22 were used to modify, compile, and tabulate the data that had been gathered. In order to strengthen the data's authenticity and dependability, the researchers additionally made corrections. The study's conclusions showed that some government policies, a lack of capital, and poor management abilities were found to be major obstacles for SMEs in Somalia. The report also emphasized the detrimental effects of inadequate regulations on humanitarian relief, imports, and unrestricted competition on the growth of SMEs in the area. It was suggested that in order to assist SMEs in Somalia, government assistance is required. Ogunmuyiwa and Okunleye (2019) used time series data to investigate how Small

and Medium Enterprises (SMEs) affect Nigeria's sustainable economic development. Information was gathered from the Bureau of Statistics (BOS) and the Central Bank of Nigeria (CBN) statistical bulletin between 1986 and 2016. The necessary econometric methods, such as the Vector Error Correction Model (VECM) and VEC-based causality tests, were then used to examine the gathered data. The results of the study showed a strong and favorable correlation between small and medium-sized business investment and Nigeria's economic expansion. This implies that Nigeria's sustainable economic development is significantly influenced by SMEs. Enhancing infrastructure facilities was suggested as a means of promoting sustainable economic development.

Paul et al. (2018) investigated the variables affecting small and medium-sized businesses' (SMEs) development, productivity, and investment in Nigeria. The study found that the following five major factors influence investment and productivity: company size, various business climate characteristics, labor force education level, infrastructural accessibility, and financial availability. These characteristics

related to the business climate include things like government rules, corruption, unstable power supplies, and insecurity. The study discovered that the biggest challenges cited by Nigerian business owners in the poll, which comprised 2,676 companies, were the availability of capital (33.1%), electricity (27.2%), and corruption (12.7%). It was suggested that corruption and insecurity be addressed. Also, the supply of electricity ought to greatly improve.

Maryam and Bassey (2018) looked at how Nigeria's industrial output affected the country's economic expansion. Time series data spanning the years 1981–2016 were used in the study. The researchers' hypothesis was that Nigeria's economic growth is unaffected by industrial output. The researchers gathered secondary data from World Bank indicators in order to perform their investigation. They analyzed the information and came to findings using the statistical software program Stata. The study's conclusions ran counter to the researchers' original theory. The findings showed that industrial output does, in fact, have a major influence on Nigeria's economic expansion. Consequently, it was suggested that industrial output be raised.

Methodology

This study employs an ex-post facto research design, analyzing existing data to examine the relationships between variables. We utilized time series data spanning 38 years (1986-2023), obtained as secondary data from the CBN statistical bulletin. Many statistical tools were used to analyze this data such as descriptive statistics, correlation analysis, Augmented Dickey-Fuller (ADF) test and multiple regressions using the E-Views econometrics software package.

Model specification

GDP was used to measure the dependent variable, and SMEs turnover, output, and INF were used to measure the independent variables. The statistical models, which are listed below, were modified from Chukwuka and Imide's (2023) study.

$$RGDP = \alpha_0 + \beta_1 SMEOUT + \beta_2 SMETURN + \beta_3 INT + \beta_4 INF + \mu$$

Where:-

RGDP= Real Gross Domestic Product

SMEOUT = SMEs output

SMETURN =SMEs turnover

INT = Interest rate

INF = Inflation rate

α = constant;

β = coefficient;

μ = error term

Presentation and Analysis of Results

Descriptive Statistics

	LRGDP	LSMEOUT	SMETURN	INT	INF
Mean	10.48915	8.138447	4.824737	18.25385	19.06711
Median	10.49756	8.508225	3.765000	17.87167	11.90000
Maximum	11.33209	10.74165	9.990000	31.65000	72.84000
Minimum	9.631547	4.137166	3.430000	9.959167	5.380000
Std. Dev.	0.578504	2.038800	2.167836	4.221655	17.49325

Skewness	0.021437	-0.441139	1.516873	0.668946	1.706542
Kurtosis	1.432092	1.982756	3.502553	4.426274	4.693308
Jarque-Bera	3.895274	2.870900	14.97227	6.055002	22.98435
Probability	0.142611	0.238008	0.000561	0.048437	0.000010
Sum	398.5878	309.2610	183.3400	693.6462	724.5500
Sum Sq. Dev.	12.38269	153.7980	173.8819	659.4277	11322.52
Observations	38	38	38	38	38

Source: Authors Computation, 2024

The mean value of LRGDP is 10.49%, as can be seen from the results showing LSMETURN has an average value of 4.82%, while LSMEOUT has an average of 8.14%. INT and INF averages were 18.25% and 19.07%, respectively. A high variance around the mean, or the dispersion around it, is measured by the standard deviation, and vice versa. According to the results, LRGDP has the lowest dispersion around the mean value while LINF has the largest variation. If the skewness value is 0, it indicates that the variables have a normal distribution; if it is more than or less than zero, it indicates

that the variables have a thick tail to the left or right. From the result it could be observed that some of our variables are not normally distributed since they have a very small value. Skewness along with kurtosis measures the degree of peakedness which is combined to give the jarque-bera statistic which is the accurate measures of normality of the variables. The jarque statistic is based on a null hypothesis of normality. The result indicates that all the variables not normally distributed because their corresponding p-value is greater than 0.05 except for SMETURN, INT and INF.

Correlation Matrix

	LRGDP	LSMEOUT	SMETURN	INT	INF
LRGDP	1				
LSMEOUT	0.76826	1			
SMETURN	0.68578	0.63570	1		
INT	-0.45247	-0.38139	-0.4013	1	

INF	-0.42229	-0.41780	-0.1328	0.4436	1
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Source: Authors Computation, 2024

The correlation matrix for every variable is displayed in table above. With a value of 0.76826, the table above demonstrates that the association between LR GDP and SMEOUT is also favorable. Additionally, with a value of 0.68578, the table

demonstrates a high correlation between LR GDP and SMETURN. LR GDP and INT have a negative correlation of -0.45347; similarly, there is a negative correlation of -0.42289 between LR GDP and INF.

Result of Variance Inflation Factor

	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
LSMEOUT	0.000248	35.97568	2.071736
SMETURN	0.000204	11.72474	1.926140
INT	4.08E-05	29.54541	1.462567
INF	2.42E-06	3.313718	1.492570
C	0.029020	60.01043	NA

Source: Authors Computation, 2023

Based on the centered VIF, it is evident from the above that multicollinearity does not exist because the corresponding centered VIF

figures are smaller than 10. As a general rule, multicollinearity is present if the related figures are bigger than 10, and vice versa.

Augmented Dickey Fuller Test (ADF result)

VARIABLE	ADF TEST STATISTIC (LEVEL)	CRITICAL VALUE (LEVEL)	ADF TEST STATISTIC (FIRST DIFFERENCE)	CRITICAL VALUE (FIRST DIFF)	PROBABILITY (5%)	ORDER OF INTEGRATION
LR GDP	-0.787413	-2.945842	-3.518529	-2.945842	0.0131	I(1)

LSMEOUT	-2.971267	-2.943427	-	-	0.0470	I(0)
SMETURN	-1.081734	-2.971853	-3.774619	-2.976263	0.0084	I(1)
INT	-3.100566	-2.943427	-	-	0.0352	I(0)
INF	-3.399487	-2.945842	-	-	0.0176	I(0)

Source: Author's computation, 2024

According to the results of the unit root Augmented Dickey Fuller Statistic test, every variable is stationary at level and following the first difference. An

autoregressive distributed lag is necessary since all the variables were integrated at the level and first difference (I(0)) and (I(1)), thus the bond test is performed.

ARDL Bounds Test

Null Hypothesis: No long-run relationship exists

Test Statistic	Value	K
F-statistic	1.077402	4
Significance	I(0) Bound	I(1) Bound
10%	2.45	3.52
5%	2.86	4.01
1%	3.74	5.06

Source: Author's Computation (2024)

F-statistics (1.077402) indicate that it lies between the I(0) and I(1) critical values at 5% and 1%, signifying indecision, a long-term association between the variables.

Therefore, the short run relationship is to be estimated.

ARDL Model Results

Having established the presence of no long run relationship between the dependent and

independent variables, the ARDL method was applied to estimate the short run parameters. The short run results of the nexus between the dependent and

independent variables estimated using the ARDL (autoregressive distributed lag) approach is presented.

Short-run ARDL model Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LRGDP(-1)	0.980767	0.042754	22.93989	0.0000
LSMEOUT	0.011199	0.011403	0.982090	0.3339
SMETURN	-0.022075	0.011472	-1.924209	0.0639
SMETURN(-1)	0.017610	0.011723	1.502222	0.1435
INT	0.001968	0.001723	1.142102	0.2624
INF	-0.000391	0.000376	-1.040688	0.3063
C	0.150972	0.365706	0.412823	0.6827
R-squared	0.997356	Mean dependent var		10.51233
Adjusted R-squared	0.996827	S.D. dependent var		0.568314
S.E. of regression	0.032011	Akaike info criterion		-3.876820
Sum squared resid	0.030741	Schwarz criterion		-3.572052
Log likelihood	78.72118	Hannan-Quinn criter.		-3.769375
F-statistic	1886.175	Durbin-Watson stat		1.286392
Prob(F-statistic)	0.000000			

Source: Author's computation 2024

The R-square, which shows how much of the variation in the dependent variable (LRGDP) can be attributed to the independent variables (LSMEOUT, SMETURN, INF, INT) in the model, is also displayed in the table. The findings show that the R-square is 0.99, meaning that the independent variables (LSMEOUT, SMETURN, INF, INT) explain for 99% of the variation in the growth and the error term accounts for the remaining 1%. 0.996827 is the adjusted R-squared value. It provides a penalized goodness of fit measure by accounting for the sample size and the number of independent variables. A high adjusted R-squared indicates that the model fits the data well. A p-value of 0.00000 is less than the selected significance level of 0.05, indicating statistical significance for the combined effect of the independent variables, according to the F-statistics. The Durbin-Watson statistic, which looks for autocorrelation in the residuals, is 1.286392. A number close to 2 denotes negligible autocorrelation.

LRGDP(-1): The LRGDP coefficient, which is one period behind, is 0.980767. This implies that, while keeping other factors equal, a one-unit rise in LRGDP in

the prior period is correlated with a 0.980767-unit increase in the current LRGDP. Additionally, as the matching p-value is less than 0.05, the probability value indicates that it is statistically significant. LSMEOUT: LSMEOUT's coefficient is 0.011199. At standard levels ($p > 0.05$), the t-statistic (0.982090) is not statistically significant. Consequently, we are unable to draw the conclusion that LSMEOUT significantly affects LRGDP. It also demonstrates that an increase of one percent in LSMEOUT will result in an increase of the same amount in LRGDP.

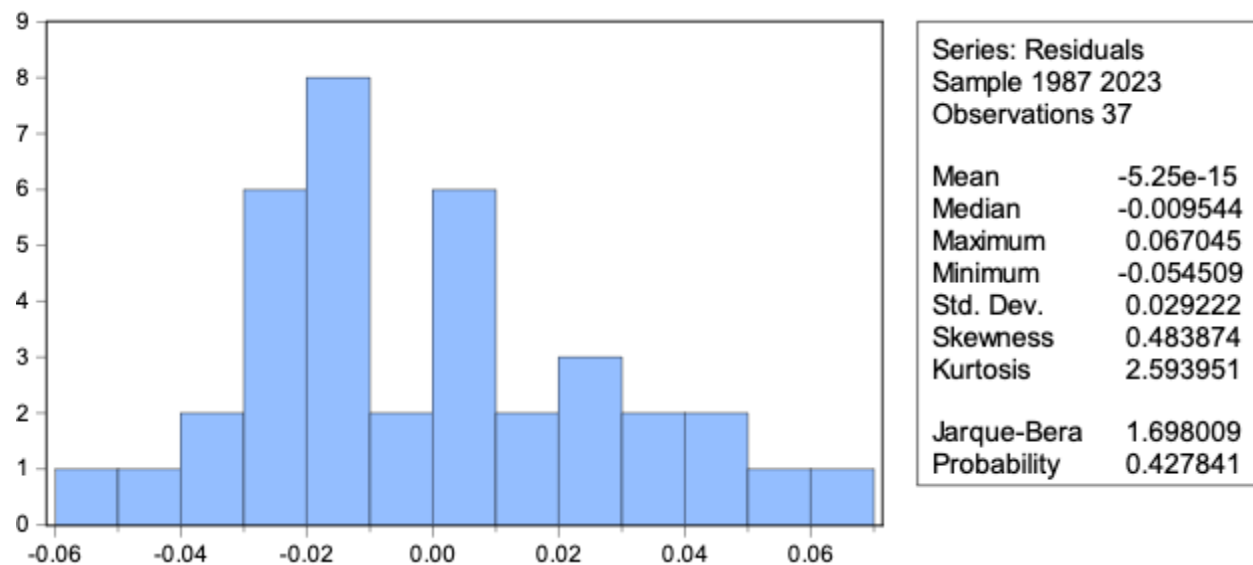
SMETURN: -0.022075 is the coefficient for SMETURN. When all other factors are held constant, the negative coefficient indicates that a rise in SMETURN is linked to a fall in LRGDP. The association may not be significant, though, as its t-statistic (-1.924209) is not statistically significant at conventional levels ($p > 0.05$). SMETURN(-1): 0.017610 is the coefficient for SMETURN that is lagging by one period. This implies that, while keeping other variables constant, a one-unit rise in SMETURN in the prior period is linked to a 0.017610-unit increase in the current LRGDP. Its t-statistic (1.502222), however,

does not indicate statistical significance ($p > 0.05$).

INT: 0.001968 is the coefficient for INT. This indicates that, while all other variables are held constant, an increase of one unit in INT is correlated with an increase of 0.001968 units in LR GDP. Its t-statistic (1.142102), however, does not indicate statistical significance ($p > 0.05$).

Normality Test

The normality test is shown below



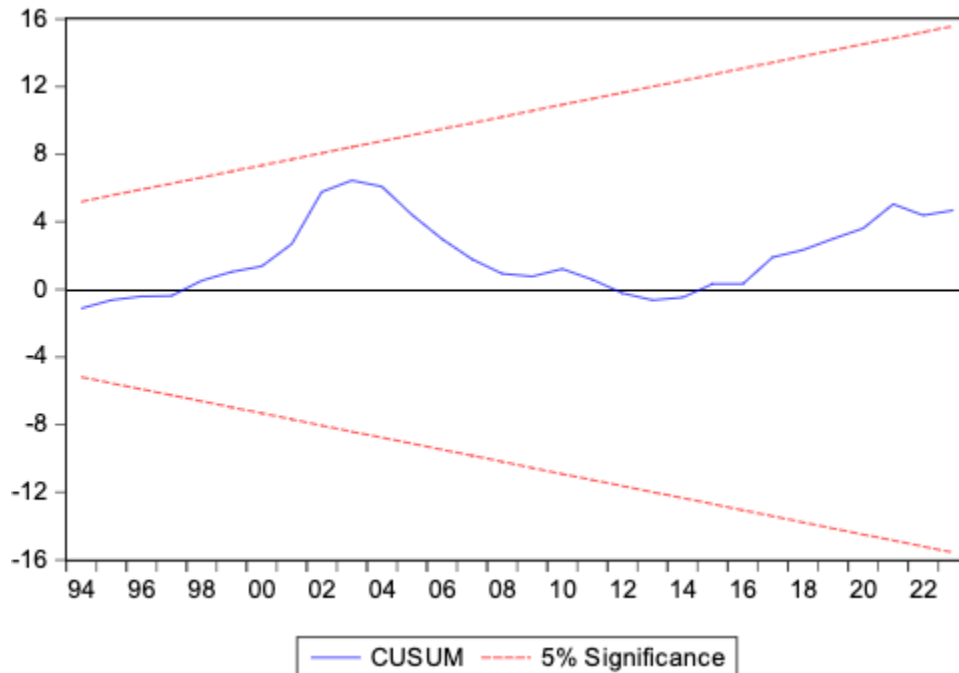
Source: Author's computation, 2024

The outcome normalcy test indicates that the alternative hypothesis is accepted since the residual is normally distributed and has

INF: -0.000391 is the coefficient for INF. This indicates that, when all other factors are held constant, a one-unit increase in INF is correlated with a -0.000391 unit fall in LR GDP. Its t-statistic (-1.040688), however, does not indicate statistical significance ($p > 0.05$).

a probability value greater than 0.05, or five percent.

Stability test result (CUSUM)

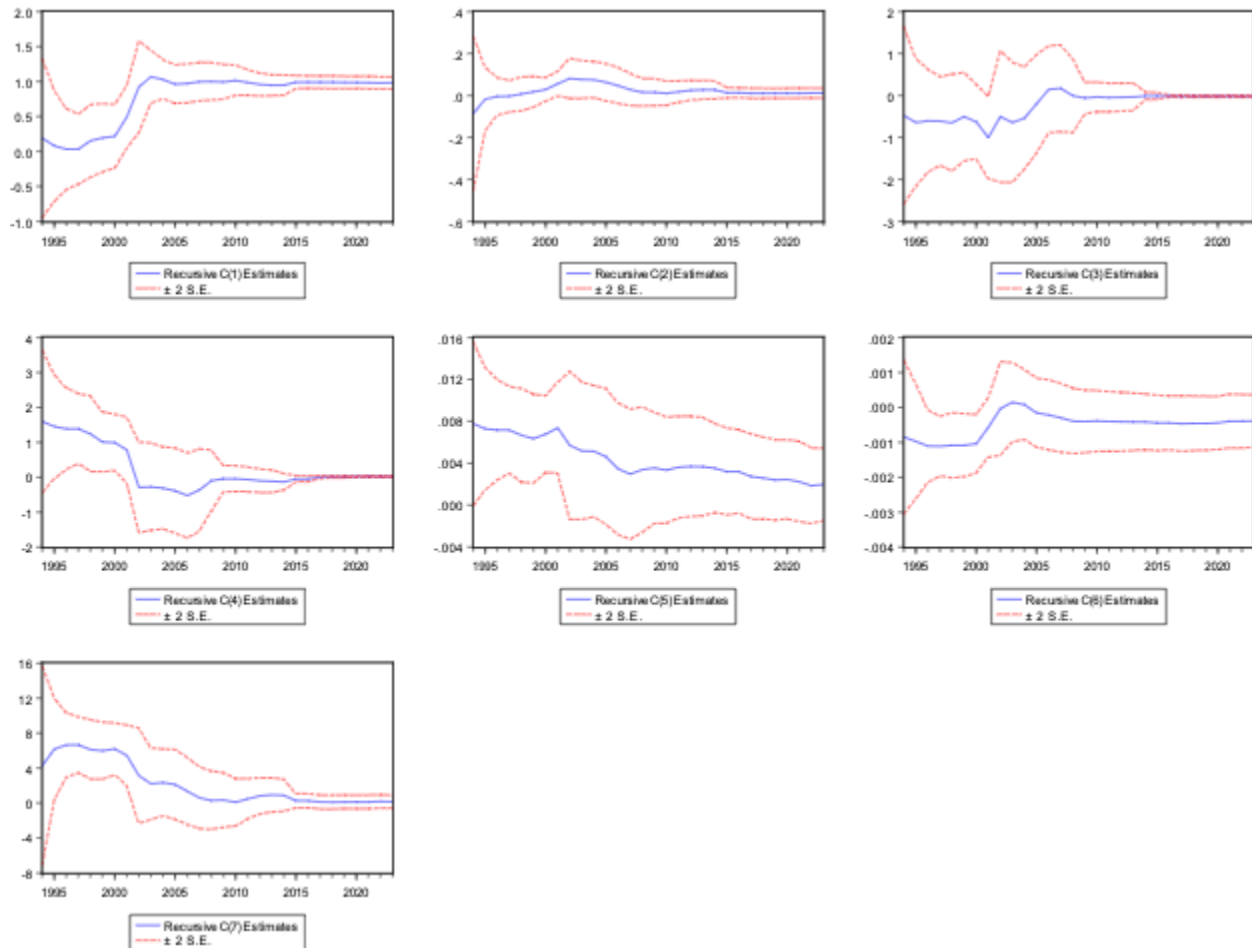


Source: Author's computation, 2024

The residual is stable, according to the rule, if the blue line falls between the two red lines (above and below). Given that the blue line lies between the two red lines (above and below), we may conclude from this analysis and the CUSUM Test that the residual is stable. Plotting random oscillations around zero is what one would

hope to see. On the other hand, if a trend toward either direction appears, it indicates that the process mean has shifted, maybe as a result of unique factors influencing the process. A process is deemed out of control when its points fall outside of the control limitations.

Stability test: Presentation of stability test result (Recursive Estimates)



Source: Author's computation, 2024

Given this analysis and the fact that the blue line lies between the two red lines (above and below), we can conclude from the CUSUM Test that the residual is stable. Plotting points should ideally show random oscillations around zero. On the other hand, the emergence of an upward or downward trend indicates a possible shift in the process

mean caused by unique factors influencing the process. The process is said to be out of control when points go beyond the control limitations.

Conclusion and Recommendations

According to the results' analysis, the Nigerian economy's expansion from 1986 to 2023 was not significantly aided by small

and medium-sized enterprises (SMEs). During this time, numerous economic reforms took place. The empirical results show that the rise of Nigeria's gross domestic product (GDP) has not been significantly fueled by the output of SMEs. In a similar vein, the analysis shows that the RGDP has decreased because the turnover of SMEs has not been a major contributor to economic growth. Furthermore, the statistical study verifies that a rise in the output of SMEs is linked to a commensurate fall in the RGDP of the nation.

It was also evident that the GDP (gross domestic product) of Nigeria is not significantly impacted by the turnover of SMEs.

On the one hand, it implies that the GDP and sales turnover of SMEs are not significantly correlated, meaning that the GDP growth of Nigeria is not boosted by the turnover of SMEs. Conversely, though, it also shows that the GDP of Nigeria is not much boosted by the output of SMEs, indicating that they are not a major force behind economic expansion. Consequently, based on the positive and negligible characteristics of the two primary variables (SME production and SME turnover) used to identify SMEs in

Nigeria, it can be said that SMEs have a positive and minor impact on the Nigerian economy.

Thus, in light of the findings, the research recommended the following actions:

SMEs should concentrate on raising sales turnover and productive output. By aiming to increase productivity and broaden their activities in order to increase the gross domestic product (GDP) of the nation. It's critical that SMEs are properly managed and controlled. If SMES are to increase their ability to contribute to economic growth, they must make prudent investments, launch new ventures, and use efficient management techniques.

Marketing ideas, goods, products, and services to consumers should be SMEs' top priority. SMEs in Nigeria can boost their sales turnover and contribute to future GDP growth by hiring a trained sales crew and investing in efficient marketing methods.

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How Place and Habits Affect Life Expectancy: Evidence from U.S. Counties

Kwadwo Poku-Agyemang

Assistant Professor

Department of Political Science

Claflin University

kpokuagvemang@claflin.edu

Christopher Kuetsinya

Department of Mathematics and Statistics

Bowling Green State University

ckuets@bgsu.edu

ABSTRACT

Health outcomes vary across the United States, but the combined impact of geographic disparities and behavior patterns on life expectancy is not yet fully understood. This study investigates the impact of individual health behaviors and county-level socioeconomic conditions on life expectancy across Metropolitan, Micropolitan, and Non-Core counties. County-level data from the Health Inequality Project and the Behavioral Risk Factor Surveillance System (1999–2014) for 1,553 U.S. counties were used to build an ordinary least squares (OLS) model with interaction terms to capture heterogeneity across the urban–rural continuum. Results show that residents of Metropolitan counties live, on average, about 1.7 years longer than those in Non-Core counties. Smoking and obesity are negatively associated with life expectancy, while physical exercise exhibits a strong positive association. Socioeconomic factors, including social capital, immigrant share, and unemployment, also contribute significantly but vary in magnitude across county types. These findings point out the importance of combining behavioral interventions with location-specific health and economic policies to successfully mitigate spatial differences in longevity throughout the United States.

INTRODUCTION

Geographic disparities in health outcomes have long been recognized as a defining feature of population well-being in the

United States. Life expectancy varies systematically across regions, reflecting both individual behaviors and the

socioeconomic and environmental characteristics of “place”. While personal health choices such as smoking, diet, and physical activity are known to influence longevity, growing evidence indicates that other factors, such as community resources, economic opportunity, and social cohesion, also play a role in health outcomes. Understanding how behavioral habits and geographic context jointly determine life expectancy is therefore critical.

The past few years have witnessed an explosion of interest in neighborhood or area effects on health (Diez Roux, 2001). A compendium of empirical studies has been undertaken to better understand these possible area/neighborhood effects. These include studies that draw the relationship between neighborhood characteristics and morbidity and mortality rates, contextual and multilevel analyses that relate area socioeconomic context to health outcomes, and studies that have compared a number of well-defined neighborhoods (Moon, Subramanian, Jones, Duncan, & Twigg, 2005). Strengthening conclusions regarding the presence and magnitude of neighborhood effects have necessitated addressing a series of conceptual and methodological issues. More importantly, problems like defining neighborhoods or relevant geographic areas, choosing relevant neighborhood characteristics, outlining the parts played by individual-level variables, adding life-course and longitudinal dimensions, and also combining a variety of research designs have increased (Diez Roux, 2001).

The idea that “place” could be of importance to health gained prominence from the 1980s and early 1990s (Haan, Kaplan, & Camacho, 1987); (Carstairs & Morris, 1989); (Humphreys & Carr-Hill, 1991); (Krieger, 1992); (Diehr et al., 1993); and interest has increased steadily over time as a lot of reports on geographic differences in health outcomes have recently emerged in epidemiology and public health journals among others (Matteson, Burr, & Marshall, 1998); (Robert, 1998); (Bennett et al., 2015); (Chetty et al., 2016).

Chetty et al. (2016) set out to estimate the level, time trend, and geographic variability that relate income to life expectancy and to identify factors related to small area variation in the United States. Bennet et al. (2015) explored the future of life expectancy and life expectancy inequalities in England and Wales. Matthew (2017) analyzed the Behavioral Risk Factor Surveillance System (BRFSS) data for 398,208 adults to estimate the prevalence of some self-reported health-related behaviors by urban-rural status. These included sufficient sleep, current non-smoking, non-drinking or moderate drinking, maintaining healthy body weight, and meeting aerobic leisure-time physical activity recommendations (Matthews, 2017).

The analysis is guided by two central research questions. First, to what extent does life expectancy vary across the Metropolitan, Micropolitan, and Non-Core county hierarchy? Previous studies have shown that urban areas tend to exhibit

higher average longevity, but it remains unclear whether these differences persist once behavioral and socioeconomic factors are controlled. Second, how do behavioral habits and socioeconomic conditions jointly explain these disparities, and do their associations vary systematically across levels of rurality? By addressing these questions, the study provides an integrated assessment of how personal habits and contextual characteristics combine to shape local health outcomes.

DATA AND VARIABLES

This study integrates multiple county-level data sources to examine how behavioral habits and socioeconomic context jointly influence life expectancy across the U.S. urban hierarchy. The primary outcome variable is period life expectancy at age 40, aggregated at the county level, derived from the Health Inequality Project by Chetty et al. (2016). These data are based on death records from the Social Security Administration's Death Master File linked to federal income tax records for all individuals with a valid Social Security number between 1999 and 2014. County-level life expectancy measures represent the expected remaining years of life at age 40 for individuals experiencing the observed cross-sectional mortality rates for a given year.

The final analytic sample consists of 1,553 U.S. counties, representing all

counties with populations exceeding 25,000 for which complete behavioral and socioeconomic data were available. Counties are classified according to the Core-Based Statistical Area (CBSA) typology into Metropolitan, Micropolitan, and Non-Core categories. This classification captures gradations along the urban–rural continuum based on population size and commuting patterns, allowing for the assessment of place-based heterogeneity in life expectancy and its correlates. Chetty et al (2016) defined period life expectancy as “the expected length of life for a hypothetical individual who experiences mortality rates at each subsequent age that match those in the cross-section during a given year”. These period life expectancies aggregated at the county level are used in this study.

For this study, county classifications from the CBSA system, Metropolitan, Micropolitan and Non-Core county categories are used. The data considered for this study consists of 1553 counties observations from 1999 to 2014 including 182 Non-Core counties, 476 Micropolitan counties and 895 Metropolitan counties. There are a total of 3,142 counties in the United States. Since 1,589 counties were not considered for this study for lack of data on these counties, only counties with a population greater than 25,000 were considered for the study and these counties are shown in figure 1.

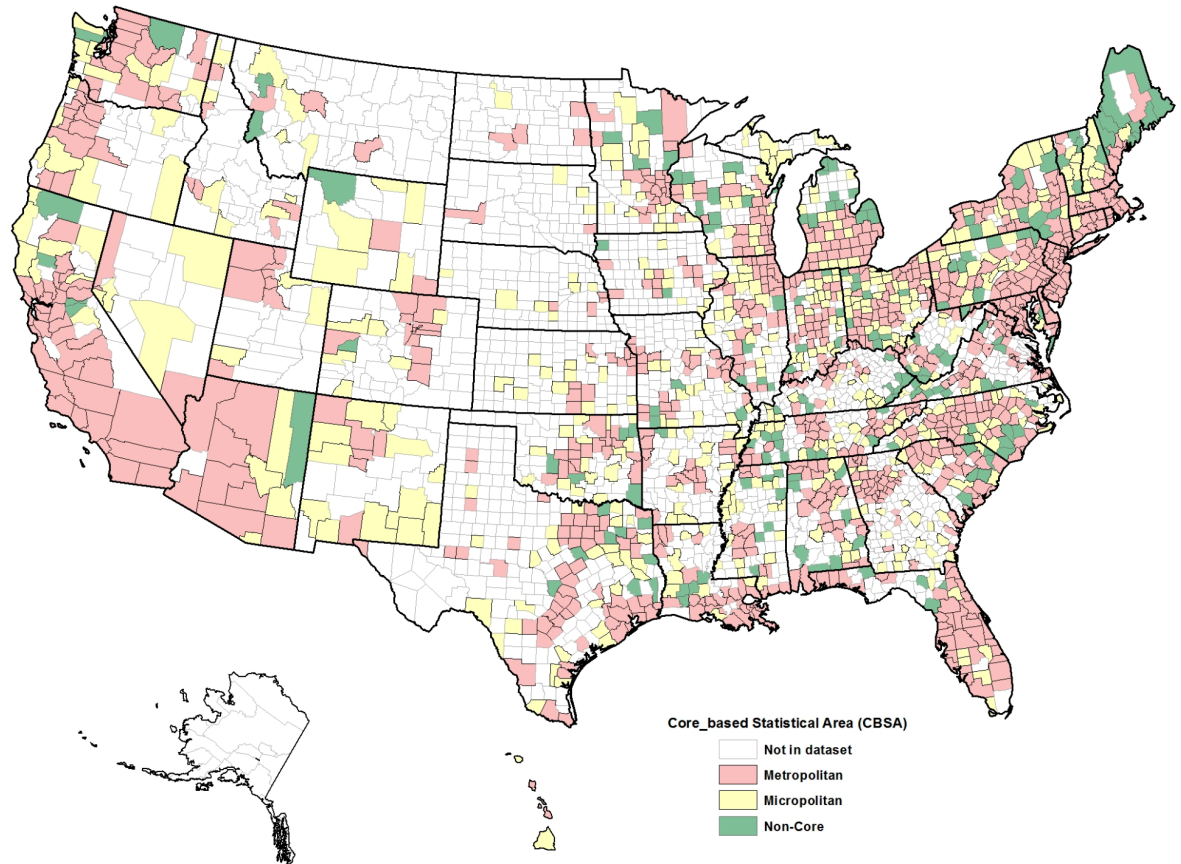


Figure 1: Map showing counties in sample as classified by population.

METHODOLOGY

To quantify how behavioral habits and socioeconomic factors relate to differences in life expectancy across the United States, this study employs a series of ordinary least squares (OLS) regression models estimated at the county level. OLS provides a straightforward and interpretable approach to evaluate linear associations between life expectancy and its predictors, allowing for the inclusion of both continuous and categorical variables as well as interaction terms that capture place-based

heterogeneity.

RESULTS

Descriptive statistics and OLS results show that behavioral factors and socioeconomic context jointly explain spatial differences in life expectancy. Table 1 presents descriptive statistics; Table 2 summarizes the main OLS regression coefficients and significance levels.

Variable	Mean	Std. Dev.	Min	Max
Life Expectancy (years)	82.60	1.36	78.22	87.06
% Smokers	20.60	5.19	1.85	42.46
% Obese	27.24	6.65	4.37	58.73
% Exercising	73.53	8.18	45.14	92.03
Unemployment Rate	4.98	1.62	2.00	17.69
Social Capital Index	-0.28	1.12	-4.26	3.79
% Foreign-Born	4.54	5.71	0.16	50.94
Income Segregation	4.31	3.25	0.16	17.88
Medicare \$ per Enrollee	9,357	1,422	6,117	16,323

Note: All variables measured at county level. Source: Health Inequality Project (Chetty et al., 2016); BRFSS (Matthews, 2017).

Table 2. OLS Regression Results: Determinants of Life Expectancy

Variable	(1) Base Model	(2) Place Dummies	(3) Interactions
% Smokers	-0.046***	-0.047***	-0.033***
% Obese	-0.017***	-0.016***	-0.003
% Exercising	0.040***	0.041***	0.040***
Unemployment Rate	-0.050***	-0.050***	-0.056**
Social Capital Index	0.293***	0.295***	0.324***
% Foreign-Born	0.052***	0.053***	0.067***
Income Segregation	-0.013*	-0.014*	-0.033

Medicare \$ per Enrollee	-0.00016***	-0.00016***	-0.00017***
Mean Household Income	3.5e-06***	3.4e-06***	8.7e-06***
Labor Force Participation	-0.001	0.000	-0.019***
Non-Core Dummy	—	0.248***	4.818***
Metro Dummy	—	0.104**	-0.291
Adj. R ²	0.700	0.703	0.726

Notes: Robust standard errors in parentheses. ***p<0.01, **p<0.05, *p<0.1. Dependent variable: life expectancy (years).

DISCUSSION

The findings indicate that behavioral habits and socioeconomic factors jointly determine geographic variation in life expectancy across the United States. Smoking and obesity exhibit strong negative associations, while exercise demonstrates a significant positive relationship. These effects vary across the urban hierarchy: the detrimental effects of smoking and obesity are greater in Metropolitan counties, suggesting that urban environments may amplify behavioral risks. Social capital consistently improves longevity, while higher Medicare spending and unemployment rates correlate with lower life expectancy, consistent with prior research.

POLICY IMPLICATIONS

Improving longevity requires both behavioral interventions and place-sensitive policies. Metropolitan areas should prioritize behavioral interventions such as smoking cessation programs and active-living infrastructure, while Micropolitan and Non-Core counties would benefit from policies enhancing healthcare access and economic opportunity. Behavioral and contextual health determinants are interdependent; thus, interventions must be tailored to the distinct social and economic environments of each county type. This study contributes to understanding how habits and place jointly influence life expectancy and underscores the importance of geographically differentiated health policy.

Table 1: Definition of Variables			
Representation	Variable Name	Definition	Source
PS	Percentage smokers	BRFSS: percentage of current smoker in the county.	CDC Behavioral Risk Factor Surveillance System (BRFSS) 1996-2008 ²
PO	Percentage Obese	BRFSS: percentage of population obese in the county.	CDC Behavioral Risk Factor Surveillance System (BRFSS) 1996-2008 ²
PE	Percentage Exercise	BRFSS: percentage of population that exercised in the last 30 days	CDC Behavioral Risk Factor Surveillance System (BRFSS) 1996-2008 ²
SSc	Social Capital	Standardized index combining measures of voter turnout rates, the fraction of people who return their census forms, and measures of participation in community organizations	Rupasingha and Goetz (2008) ²
PbF	Percent Foreign born	Percentage of county residents born outside the United States	2000 Census SF3 Sample Data Table P021 ²

InS	Income Segregation	Rank-order index estimated at the census-tract level computed for each of the income brackets given in the 2000 census	2000 Census SF3 Sample Data Table P052 ²
MDPE	Medicare Dollar per enrollee	Age, sex, race, and price-adjusted Medicare reimbursements per enrollee in 2010 (\$)	Dartmouth Atlas 2010 ²
UnP	Unemployment rates	Unemployed civilian population 16 years and over divided by civilian labor force population 16 years and older	2000 Census SF3 Sample Data Table DP-3 ²
HHI	Mean Household Income	Aggregate household income in the 2000 Census divided by the number of people aged 16-64 (\$)	2000 Census SF3 Sample Data Table P054 ²
PcP	Percentage change in population	percentage change in county non-institutional civilian population from 1980 to 2000	1980, 2000 Census ²
PCLF	Percentage change in labor force	Fraction change in CZ civilian labor force population from 1980 to 2000	1980, 2000 Census ^[1]
LFP	Labor force participation	Fraction of people at least 16 years old that are in the labor force	2000 Census SF3 Sample Data Table P043 ²
PNMet	Distance to nearest metro area	This shows the distance (in miles) to the nearest Metropolitan area.	2010 Census, the US Census Bureau
PNC_Met	Distance to nearest central metro	This shows the distance (in miles) to the nearest central Metropolitan area.	2010 Census, the US Census Bureau

Digital Marketing Analytics and Consumer Trust in Online Retailing: The Mediating effect of customer satisfaction

Jayampathi E.K.¹ and Punchihewa P.S.D.²

^{1,2}Department of Management and Entrepreneurship, Faculty of Management and Finance,
University of Ruhuna, Sri Lanka.
jayampathik@mgt.ruh.ac.lk

Abstract

This study investigates the impact of Digital Marketing Analytics (DMA) on consumer trust in online retailing, with particular emphasis on the mediating effect of customer satisfaction in the Sri Lankan context. Grounded in the Stimulus–Organism–Response (S–O–R) framework, DMA is conceptualized as a technological stimulus, customer satisfaction as the organismic state, and consumer trust as the behavioral response. Despite the growing adoption of data-driven marketing practices, limited empirical evidence exists on how DMA influences relational outcomes such as trust, particularly in emerging digital markets. A quantitative research design was employed using a cross-sectional survey of 437 online consumers in Sri Lanka who had recent exposure to digital marketing activities. Data were collected through a structured questionnaire and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The measurement model demonstrated satisfactory reliability and validity, while the structural model showed good predictive power and model fit. The findings disclose that DMA has a significant positive effect on both customer satisfaction and consumer trust. Customer satisfaction also employs a strong positive influence on trust, confirming its role as a key relational mechanism in online retail environments. Importantly, the results provide robust support for the mediating role of customer satisfaction in the relationship between DMA and consumer trust, indicating that analytics-driven marketing strategies enhance trust primarily by improving customer experiences. This study contributes to the literature by extending DMA research toward relational outcomes and validating the S–O–R framework in a digital marketing context within an emerging economy. From a managerial perspective, the findings highlight the strategic importance of leveraging digital marketing analytics to deliver personalized, relevant, and satisfying customer experiences to build trust and sustain long-term customer relationships in competitive online markets.

Keywords: Digital Marketing Analytics, Customer Trust, Customer Satisfaction, Online Retailing

Introduction

The rapid advancement of digital technologies has significantly transformed how organizations interact with customers and deliver value in contemporary markets (Krishen et al., 2021; Saura, 2021). The expansion of social media platforms; e-commerce websites and mobile applications has led to the creation of vast volumes of consumer data, enabling firms to gain a better understanding of consumer behaviour and preferences (Erevelles et al., 2016; Theodorakopoulos & Theodoropoulou, 2024). In this context, digital marketing analytics (DMA) has become an important organizational capability enabling firms to collect, process and analyze digital customer and campaign data to support strategic marketing decisions, assess marketing performance and enhance customer experiences (Al Adwan et al., 2023; Saura, 2021). Through analytics-driven insights, organizations can monitor the interaction of consumers, generate purchase patterns, develop personalized marketing strategies, and transform raw data that support evidence-based decision-making and strengthen organizational competitiveness (Erevelles et al., 2016; Cadden et al., 2023;

Theodorakopoulos & Theodoropoulou, 2024).

The integration of big data analytics into marketing activities has fundamentally changed how organizations understand and influence consumer behavior. (Al Adwan et al., 2023; Theodorakopoulos & Theodoropoulou, 2024). Firms increasingly use data driven insights to create targeted promotions, personalized recommendations and relevant marketing campaigns to boost customer engagement and optimize decision-making processes (Saura, 2021; Blasco-Arcas et al., 2022). In particular, social media platforms have become critical marketing platforms through which organization can communicate with their customers, monitor the feedback and analyze the consumer preferences in real-time (Krishen et al., 2021; Wibowo et al., 2021). Consequently, organizations that effectively utilize digital marketing analytics are better positioned to enhance marketing effectiveness, strengthen customer relationships, and achieve competitive advantages in increasingly digitalized markets (Cadden et al., 2023; Al Adwan et al., 2023).

In digital commerce environments, customer trust plays a crucial role in influencing consumers' willingness to engage in online transactions (Kim et al., 2008; Quintus et al., 2024). Unlike the traditional retail setting, online transactions involve much greater uncertainty as customers do not have physical capacities to evaluate products or to interact directly with sellers, making trust especially salient to addressing perceived risk (Kim et al., 2008). Previous studies suggest that digital marketing activities, particularly those conducted through social media platforms, can influence consumer perceptions, engagement, and trust toward brands and online platforms (Hajli et al., 2017; Ebrahim, 2020). In this regard, DMA may contribute towards trust by enabling organizations to provide more relevant and timely communication, accurate and consistent information, personalized offerings and faster responses to customer needs (Ebrahim, 2020; Hafez, 2021). However, although analytics-driven personalization can enhance relevance and convenience, customer trust may also depend on whether such practices are perceived as helpful and transparent rather than intrusive (Blasco-Arcas et al., 2022).

Customer satisfaction is also another decisive factor on customer trust on digital environments (Rita et al., 2019; Javed & Wu, 2020). It reflects consumers' overall evaluation of their experience with a product or service and is widely recognized as an important determinant of relationship outcomes such as loyalty, trust, and repurchase intention (Rita et al., 2019; Javed & Wu, 2020). In digital contexts, organizations are increasingly reliant on data-driven marketing strategies to provide personalized experiences to improve customer satisfaction (Chen & Lin, 2019; Wibowo et al., 2021). Empirical evidence further shows that social media marketing activities and interactive digital communication significantly influence customer satisfaction and behavioral intentions in online environments (Chen & Lin, 2019; Jamil et al., 2022). Therefore, customer satisfaction may play an important mediating role in the relationship between digital marketing analytics and customer trust by explaining how analytics-driven marketing practices are translated into positive relational outcomes (Rita et al., 2019; Javed, & Wu., 2020).

From a theoretical point of view, the Stimulus-Organism-Response (SOR) framework offers a useful perspective to explain how digital marketing practices shape consumer perceptions and behavioural responses (Mehrabian & Russell, 1974; Eroglu et al., 2001). According to the SOR framework, external stimuli affect people's internal cognitive and emotional states, which in turn, affect behavioural responses (Mehrabian & Russell, 1974). In digital marketing contexts, DMA can be considered a stimulus because it represents an external organizational capability that shapes consumers' online experiences, while customer satisfaction reflects the organism and customer trust represents the response (Eroglu et al., 2001). Accordingly, the SOR framework offers a suitable theoretical basis for explaining both the direct influence of DMA on trust and its indirect influence through customer satisfaction (Mehrabian & Russell, 1974; Eroglu et al., 2001).

Emerging-market online shopping environments provide a particularly relevant context for examining these relationships (Quintus et al., 2024). Sri Lanka is a meaningful setting given the importance of research on the recent online shopping

experiences and customer satisfaction and loyalty outcomes of the country's e-commerce sector (Madushika et al., 2024; Nandasena & Wickramasinghe, 2024). At the same time, consumer responses in emerging digital markets may differ from those in developed economies because of variation in digital adoption, trust in online platforms, privacy concerns, infrastructure, and overall consumer experience (Quintus et al., 2024). However, empirical evidence examining how digital marketing analytics influences customer trust in the Sri Lankan online shopping context remains limited. While prior studies have largely examined DMA in relation to performance, engagement, and decision-making, fewer studies have explored its influence on relational outcomes such as customer trust, and even fewer have tested customer satisfaction as a mediating mechanism, particularly in emerging-market online shopping contexts such as Sri Lanka (Al Adwan et al., 2023; Theodorakopoulos & Theodoropoulou, 2024; Quintus et al., 2024).

In order to fill this void, the current study seeks to investigate the impact of digital marketing analytics on customer's trust, and

examine the mediating relationship of customer's satisfaction among online consumers in Sri Lanka. Based on the Stimulus-Organism-Response model, the research treats digital marketing analytics as stimulus, customer satisfaction as the organism, and customer trust as the response (Mehrabian & Russell, 1974; Eroglu et al., 2001). By empirically testing these relationships, the study contributes to the literature by extending research on digital marketing analytics toward relational outcomes, clarifying the mediating role of customer satisfaction, and providing context-specific evidence from an emerging online shopping market. The findings also offer practical insights for organizations seeking to use analytics-driven marketing strategies to enhance customer experiences, strengthen trust, and build long-term customer relationships in competitive digital markets.

Literature review

Digital marketing analytics in online retail

Digital marketing analytics (DMA) is the application of data, analytical techniques, and digital technologies in comprehending

customer behavior and maximizing marketing activities across digital touchpoints (Kannan & Li, 2017; Petrescu & Krishen, 2022). Contemporary DMA increasingly makes use of machine learning and AI to transform massive amounts of clickstream, search and transaction data into actionable personalization and targeting capabilities (Ngai & Wu, 2022; Kopalle et al., 2021). Within e-commerce, the application of analytics-based marketing activities usually constitute personalization, data-driven recommendations, and targeted promotions, which are very much consistent with how this study operationalises DMA (Kannan & Li, 2017; Teepapal, 2025).

Personalization in online retail is generally evident in the form of tailored content, product recommendations and customized interfaces designed to enhance relevance and minimize the effort required by customers to make decisions (Alimamy & Gnoth, 2022; Teepapal, 2025). Recommendation systems are a key analytics application that convert observed behavior (e.g. browsing history and purchases) into predicted preferences and ranked product recommendations (Ngai & Wu, 2022; Hassan et al., 2025). Targeted

promotions and advertising are also based on analytics-based segmentation and prediction to deliver offers aligned to inferred needs and interests (Kannan & Li, 2017; Lee et al., 2022). Because of the implementation of DMA capabilities through visible website and app features, consumers tend to assess analytics in an indirect way through perception of relevance, quality of personalized services, and "smartness" of digital services provided by the retailer (Teepapal, 2025; Alimamy & Gnoth, 2022). Accordingly, DMA in the present study has been conceptualized as a perceived presence of personalized recommendations, tailored promotions, and behavior-tracking in order to improve the online shopping experience (Kannan & Li, 2017; Teepapal, 2025).

Stimulus–Organism–Response (S–O–R) Framework for Online Consumer Behavior

The Stimulus-Organism-Response (S-O-R) perspective is very common in the digital space to understand how external environmental cues affect internal psychological states and then leads to an impact on consumer response (Teepapal, 2025). In the context of technology

mediated shopping, stimuli can involve platform features, and marketing cues, such as personalization and recommendations, and promotional targeting made possible using analytics (Teepapal, 2025; Lee et al., 2022). The organism component reflects internal evaluations and affective-cognitive reactions that arise as consumers interpret these stimuli as they experience their time online (Teepapal, 2025; Mamakou et al., 2024). In digital commerce studies, organismic states often refer to the perceptions of e-commerce such as trust, usefulness, privacy, satisfaction, and other perceptions of their experience (Teepapal, 2025; Soleimani, 2022). Responses represent the consumer outcomes that follow from the mentioned internal states, including the formation of relationships such as trust, and behavioral tendencies such as continued use, loyalty, and purchase-related intentions (Soleimani, 2022; Hassan et al., 2025).

This study would coincide DMA with the study of the stimulus role as analytics capabilities are externally manifested through aspects such as tailored suggestions and targeted messages presented to the user (Kannan & Li, 2017; Teepapal, 2025). Customer satisfaction is situated as the

organism due to it being an internal evaluative state created due to the lived on-line shopping experience and the degree to which expectations are fulfilled (Mamakou et al., 2024; Rita et al., 2019). Consumer trust is modeling the response as it is a relationship quality outcome that is the willingness to rely on the online retailer and perceive the retailer as reliable and secure (Tandon et al., 2021; Soleimani, 2022).

Customer Satisfaction as an Organismic State in E-commerce

Customer satisfaction in online retail is usually thought of as an overall evaluative judgment produced by a comparison of the shopping experience with expectations and desired outcomes (Mamakou et al., 2024; Rita et al., 2019). In e-commerce experiences, satisfaction is determined by both functional performance (e.g. system reliability and fulfilment) and experiential aspects (e.g. ease, convenience, and perceived relevance) (Mamakou et al., 2024; Rita et al., 2019). User experience and e-service quality research explains that website and services performance contribution to the level of satisfaction is meaningful to reduce friction and improve

perception value in the process of digital journey (Mamakou et al., 2024).

Empirical findings also suggest that the strength of online experiences and enhancements in services are likely to be associated with more favorable post-purchase evaluations and overall satisfaction (Mamakou et al., 2024; Rita et al., 2019). Because satisfaction summarizes the evaluation of the consumer's experience, it can be understood as an organismic state, which captures how the consumers "feel" about the retailer after being exposed to the retailer's digital environment and marketing tactics (Teepapal, 2025; Mamakou et al., 2024). Satisfaction is therefore appropriate as an appropriate mediator theoretically, if the focal stimulus is a set of digital features (such as analytics-driven personalization) that are intended to enhance the perceived shopping experience (Teepapal, 2025; Alimamy & Gnoth, 2022).

Consumer Trust as a Response Outcome in E-commerce

Trust is a key concept in e-commerce as online transactions require uncertainty, distance, and information asymmetry, which makes trusting the retailer's competence and

integrity important (Soleimani, 2022; Tandon et al., 2021). In the context of platform-based shopping, trust is commonly referred to as an individual's belief that the website or the retailer is reliable, honest, and will be able to protect consumers during transactions (Soleimani, 2022; Mofokeng, 2023). Trust is also a mechanism that helps lower perceived risk and makes consumers more willing to engage in online purchasing relationships over time (Soleimani, 2022; Tandon et al., 2021). Institutional mechanisms research emphasizes that trust in online markets can be increased by signals and safeguards such as guarantees, policies, system reliability cues that make the environment safer for people (Tandon et al., 2021; Mofokeng, 2023). Trust reviews further show that privacy and security issues are often threats to trust as consumers are fearful of data misuse and insecure transactions in a digital environment (Soleimani, 2022; Cai and Mardani, 2023). Accordingly, trust is an appropriate response variable in the study of analytics-driven personalization as consumers might see personalization as competent service improvement or intrusive data exploitation (Lee et al., 2022; Teepapal, 2025). In the

operationalization of trust in this study, consumer trust is embodied in their belief about reliability, honesty, and security in transaction which are in line with the current conceptualization of e-trust in the context of e-commerce. (Soleimani, 2022; Tandon et al., 2021)

Hypothesis Development

Digital marketing analytics → customer satisfaction

A core argument in digital marketing research is that analytics capabilities generate value by making things more relevant, timely, and appropriate between consumer needs and marketing actions (Kannan & Li, 2017; Petrescu & Krishen, 2022). When consumers feel that recommendations are tailored to them and that they are helpful, they are more likely to feel a sense of convenience and lower decision-effort which aids in more positive experience evaluations (Alimamy & Gnoth, 2022; Teepapal, 2025). AI-enabled personalization research also suggests personalization can help increase perceived usefulness, customer-centric experiences, which is closely related to satisfaction judgments in digital environments

(Teepapal, 2025). From a customer experience perspective, analytics-enabled tailoring may help improve customer satisfaction by enabling customers to find relevant products more quickly, and by making the customer shopping journey feel more responsive (Mamakou et al., 2024; Teepapal, 2025). This mechanism is consistent with the notion that satisfaction arises from the degree to which the platform experience has been able to meet expectations for convenience, relevance, and service performance (Mamakou et al., 2024; Rita et al., 2019). However, personalization also has the potential to have a negative effect on satisfaction when it is seen as intrusive, or when consumers experience a loss of control over their data and the information they view (Lee et al., 2022; Cai & Mardani, 2023). Research on personalization and intrusiveness suggests that perceived intrusiveness is an important negative interpretation of personalization that can undermine consumer responses in social and digital media contexts (Lee et al., 2022). Admittedly, work on intelligent personalization and privacy similarly suggests that privacy-related concerns may lead to more resistance to personalized

marketing, which can weaken the customer experience and related evaluations. (Cai & Mardani, 2023).

Therefore, the net effect of the use of DMA on satisfaction is expected to depend on whether the analytics-driven features are interpreted as helpful relevance-enhancing tools (rather than as privacy-threatening surveillance) (Teepapal, 2025; Lee et al., 2022). With this research measuring DMA via perceived personalization, customized promotions, and service improvement through tracking, the prevailing theory predicts that there will be an effect on satisfaction under normal retail conditions (Kannan & Li, 2017; Mamakou et al., 2024).

Thus, the following hypothesis is proposed:

H1: Digital marketing analytics has a positive and significant relationship with customer satisfaction

Digital marketing analytics ↔ consumer trust

Analytics-based personalization can do something to build trust if it signals competence and customer orientation of the retailer because consumers know that the retailer knows their needs and can deliver value in a predictable manner (Teepapal,

2025; Hassan et al., 2025). Personalization research in online shopping suggests that perceived personalization is connected with perceptions of trust, and trust can serve as an important mechanism through which personalization can affect subsequent outcomes (Alimamy & Gnoth, 2022; Teepapal, 2025).

AI-driven e-commerce evidence further reveals that trust has a strong involvement in consumer responses to recommendation systems, particularly when recommendations generate perceptions of service quality and platform capability (Hassan et al., 2025). At the same time, the use of personal data for targeting may lead to lower trust if consumers perceive that the retailer uses data in ways that breach patients' expectations of privacy, fairness or transparency. (Lee et al., 2022; Cai & Mardani, 2023). In this perspective, the fact that personalization is "creepy" or exploitative when it's too revealing or when consumers perceive it that the retailer's data practices are opaque (Lee et al., 2022; Soleimani, 2022). Research on privacy and intelligent personalization supports this worry showing that privacy-related perceptions can lead to purchase resistance

and negative reactions to personalized marketing practices (Cai & Mardani, 2023). Trust reviews on e-commerce are also insisting that privacy and security concerns are among the driving forces of trust. Trust reviews in e-commerce also state that privacy and security concerns are among the ongoing factors of mistrust, which further backs the idea of how analytics-based tracking can turn out to be risky when it comes to relationship outcomes (Soleimani, 2022).

Thus, DMA may enhance trust by means of competence and relevance signals, but at the same time, risk to undermine trust by means of perceived intrusiveness and privacy concerns. (Teepapal, 2025) Because this study focuses on consumer perceptions of tailored recommendations and promotions as service-enhancing features, the expected relationship is positive in the case that personalization is seen as beneficial and respectful. (Alimamy & Gnoth, 2022; Hassan et al., 2025).

Thus, the following hypothesis is proposed:

H2: Digital marketing analytics has a positive and significant relationship with consumer trust.

Customer satisfaction ↔ consumer trust

Satisfaction and trust are closely linked in the development of e-commerce relationships as repeated positive experiences form a proof that the retailer is trustworthy and working in the customer's interest (Rita et al., 2019; Soleimani, 2022). Evidence from e-commerce models shows that experience-based evaluations and service performance factors may affect both satisfaction and trust, which supports the notion that the quality of the relationship develops from positive interactions (Rita et al., 2019; Mamakou et al., 2024). Trust-focused studies also highlight consumers' beliefs in reliability and security which are formed by accumulative results of interaction with the website and its services (Mofokeng, 2023; Soleimani, 2022).

In e-commerce research based on artificial intelligence, trust has been found to positively affect satisfaction and loyalty, so it is plausible that trust and satisfaction may positively affect each other in technology-mediated retail relationships (Hassan et al., 2025). Due to the possibility of the direction between satisfaction and trust changing depending on the context and modeling choice, it is increasingly becoming

part of a wider system of relationship quality based on experiences and perceived safeguards (Soleimani, 2022; Hassan et al., 2025).

Within an S-O-R framing of this study, the concept of satisfaction is placed conceptually and first as an internal, evaluative state that influences a more stable, relational outcome (trust) (Teepapal, 2025; Rita et al., 2019). Accordingly, it is expected that satisfaction is positively related to trust since satisfied consumers tend to believe that the retailer delivers expectations, is reliable and offers a safe environment (Rita et al., 2019; Tandon et al., 2021).

Thus, the following hypothesis is proposed:

H3: Customer satisfaction has a positive and significant relationship with consumer trust.

Customer satisfaction as a mediator between digital marketing analytics and trust

Mediation logic is suitable when the focal stimulus functions by experiential improvements which consumers first have to evaluate internally prior to forming broader relational judgments (Teepapal, 2025; Mamakou et al., 2024). In analytics rich

environments personalization and perceived recommendation relevance may enhance the shopping experience resulting in higher levels of shopper satisfaction as an organismic evaluation of the retailer (Teepapal, 2025; Alimamy and Gnoth, 2022). Higher satisfaction then contributes to trust formation as positive evaluations encourage beliefs that the retailer is reliable, customer-oriented and safe to do business with. (Rita et al., 2019; Tandon et al., 2021). This mediating pathway is in line with relationship-oriented findings in e-commerce in which service features affect satisfaction and trust as related but distinct outcomes of digital experience quality (Rita et al., 2019; Soleimani, 2022). AI-driven commerce evidence also shows that personalization features can reinforce the trust-satisfaction dynamic, depicting the crucial role of personalization on the causation of relationship constructs (Hassan et al., 2025). At the same time, privacy and intrusiveness concerns are able to undermine the mediating process in terms of decreased satisfaction and/or trust, when personalization is perceived as excessive or opaque (Lee et al., 2022; Cai & Mardani, 2023). Therefore, exploring satisfaction as a

mediator provides a theoretically grounded explanation of the reason why DMA may translate into trust for some consumers and contexts but not others. (Teepapal, 2025; Soleimani, 2022).

Thus, the following hypothesis is proposed:

H4: Customer satisfaction mediates the relationship between digital marketing analytics and consumer trust.

Methodology

The study adopted a positivist research philosophy and a deductive approach to examine the relationships between exogenous and endogenous variables using empirical data. Based on SOR theory and the literature, the conceptual framework and hypotheses were developed. Quantitative survey technique with cross-sectional time horizon has been used to gather data to determine the causation among study variables. The target population of the study consisted of online consumers in Sri Lanka who actively engage in online purchasing through digital platforms such as social media and e-commerce websites. Since there is not a detailed sampling frame of online consumers, the probability sampling was not possible (Yunus et al., 2022). This study

used non-probability sampling techniques of purposes to select respondents who have relevant experience in online shopping and exposure to digital marketing practices of online shopping. Purposive sampling helps the researcher to select information-rich participants who can give reliable information about digital marketing analytics, consumer trust, and customer satisfaction. Respondents were selected in light of the following criteria: (1) Individuals who have purchased products through online platforms in the past 6 months, (2) Individuals who have been exposed to digital marketing promotions such as social media advertising, personalized recommendations, or email marketing, and (3) Individuals aged 18 years or above. Data was collected using a

structured online questionnaire distributed via Google Forms through social media platforms, email, and professional networks. Only respondents who met the screening criteria were allowed to complete the questionnaire. The Google form created for the questionnaire of the study was administered among selected respondents via WhatsApp and email. Accordingly, It was able to receive 437 responses from respondents. None of the questionnaires had to be eliminated as it was mandatory to fill all questions to proceed in the google form. Thus, all 437 responses received from responses were considered for the data analysis of the study. Table 1 shown below explains the status of the respondents of the study and their digital business engagement.

Table 1: Profile of Respondents

Demographic Factor	N	Percentage
Gender - Male	188	43.03%
Female	249	56.97%
Educational Background – Never Schooling	00	0%
Ordinary Level	87	19.9%
Advanced Level	176	40.2%
Degree	121	27.6%
Postgraduate Degree	53	12.12%
Digital Business Usage – Whatsapp	424	97.0%
E-mail	376	86.0%
Facebook	415	94.9%
Instagram	176	40.2%
E-commerce Websites	364	83.2%

The structural path model was applied to test the hypotheses reflected in from the study which was aimed at determining the effect of digital marketing analytics and customer

satisfaction on consumer trust. The structural model proposed for the study is illustrated in figure 1.

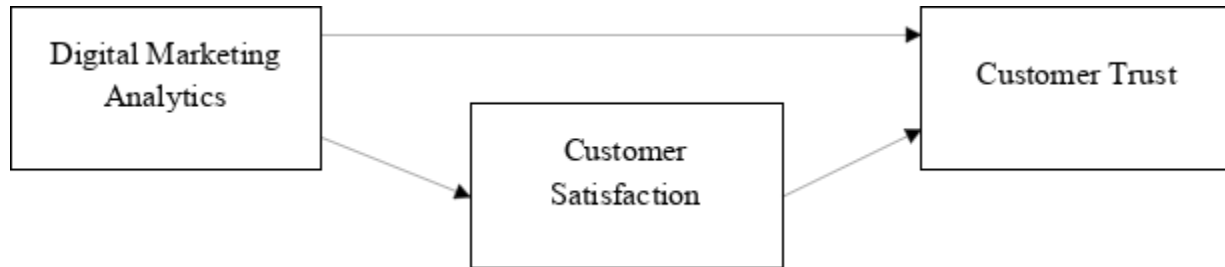


Figure 01: Conceptual Framework

The study used a structured questionnaire as the research instrument which was developed based on the literature as to align with the SOR model. The research instrument consisted of four main sections including questions to test the profile of respondents, digital marketing analytics, customer satisfaction, and consumer trust. The digital marketing analytics was

measured based on three indicators consisting of six items. Customer satisfaction was measured using six items targeted at three indicators. The consumer trust was measured with six items accompanied by four indicators. All these indicators were assessed using a five-point Likert scale scoring which was ranged from 5-Strongly agree to 1-strongly disagree.

Table 2: Operationalization

Variable	Indicators	Code	Item	Source
Digital Marketing Analytics	- Personalization - Data-driven recommendations	DA01	This online store provides personalized product recommendations based on my preferences.	(Chatterjee et al., 2022; McLean & Wilson, 2022; Kapoor et al., 2022)

	Targeted promotions	DA02	The website uses my past browsing/purchase data to offer relevant suggestions.	
		DA03	Promotions and advertisements I receive are tailored to my interests.	
		DA04	The website understands my needs through data analysis.	
		DA05	The online retailer uses advanced technology to improve my shopping experience.	
		DA06	I feel the website tracks customer behavior to enhance services.	
Consumer Trust	- Overall satisfaction - Experience evaluation - Expectation fulfilment	CT01	I trust this online store.	(Tandon et al., 2021; Bilgihan et al., 2021)
		CT02	This website is reliable.	
		CT03	This online retailer keeps customers' best interests in mind.	
		CT04	I feel secure when making transactions on this website.	
		CT05	This online store is honest with its customers.	
		CT06	I believe this website is trustworthy.	
Customer Satisfaction	- Reliability - Security - Honesty - Trustworthiness	CS01	I am satisfied with my overall experience with this online store.	(Kim & Lennon, 2021; McLean & Wilson, 2022)
		CS02	This online store meets my expectations.	

		CS03	I am happy with the services provided by this online retailer.	
		CS04	My decision to shop from this website was a wise one.	
		CS05	I am pleased with the personalized services provided.	
		CS06	Overall, I am satisfied with this online shopping experience.	

Structural Equation Modelling (SEM) approach was applied to analyze the data collected for the study using the SMART-PLS software. SEM approach was recommended by Hair et al. (2019) as a better approach to assess prediction-oriented research, mediating testing, and complex models as depicted in figure one. The measurement model was assessed through reliability and validity tests, including Cronbach's alpha, composite reliability, and average variance extracted (AVE). The structural model was evaluated using path coefficients and bootstrapping procedures to test the proposed hypotheses and mediation effects.

Data Analysis

Measurement Model Assessment

The path model was tested for the fitness of the measurement model (Hair et al., 2019). Reliability and validity tests were undertaken to assess the measurement model fitness. Outer loadings, Composite reliability, and Cronbach's Alpha were tested to ensure the reliability of the measurement model while Discriminant Validity and Convergent Validity tests were employed to assess the validity of the measurement model. As depicted in table 3, all outer loadings are greater than 0.7 which indicates all indicators used in the measurement model are reliable and contribute meaningfully to the latent constructs, enhancing both the quality and validity of the PLS model (Hair et al., 2019). Consequently, Cronbach's Alpha and

Composite Reliability results presented in table 3 confirm that the reliability is established in the measurement model which exceeds threshold level of 0.7 for all latent variables (Hair et al., 2019). The threshold for convergent validity was met if the average variance extracted (AVE) for each latent variable exceeded 0.5 (Hair et al., 2019). The corresponding AVE results are

shown in table 3 confirm that convergent validity is also established. AVE extracted for each construct/variable as reported in table 3 are higher than the required level of 0.5 (50%). Fornell & Larcker (1981) highlighted that each construct has a capability to explain more than half of variance in measuring items on average. Thus, the convergent validity is established.

Table 3: Outer loadings, reliability, validity, and multicollinearity

Variable/Dimension	Item Code	Outer Loadings	Cronbach's Alpha	Composite Reliability	AVE
Digital Marketing Analytics	DA01	0.841	0.834	0.852	0.574
	DA02	0.834			
	DA03	0.862			
	DA04	0.724			
	DA05	0.865			
	DA06	0.745			
Consumer Trust	CT01	0.747	0.843	0.847	0.690
	CT02	0.788			
	CT03	0.721			
	CT04	0.823			
	CT05	0.835			
	CT06	0.847			
Customer Satisfaction	CS01	0.813	0.842	0.843	0.573
	CS02	0.755			
	CS03	0.798			
	CS04	0.820			
	CS05	0.821			
	CS06	0.823			

The Discriminant validity was tested using several measures: cross loadings, Fornell and Larcker criterion, and HTMT. Each item loadings should be loaded highest against its

respective construct (Hair et al., 2019). In Fornell and Larcker Criterion the square root of the AVE for each construct should be greater than its highest correlation with other

constructs (Fornell & Larcker, 1981). The HTMT values for each construct should be less than 0.9 (Hair et al., 2019). The results

in Tables 4, 5, and 6 confirm that all discriminant validity is established.

Table 4. Discriminant Validity – Fornell and Larcker Criterion

Variable	CS	CT
CT	0.774	
DA	0.736	0.765

Table 5. Heterotrait-Monotrait Ratio (HTMT)

Dimension	CS	CT
CT	0.874	
DA	0.865	0.884

Table 6. Cross Loadings

Indicator	DA	CS	CT
DA1	0.820		
DA2	0.834		
DA3	0.779		
DA4	0.763		
DA5	0.778		
DA6	0.768		
CS1		0.805	
CS2		0.823	
CS3		0.811	
CS4		0.742	
CS5		0.759	
CS6		0.788	
CT1			0.838
CT2			0.854
CT3			0.758
CT4			0.812
CT5			0.808
CT6			0.806

Structural Model Assessment

The structural model was assessed through collinearity, path coefficients, coefficient of determination (R^2), effect sizes (f^2), predictive relevance (Q^2), and model fit (SRMR). The results of the study indicate that digital marketing analytics significantly influences customer satisfaction ($\beta = 0.63$, p

< 0.001) and customer trust ($\beta = 0.21$, $p = 0.001$). Customer satisfaction also has a significant positive effect on customer trust ($\beta = 0.58$, $p < 0.001$). These results indicate that the model explains 40% of the variance in customer satisfaction and 56% of the variance in customer trust.

Table 7: Structural Model Assessment Results (PLS-SEM)

Relationship	VIF	f^2 Effect Size	R^2	Q^2	q^2
DA $\rightarrow$ CS	1.42	0.40 (Large)	0.40	0.28	0.22
DA $\rightarrow$ CT	1.55	0.05 (Small)	0.56	0.35	0.04
CS $\rightarrow$ CT	1.55	0.33 (Medium–Large)	0.56	0.35	0.18

Table 8: Model Fit

Model Fit Index	Value	Threshold	Interpretation
SRMR	0.061	< 0.08	Good model fit

Table 9: Predictive Power (PLSpredict)

Endogenous Construct	RMSE (PLS Model)	RMSE (LM Benchmark)	Predictive Power
CS	0.621	0.684	High
CT	0.598	0.642	High

Relationship	VIF	Path Coefficient (β)	t-value	p-value	f^2 Effect Size	R^2	Q^2	q^2
DA $\rightarrow$ CS	1.42	0.63	11.25	<0.001	0.40 (Large)	0.40	0.28	0.22
DA $\rightarrow$ CT	1.55	0.21	3.48	0.001	0.05 (Small)	0.56	0.35	0.04
CS $\rightarrow$ CT	1.55	0.58	9.67	<0.001	0.33 (Medium–Large)	0.56	0.35	0.18

Hypotheses Analysis

The results indicate that digital marketing analytics has a significant positive effect on customer trust ($\beta = 0.649$, $p < 0.000$) and customer satisfaction ($\beta = 0.742$, $p < 0.000$). Customer satisfaction also significantly influences customer trust ($\beta = 0.625$, $p <$

0.000). Furthermore, the indirect effect of digital marketing analytics on customer trust through customer satisfaction is significant ($\beta = 0.628$, $p < 0.000$), confirming the mediating role of customer satisfaction. The total effect of digital marketing analytics on customer trust is 1.113.

Table 10. Path Coefficients (β) and T-statistics

No	Effect	Coefficient	T statistics	P value	Result
H ₁	DA->CT	0.649	9.811	$p < 0.001$	Supported
H ₂	DA->CS	0.742	10.265	$p < 0.001$	Supported
H ₃	CS->CT	0.625	7.963	$p < 0.001$	Supported
H ₄	DA->CS->CT	0.464	11.324	$p < 0.001$	Supported

Discussion

This study surveyed the effect of digital marketing analytics on customer trust with the mediating role of customer satisfaction. The findings strongly support the proposed relationships and emphasize the important role of data-driven marketing capabilities in shaping customer relationship outcomes.

Firstly, findings suggest that digital marketing analytics has an important positive impact on customer trust, and so

confirms that organizations which successfully use customer data and analytical tools in relation to marketing are better placed to foster trusting relationships with customers. By making it easier to uncover subtleties of consumer behavior and preferences, digital marketing analytics is helping firms create more relevant and personalized support. When customers feel that a firm is using their data to provide greater quality and responsiveness in

service, customer confidence in the firm will increase, further building trust.

Secondly, the data shows that digital marketing analytics has a positive impact on customer satisfaction. This implies that analytics capabilities equip organizations to improve the customer experience in terms of targeted marketing strategies and personalized interactions. By analyzing customer behavior and feedback, firms can make marketing communications more closely tailored to customer expectations, thereby lifting satisfaction levels.

Thirdly, the study confirms the significant prediction of customer satisfaction on customer trust which consonant with relationship marketing theory. Satisfied customers are more likely to perceive a firm to be reliable and competent and therefore further build trust in the organization. Thus, good experiences with a firm play a major role in building long-term customer relationships.

Most importantly, the results show that customer satisfaction mediates the relationship between digital marketing analytics and customer trust. This means that the impact of digital marketing analytics

on trust is mediated, in part, by improvements in customer satisfaction. Consequently, analytics-driven marketing strategies produce a greater satisfaction in customers which in turn produces a higher-trust factor in the firm. The outcome of the mediation highlights the fact that the effectiveness of analytics capabilities in establishing trust is largely based on their ability to amplify customer satisfaction.

Overall, the findings emphasize the strategic importance of digital marketing analytics for augmenting the customer experience and strengthening customer relationships. Organizations that effectively use analytics are better positioned to understand customer behavior, provide personalized interactions and respond to customer needs with greater precision, thus enhancing customer satisfaction and building greater customer trust in an increasingly competitive environment within digital settings.

Conclusion

This study examined the influence of digital marketing analytics on customer trust and investigated the mediating role of customer satisfaction among online consumers in Sri Lanka. Based on the

Stimulus-Organism-Response (SOR) theory, digital marketing analytics was conceptualized as a technological stimulus affecting the internal consumer evaluations of satisfaction, which then affect behavioral responses of trust. The empirical findings are strong support to the proposed model and point to the strategic importance of analytics-driven marketing capabilities in digital commerce environments.

The results show that digital marketing analytics has a highly positive effect on customer satisfaction and customer trust. This means that organizations that are able to use customer data and predictive insights, along with personalized digital marketing strategies, are better able to provide meaningful and relevant customer experiences. When customers see that online retailers know their preferences and have advanced analytics to enhance service and recommendations, their level of satisfaction and confidence in the firm rises. In line with relationship marketing theory, the results also support the consideration that customer satisfaction has significant influence on customer trust, in further support of the view that positive customer experiences are basic in building long term relational outcomes

(Morgan & Hunt, 1994; McLean & Wilson, 2022).

A key contribution of this study is the identification of customer satisfaction as a mediator between the digital marketing analytics and customer trust. While past studies have discussed digital marketing capabilities and trust individually, limited research has paid attention to the indirect mechanism that connects these constructs in a single framework. The results prove that the use of digital marketing analytics can strengthen trust not only directly but also indirectly by creating customer satisfaction, thereby expanding the use of the SOR framework to digital marketing contexts.

From a managerial view, the results of the research highlight the need for organizations to invest in digital marketing analytics capabilities to gain a better understanding of customer behavior and to provide personalized services. Firms that leverage analytics-driven insights to build customer experience strategies are more likely to drive customer satisfaction and customer trust in increasingly competitive digital markets.

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