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Operations Strategy in Kenya's Micro, Small and Medium Enterprises Sector

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Abstract

Survey explores operations strategy content from a sector perspective, focusing on Kenya's Micro Small and Medium Enterprises (MSMEs) sector. Study focused on six operations strategy contents: cost, innovation, quality, flexibility, customer service and delivery. Study operationalized target constructs using multiple items from literature. Data collection relied on structured questionnaire. 216 firms (54% response rate) from 23 economic sub-sectors participated in the survey. Convergent validity was evaluated using principal component analysis loading, while Cronbach's alpha coefficient and Intraclass correlation coefficients evaluated internal reliability and multidimensional properties of input variable items. Exploratory Factor Analysis and descriptive statistics were used to extract and profile operations strategy contents. Study findings supported selected operations strategy contents other than cost. Characterization of extracted operations performance objectives operations supports multidimensional properties and fluidity of their theoretical and empirical items. Study offers insights to policy makers as to plausible focus areas for MSMEs' growth and competitiveness. In view of increasing mixed results for operations strategy content in the MSME context, replication and comparative evaluation of findings with existing empirical literature from other regions and subsectors is encouraged.

Keywords

Operations Strategy, Operations Performance Objective, Survey, MSME, Exploratory Factor Analysis

1. Introduction

Micro, small and medium enterprises (MSMEs) account for majority of organiza-

tions in different economies with varying impact on economic activities and outcomes (Afdal, Siwi, Kurniawati, & Marwan, 2021; Eggers, 2020; KNBS, 2019). They constitute 90% of global enterprises and employs over 50% of world labour force (Afdal et al., 2021; Atiase, Mahmood, Wang, & Botchie, 2018; Malesios, De, Moursellas, Dey, & Evangelinos, 2021; Sellitto, Valladares, Pastore, & Alfieri, 2022). MSMEs are unique organizations (Afdal et al., 2021; Eggers, 2020) which are characterized as limited in resources endowment, faced with strong competition, and rarely capable of operating at optimal levels (Ahmedova, 2015; Ashwini Nand, Singh, & Power, 2013; Durugbo, Anouze, Amoudi, & Al-Balushi, 2021). Consequently, their continued growth and dominance in different economies has spurred and sustained research attention towards their sustainability, success and efficiency (Ahmedova, 2015; Alfoqahaa, 2018; Eggers, 2020). Theoretical relevance and anticipated contribution of operations strategy in MSMEs sustainability have supported an emerging paradigm shift of operations strategy research (Alfoqahaa, 2018; Aziz, 2019; Gyimah & Adeola, 2021).

Initial conceptualization of operations strategy content comprised cost, delivery, flexibility and quality (Skinner, 1969). Emerging trends show acknowledgement and empirical evaluation of other elements, leading to an expanding list of operations strategy content. Additional elements include innovation, customer service, corporate social responsibility, environment, and sustainability (Avella, Vazquez-Bustelo, & Fernandez, 2011; Díaz-Garrido, Martín-Peña, & Sánchez-López, 2011; Grant, Cadden, McIvor, & Humphreys, 2013; Hussain, Ajmal, Khan, & Saber, 2015; Longoni & Cagliano, 2015; Nauhria, Pandey, & Kulkarni, 2011; Prabhu, Nambirajan, & Abdullah, 2020; Russell & Millar, 2014; Sellitto et al., 2022). In furtherance to established operations strategy literature, recognition of additional elements and implications thereof harbors probable and unexplored opportunities to its contribution to organizational success (Jagoda & Kiridena, 2015; Vilkas, Duobienė, Rauleckas, Rūtelionė, & Šeinauskienė, 2023).

Evaluation of the concept in MSME context continues on several frontiers, amongst them identification, operationalization and validation of operations strategy contents, emphasis, contribution and interaction with other organizational concepts (Ahmedova, 2015; Alfoqahaa, 2018; Cai, 2018; Durugbo et al., 2021; Vilkas et al., 2023). Perusal of emerging empirical literature depicts mixed empirical findings, varied methodological approaches and theoretical perspectives, leading to non-generalizability of MSMEs based findings (Ahmedova, 2015; Kathuria, Kathuria, & Kathuria, 2018; Russell & Millar, 2014; Sarmiento, Whelan, & Sprenger, 2018). In addition, scholars (Ahmedova, 2015; Boon-itt & Wong, 2016) acknowledge discrepancies in MSME empirical findings to established literature and management practices from large and successful organizations. Consequently, continuous evaluation of the basic doctrines, theories, principles, methodology and underlying assumptions of operations strategy are well supported (Boon-itt & Wong, 2016; Cai, 2018; Durugbo et al., 2021; Grant et al., 2013; Kathuria et al., 2018; Prabhu et al., 2020; Rosenzweig & Easton, 2010; Sarmiento & Shukla, 2011; Sarmiento,

Whelan, & Sprenger, 2018). In addition, replication, validation and expansion of empirical research of operations strategy in different MSME contexts is well documented (Alfoqahaa, 2018; Durugbo et al., 2021; Longoni & Cagliano, 201; Russell & Millar, 2014; Sarmiento, Whelan, & Thürer, 2018). Relevance and growing research focus of operations strategy in MSME context has been identified as supportive of an emerging paradigm shift of operations strategy literature (Ahmedova, 2015; Aziz, 2019; Gyimah & Adeola, 2021).

1.1. Research Gap and Study Objective

Increasing research attention to operations strategy in MSMEs context portrays a plethora of operational objectives, practices and outcomes (Ahmedova, 2015), with several methodological, empirical and conceptual gaps identified. Despite increasing research focus on the role of operations strategy in MSME context, limitation to generalizability of related findings is acknowledged (Alfoqahaa, 2018; Durugbo et al., 2021; Kathuria et al., 2018; Sellitto et al., 2022; Vilkas et al., 2023). Non-generalizability of findings is attributed to several factors, including varying results, lack of comparative studies, reliance on small samples and case studies from selected economic sub-sectors and application of varied methodological approaches (Durugbo et al., 2021; Grant et al., 2013; Kathuria et al., 2018; Russell & Millar, 2014; Sarmiento, Whelan, & Sprenger, 2018; Sarmiento, Whelan, & Thürer, 2018; Sellitto et al., 2022).

Further, MSMEs display varied structural and infrastructural posture, and accompanied sensitivity to their contextual settings (Afdal et al., 2021; Aziz, 2019; Eggers, 2020; Kathuria et al., 2018). This espouses non-generalizability of findings, supporting calls for validation, replication, comparison and consideration of emerging perspectives and findings from varied MSME contexts (Cai, 2018; Longoni & Cagliano, 2015; Russell & Millar, 2014; Sarmiento, Whelan, & Thürer, 2018). In light of evolving debate and identified knowledge gaps, study addresses the questions: "How is operations strategy manifested from a varied MSME subsector perspective?" Accordingly, study sought to explore operations strategy content from a MSME sector perspective with a focus on six constructs: cost, delivery, flexibility, quality, innovation and customer service.

In addition to addressing specified objective, current study contributes to operations strategy literature in several ways. First, notwithstanding ongoing focus on identification of additional operations strategy content (Durugbo et al., 2021), perusal of literature depicts disproportional empirical attention in favour of cost, delivery, flexibility and delivery to other identified elements. As such, inclusion and empirical evaluation of other elements in the expanding list is timely and necessary. Secondly, study expands existing empirical research and perspectives (Longoni & Cagliano, 2015; Russell & Millar, 2014) by focusing on MSMEs in Kenya's economic context. Operations strategy posture of MSME in Kenya's context is hardly explored, if any. Kenya's economy is an essential trade route and partner in regional and global trade (Maurer, Magis, & Tammelleo, 2023), hence consid-

ered the largest and most diversified emerging and developing economy in East Africa. Lastly, in attempt to address methodological limitations deriving from single or selected subsector analysis in MSME studies (Grant et al., 2013), study sought to evaluate operations strategy content from a wider and varied MSME perspective.

1.2. Kenya's MSME Sector

Kenya's economy is predominantly MSMEs based. Their estimated population is over 7.4 million, contributing about 40% of gross domestic product and employing about 80% of the country's labour force. The sector account for 92% of annual jobs creations, 98% of all business in Kenya, with over 70% of them operating as informal entities (KNBS, 2019).The sector exhibits diversity of Kenya's economic context with representation across economic sub-sectors and MSMEs classification (KBA, 2021). Stakeholders including practitioners, scholars, and government and private sector agencies continue to streamline and support the sector, given its role in national, regional and global trade and economics (Maurer et al., 2023).

Whereas research attention to operations strategy in MSMEs context has been increasing (Durugbo et al., 2021; Kathuria et al., 2018; Sellitto et al., 2022), focus has largely remained on selected economic sub-sectors. Evaluation and characterization of operations strategy from an entire MSME sector perspective remain largely unexplored. Towards this end, diversity of Kenya's MSMEs sector (KBA, 2021) makes an ideal setup in exploring operations strategy from a sector perspective.

2. Literature Review

2.1. Operations Strategy & Conceptual Model

Conceptualization of operations strategy as the missing link to corporate success (Skinner, 1969) and its subsequent application beyond manufacturing context affirms dynamic and universal role of production function in the attainment of corporate goals (Slack & Lewis, 2017). Operations strategy symbolizes collective patterns and actions in directing resources towards production and delivery of goods and services through a transformational process aimed at fulfil existing and future market needs. It denotes firm's efforts towards nurturing and deploying production assets for operational sustainability and corporate goals (Boyer & Lewis, 2002; Grant et al., 2013; Slack & Lewis, 2017).

Operations of a firm's production function defines operations strategy posture, manifested by pursued competitive priorities and their emphasis (Boyer & Lewis, 2002; Skinner, 1969; Slack & Lewis, 2017). Literature depicts adoption of different terminologies for competitive priorities, including competitive dimensions, manufacturing capabilities, operations performance objectives (Avella et al., 2011; Durugbo et al., 2021; Skinner, 1969; Wheel Wright, 1984). The many different terms are used to identify components of operations strategy represent intangible difference of semantics (Durugbo et al., 2021) while manifesting varied attempts to adopt operations-friendly language in emphasizing role of operations function

and linkage to corporate success (Ashwini Nand et al., 2013; Díaz-Garrido et al., 2011; Enis Bulak & Turkyilmaz, 2014). Scholars (Alfoqahaa, 2018; Aziz, 2019; Cai, 2018; Durugbo et al., 2021; Kathuria et al., 2018; Russell & Millar, 2014; Sarmiento, Whelan, & Thürer, 2018; Sellitto et al., 2022; Vilkas et al., 2023) acknowledgement of sustained debate on operations strategy's theoretical underpinnings as well as its empirical evaluation of its contents and their interactions with other organizational constructs and concepts.

Operations strategy was initially conceptualized with four operations performance objectives: cost, quality, flexibility, and time (Skinner, 1969), with the latter substituted with delivery to emphases broader aspect of time (Boyer & Lewis, 2002; Vilkas et al., 2023). Evolution of the concept, alignment with shifting paradigms and corporate strategy development has culminated in recognition and inclusion of an expanding list of operations performance objectives in theoretical and empirical studies. Other commonly identified elements to initial elements include innovation, knowhow, customer service, environment, sustainability, and corporate social responsibility (Avella et al., 2011; Boyer & Lewis, 2002; Durugbo et al., 2021; Longoni & Cagliano, 2015; Prabhu et al., 2020; Sellitto et al., 2022). Research efforts towards identification, operationalization, validation and classification of operations strategy elements continues to command research attention (Durugbo et al., 2021). **Figure 1** illustrates conceptual model of operations strategy that is anchored on the initial configuration (Skinner, 1969) while integrating accumulating literature and expanding list of operations performance objectives.

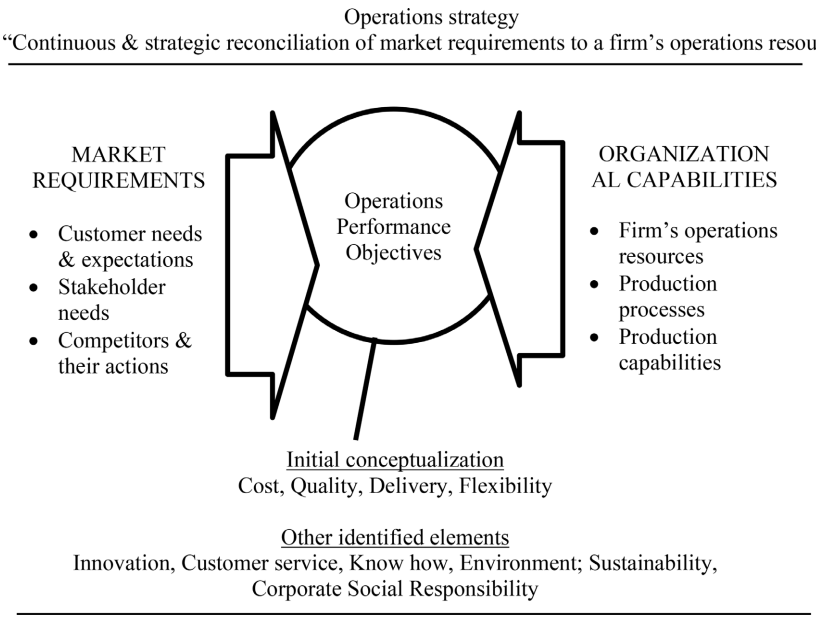

Figure 1. Operations strategy conceptual model.

2.2. Operations Strategy Content in MSME—Empirical Review

Authenticity and interest beyond manufacturing context is illustrative of universal properties of operations strategy theory and principles, and its deemed contribu-

tion to organization's success (Slack & Lewis, 2017). Despite increasing theoretical relevance of operations strategy in MSME context, perusal of empirical literature from different economic contexts shows unbalanced focus on manufacturing over non-manufacturing context, which underwhelms operations strategy's widening theoretical scope and integration of non-manufacturing and other emerging contexts (Ahmedova, 2015; Aziz, 2019). At the same time, empirical studies depicts varied findings for operations strategy content and their emphasis (Alfoqahaa, 2018; Kathuria et al., 2018; Sellitto et al., 2022; Vilkas et al., 2023).

Scholars (Alfoqahaa, 2018; Russell & Millar, 2014) support continued focus on varied contexts for provision of comparative literature and broader insights. Such insights are critical to the integration and validation of emerging knowledge, review of existing theory and methodologies on a continuous basis. **Table 1** summarizes operations strategy contents in MSME based empirical studies.

Perusal of **Table 1** shows empirical inclusion of operations performance objectives from the expanding list remains relatively low relative to the concept's initial

Table 1. Operations strategy content in MSME context.

Researchers	Operations performance objectives									
	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10
Avella et al. (2011)	✓	✓	✓	✓	-	-	-	✓	-	-
Cai (2018)	✓	✓	✓	✓	-	-	-	-	-	-
Díaz-Garrido et al. (2011)	✓	✓	✓	✓	-	-	✓	✓	-	-
Enis Bulak & Türkyilmaz (2014)	✓	✓	✓	✓	-	-	-	-	-	-
Grant et al. (2013)	✓	✓	✓	✓	-	-	✓	-	-	-
Hallgren et al. (2011)	✓	✓	✓	✓	-	-	-	-	-	-
Hussain et al. (2015)	✓	✓	✓	✓	-	✓	-	-	-	-
Idris & Naqshbandi (2019)	✓	✓	✓	✓	-	-	-	-	-	-
Kathuria et al. (2018)	✓	✓	✓	✓	-	-	-	-	-	-
Longoni & Cagliano (2015)	✓	✓	✓	✓	-	-	-	✓	-	✓
Muzamil & Idris (2012)	✓	✓	✓	✓	-	-	-	-	-	-
Nauhria et al. (2011)	✓	✓	✓	✓	✓	-	✓	-	✓	-
Prabhu et al. (2020)	✓	✓	✓	✓	-	✓	✓	-	-	-
Russell & Millar (2014)	✓	✓	✓	✓	✓	-	-	-	-	-
Sellitto et al. (2022)	✓	✓	✓	✓	✓	-	✓	-	-	✓
Thürer et al. (2015)	✓	✓	✓	✓	✓	-	-	-	-	-
Peng et al. (2011)	✓	✓	✓	✓	✓	-	-	-	-	-

a. X1 = cost; X2 = quality; X3 = flexibility; X4 = delivery; X5 = innovation; X6 = know how; X7 = customer service; X8 = environment; X9 = sustainability; X10 = corporate social responsibility; b. ✓ = construct included in the study; - = construct not included in the study.

elements. Where considered, inclusion of elements from the expanding list varies across studies, with innovation and customer service being notable selections. Current study focuses on empirical evaluation of innovation and customer service amongst operations strategy's initial elements: cost, quality, delivery and flexibility. Innovation and customer service are amongst the frequently evaluated elements in the expanding list of operations strategy content. Evaluation of operations performance objectives is broad, as it captures diverse firm's operations and market features. These features reflect in multidimensional properties of operations performance objectives, operationalized with multiple items while lacking selection and prioritization criteria (Díaz-Garrido et al., 2011; Hallgren, Olhager, & Schroeder, 2011).

3. Research Methodology

3.1. Research Design, Population and Sampling

Study adopted survey design. Survey approach was selected on prior adoption in MSMEs and operations performance objective studies (Ahmedova, 2015; Alfoqahaa, 2018; Cai, 2018; Durugbo et al., 2021; Longoni & Cagliano, 2015; Thürer, Godinho Filho, Stevenson, & Fredendall, 2015). Survey method supports statistical validity, reliability, inferences and generalizability of findings, and is a common approach in quantitative research (Apuke, 2017; Saunders, Thornhill, & Lewis, 2019), thus an appropriate approach for current study.

Focus population comprised all MSMEs in Kenya, estimated at 7.5 million entities (KBA, 2021; KNBS, 2019). 72% of MSMEs in Kenya are not registered entities (KNBS, 2019), thus unavailability of a comprehensive and reliable MSME database. As a result, survey relied on convenience sampling. While convenience sampling is predisposed to sampling biases and systematic error, appropriate operationalization can yield good population representation and useful insight for advancement of science (Doebel & Frank, 2024). Suggested approaches for improving convenience sample's representativeness include adoption of online data collection methods; diversity in sample targeting, and focusing on large samples (Doebel & Frank, 2024; Golzar, Noor, & Tajik, 2022). These suggestions were incorporated in the study. For instance, study relied heavily on online data collection method, where the tool was distributed via a google link. Further, given lack of centralized sampling frames and directories of MSMEs, study relied on various MSME networking groups and business entities such as insurance firms, training and consulting firms, and general trading firms with dealings with MSME across different sub sector. These entities were encouraged to distribute the research tool to other eligible entities within their reach in an effort to reach varied and diverse sample. Participating entities and respondents were drawn from several regions within the country. Responding firms were screened for their MSME qualification and completeness of data.

Yamane's sample size formula at 5% error margin determined 400 MSMEs as appropriate target sample size for the study. The deriving sample size estimation

corresponds to minimum sample size determination tables approach (Saunders et al., 2019; Taherdoost, 2016).

3.2. Data Collection and Variable Measurement

Study relied on closed ended questionnaire. Closed ended questionnaires allow for expediency in data standardization and collection, statistical analysis and comparison (Bryman, 2016). Survey targeted single respondent per MSME. Cognizant of MSMEs lean management structures (Eggers, 2020), qualified respondents criterion was expanded to included owners, managers, or other individuals with sufficient knowledge of the entity's operations. The designation of each of the respondent was captured in the survey instrument. Use of single respondent, and from operational level is supported in operations strategy research (Cai, 2018; Grant et al., 2013) and in MSME studies (Kull, Kotlar, & Spring, 2018; Müller & Voigt, 2018).

Survey used multiple items approach to operationalize operations performance objectives drawn from empirical literature. Deriving items were scrutinized for suitability and adaptability to Kenya's MSME context, with five items selected for each construct. Selected items and their sources are summarized in **Table 2**. Measurement for each item relied on seven-point interval scale. Use of interval scale is a common approach in operations strategy research in MSME context (Cai, 2018; Enis Bulak & Turkyilmaz, 2014; Idris & Naqshbandi, 2019; Prabhu et al., 2020; Russell & Millar, 2014; Sellitto et al., 2022). MSME's demographic characteristics included in the tool focused on MSME age, number of employees and firm products. The latter two were used to determine MSME size classification and economic subsector respectively. Data collection instrument was validated through an MSME expert and further pretested with five MSMEs. Feedback obtained was incorporated, which involved adaptation of terms for simplicity and clarity in item operationalizing statements. **Table 2** summarizes dimensional and operationalization items used in this study.

Table 2. Adopted variable operationaization: dimensional and operationalization items.

Variable	Operational dimension	Operational items
Cost	Low-cost operations (Idris & Naqshbandi, 2019)	Low operations cost (Cai, 2018; Nauhria et al., 2011; Prabhu et al., 2020; Sellitto et al., 2022; Thürer et al., 2015)
		Low priced products (Grant et al., 2013; Sellitto et al., 2022; Thürer et al., 2015)
		Reduced inventory costs (Russell & Millar, 2014; Sellitto et al., 2022)
		Low operating costs (Ellis et al., 2023; Hallgren et al., 2011; Kathuria et al., 2018; Russell & Millar, 2014)
		Reduced materials cost (Nauhria et al., 2011; Russell & Millar, 2014; Sellitto et al., 2022)
Quality	Product standard & features (Thürer et al., 2015)	Conformance to standards (Enis Bulak & Turkyilmaz, 2014; Hussain et al., 2015; Prabhu et al., 2020)
		Consistence product (Avella et al., 2011; Kathuria et al., 2018; Thürer et al., 2015)

Continued

		Product Performance (Avella et al., 2011; Cai, 2018; Prabhu et al., 2020; Russell & Millar, 2014; Sellitto et al., 2022)
		Meeting customer needs (Avella et al., 2011; Cai, 2018; Grant et al., 2013; Hussain et al., 2015; Kathuria et al., 2018)
		Low defective rate (Avella et al., 2011; Cai, 2018)
Delivery	Product swiftness & reliability (Russell & Millar, 2014)	Timely delivery (Grant et al., 2013; Idris & Naqshbandi, 2019; Prabhu et al., 2020; Russell & Millar, 2014)
		Order accuracy (Díaz-Garrido et al., 2011; Prabhu et al., 2020; Sellitto et al., 2022)
		Delivery lead time (Avella et al., 2011; Idris & Naqshbandi, 2019; Kathuria et al., 2018; Nauhria et al., 2011)
		Reliable products (Avella et al., 2011; Cai, 2018; Grant et al., 2013; Kathuria et al., 2018; Prabhu et al., 2020; Thürer et al., 2015)
		Process agility/Speed (Cai, 2018; Kathuria et al., 2018; Prabhu et al., 2020; Russell & Millar, 2014; Sellitto et al., 2022)
Flexibility	Ability to adapt to fluctuating requirement (Sellitto et al., 2022)	Volume flexibility (Avella et al., 2011; Cai, 2018; Hallgren et al., 2011; Prabhu et al., 2020; Russell & Millar, 2014; Thürer et al., 2015)
		Design flexibility and change over (Avella et al., 2011; Cai, 2018; Prabhu et al., 2020; Russell & Millar, 2014; Thürer et al., 2015)
		Wide product range (Avella et al., 2011; Cai, 2018; Prabhu et al., 2020; Sellitto et al., 2022; Thürer et al., 2015)
		Product mix (Cai, 2018; Prabhu et al., 2020; Russell & Millar, 2014; Sellitto et al., 2022; Thürer et al., 2015)
		Handling of order variations (Avella et al., 2011; Sellitto et al., 2022)
Innovation	Incremental/fundamental Alteration of product, processes or markets (Russell & Millar, 2014)	Technological changes (Durugbo et al., 2021; Russell & Millar, 2014; Sellitto et al., 2022)
		New product development (Durugbo et al., 2021; Prabhu et al., 2020; Russell & Millar, 2014; Sellitto et al., 2022)
		Product /process improvement (Díaz-Garrido et al., 2011; Durugbo et al., 2021)
		Innovative supply practices (Nauhria et al., 2011)
		Innovative product (Thürer et al., 2015)
Customer service	Efforts for value delivery, stakeholder's satisfaction and retention (Sellitto et al., 2022)	Personalized service (Hussain et al., 2015; Nauhria et al., 2011)
		After sale service (Díaz-Garrido et al., 2011; Grant et al., 2013; Prabhu et al., 2020)
		Product information (Díaz-Garrido et al., 2011)
		Customer recognition (Díaz-Garrido et al., 2011; Hussain et al., 2015)
		Customer engagement (Hussain et al., 2015; Nauhria et al., 2011)

3.3. Validity and Reliability of Collected Data

Corroboration of validity, reliability and normal distribution properties is essential in facilitating transparency, quality and integrity of data, measurement approach and statistical results obtained thereof (Mohajan, 2017). Stability of

adopted measurement scale, internal stability, consistency and repeatability of adopted measurement scale and instrument were evaluated using validity and reliability measures (Taherdoost, 2016). Sufficiency of validity and reliability measures requires their joint consideration and interpretation (Sürücü, Yikilmaz, & Maslakçi, 2022). Study evaluated convergent validity using principal component analysis (PCA) loadings threshold greater than 0.4 (Taherdoost, 2016) Cronbach Alpha Coefficient ($\alpha > 0.5$) threshold (Hinton, McMurray, & Brownlow, 2014) was adopted for internal reliability. In addition, Intraclass correlation coefficients criterion (Koo & Li, 2016) was adopted reliability of multidimensional variable items.

3.4. Data Analysis

Survey adopted exploratory factor analysis (EFA) to extract and characterize operations performance objectives. EFA, a statistical data reduction technique, groups items from underling data patterns, facilitating interpretation of complex data structures (Howard, 2016; Osborne & Fitzpatrick, 2012; Sürücü et al., 2022). This approach was adopted for various reasons, including improvement of measurement reliability, dimensional reduction, identification of other hidden constructs within a data set and simplicity in its interpretation (Hair, Black, Babin, & Anderson, 2019; Tabachnick & Fidell, 2014). Cognizant of other applicable approaches of identifying operations performance objectives in operations strategy research, use of EFA approach is well established (Avella et al., 2011; Díaz-Garrido et al., 2011; Idris & Naqshbandi, 2019; Kathuria et al., 2018; Longoni & Cagliano, 2015; Muzamil & Idris, 2012; Prabhu et al., 2020; Russell & Millar, 2014; Peng, Schroeder, & Shah, 2011).

Scholars (Beavers et al., 2013; Howard, 2016; Watkins, 2018) highlight necessity of evaluating data for suitability and sufficiency in safeguarding integrity and consistency of EFA result. Evaluation approaches and considered threshold include adequacy of sample size (Beavers et al., 2013), sampling adequacy (Kaiser, 1974; Tabachnick & Fidell, 2007), internal reliability of survey items (Hinton et al., 2014), inter-correlation matrix (Howard, 2016) and unidimensional properties (Vaske, Beaman, & Sponarski, 2017) of input variables. Summary of adopted thresholds and obtained results for these considerations are in the results section.

While EFA provides several latent factor extraction methods, principal components analysis and principal axis factoring are most common (Henson & Roberts, 2006; Tabachnick & Fidell, 2014; Thompson, 2004). Distinction between the two approaches and associated implications remains contested (Conway & Huffcutt, 2003; Gorsuch, 2013; Henson & Roberts, 2006; Loewen & Gonulal, 2015; Thompson, 2004). Nonetheless, PCA is recommended when no prior models, theory or assumptions on underlying structure exist (Ford et al., 1986; Gorsuch, 2013; Pett et al., 2006). PCA is also recommended where data collection instruments is designed containing several items for the purpose of data reduction to identify preliminary EFA solution (Conway & Huffcutt, 2003; Costello & Osborne, 2005) with

unique latent factors (Netemeyer et al., 2003).

A key limitation of PCA is its inability to distinguish between unique, shared and noise variations in a data set (Gorsuch, 2013; Tabachnick & Fidell, 2014), thus likely to inflate explained variances of resulting latent factors (Gorsuch, 2013; McArdle, 1990). To address this limitation, literature depicts several approaches including cut-off point for item loading scores, minimum sample size and number of items per extracted factor (Costello & Osborne, 2005; Fava & Velicer, 1992; Gaskin & Happell, 2014; Snook & Gorsuch, 1989). In view of the foregoing and conceptualization of this study, PCA approach was adopted for factor extraction.

EFA technique incorporates multiple mathematical operations and methodologies, while providing for various considerations and alternatives (Beavers et al., 2013; Gaskin & Happell, 2014; Howard, 2016; Watkins, 2018). **Table 3** provides a summary of EFA considerations and established thresholds (Acar GüvendiR & Özer Özkan, 2022; Baraldi & Enders, 2010; Beavers et al., 2013; Braeken & Van Assen, 2017; Costello & Osborne, 2005; Fabrigar & Wegener, 2012; Fabrigar, Wegener, MacCallum, & Strahan, 1999; Watkins, 2018) adopted for the study.

Table 3. EFA consideration, evaluation approach and threshold.

Consideration	Evaluation approach and threshold
Factor Extraction Method	Principal Component Analysis (Beavers et al., 2013; Fabrigar & Wegener, 2012; Watkins, 2018)
Factor Rotation approach	Orthogonal approach: Varimax (Beavers et al., 2013; Costello & Osborne, 2005; Howard, 2016)
Factor retention Method	Kaiser criterion, factors with Eigen values (K) > 1 (Costello & Osborne, 2005; Fabrigar et al., 1999) Parallel Analysis.. Retain factor where computed Eigen value (K) > Simulated Eigen value Eigen value (Braeken & Van Assen, 2017) Retained factor > 3 Items (Costello & Osborne, 2005; Watkins, 2018)
itemloading cut-off	Retain items with Factor loading > 0.30 (Costello & Osborne, 2005)
Cross loading of items	Item placed into factor based on highest factor loading value (Acar GüvendiR & Özer Özkan, 2022)
Missing values in EFA data matrix	If missing values < 10% of data matrix, replace with mean; <15%, use regression to estimate (Baraldi & Enders, 2010; Watkins, 2018)

4. Results

4.1. Response Rate and Sample Characteristics

A total of 230 firms responded to the survey, with 14 firms eliminated for non-MSME profile, incomplete or inconsistency information. Effectively, study relied on data from 216 MSMEs against a target of 400 MSMEs, thus a 54.0% response rate. Response rate above 20% are acceptable for empirical operations management studies (Boon-itt & Wong, 2016). In addition, response rate between 35% and 50% are acceptable in business and management studies (Mellahi & Harris, 2016). In view of these observations, survey's attained response rate of 54% was considered sufficient. **Table 4** summarizes attained MSMEs sample distribution by subsector, MSME classification, average size and age.

Table 4. Attained MSME sample characteristics.

MSME distribution by economic subsector			Distribution by MSME classification		
Economic sub sector	n	%	MSME category	n	%
Agri/agro business	13	6.0	Micro	149	69.0
Beauty & Related Services	8	3.7	Small	40	18.5
Branding & Marketing	14	6.5	Medium	27	12.5
Clothing, Fashion & Laundry Services	9	4.2	Total	216	100.0
Construction & Related Services	23	10.6			
Consultancy & Training	16	7.4			
Education & related services	3	1.4			
Electronics	3	1.4	Distribution by size (employees)		
Engineering/fabrication	7	3.2	MSME category	Mean	SD
Event Management	4	1.9	Micro	3.75	2.41
Financial Services	13	6.0	Small	18.00	6.19
Food & Beverages/Hospitality	11	5.1	Medium	95.33	58.66
Health Services	9	4.2	Aggregate	17.84	36.31
Insurance	5	2.3			
ICT related services	6	2.8			
Legal Services	6	2.8			
Logistics/Courier Services	3	1.4	Distribution by MSME age (years of operation)		
Manufacturing	7	3.2			
Petroleum services	7	3.2	MSME category	Mean	SD
Retail/Trading	41	19.0	Micro	6.88	6.59
Sanitary Services	4	1.9	Small	9.10	6.73
Security services	2	0.9	Medium	14.70	9.83
Tours & Travel services	2	0.9	Aggregate	8.27	7.52
Total	216	100.00			

Attained sample represented 23 economic sub-sectors with varied representation ranging between 1% and 20%. Distribution of sampled firms by MSME classification comprised micro, small and medium firms at 69%, 18& and 13% respectively. Distribution of attained sample across varied economic sub-sectors and by MSME size classification resonates with MSME profiling in Kenya (KNBS, 2019). From the attained sample, medium sized firms reported the highest average tenure of 15 years, followed by small and micro sized firms with 9 and 7 years respectively. Sampled MSMEs reported an average age of 8 years. As such, attained sample surpasses established MSMEs survival hurdle of 5 years (Gyimah & Adeola, 2021), and therefore deemed capable of a fair representation of MSMEs opera-

tions.

Respondents were clustered around their functional roles, with results summarized in Table 5. Derived results depict high participation by MSME owner-manager and functional management level staff. This caliber of respondents is deemed knowledgeable and capable of evaluating and presenting their respective firm's operational decisions and practices.

Table 5. Distribution of respondents by role/function.

Respodents' Role	n	Percentage
Business Development	7	3%
Finance & Administration	15	7%
General Management	31	14%
Operations /Logistics	36	17%
Owner /Managing Director	117	54%
Sales/Relationship Officer	5	2%
Not indicated	5	2%
Total	216	100%

4.2. Input Variable Diagnostics

4.2.1. Descriptive and Normal Distribution Properties

Survey summarized input variables using means and standard deviation (SD). Normal distribution properties were evaluated using skewness and kurtosis, with a threshold of ≥2.0 and ≥7.0 (Curran, West, & Finch, 1996) respectively. Table 6 summarizes survey findings.

Table 6. Study variable's descriptive and normal distribution properties.

Input Variable	Descriptive statistics				Normal distribution	
	n	items	Mean	SD	Skewness	kurtosis
Quality	216	5	6.31	0.84	−2.67	11.14
Delivery	216	5	6.17	0.86	−2.07	6.63
Customer service	216	5	5.89	0.92	−1.08	1.28
Flexibility	216	5	5.58	1.18	−1.15	1.39
Innovation	216	5	5.40	1.22	−0.90	0.65
Cost	216	5	5.12	1.07	−0.46	−0.14

Deriving from summary statistics for input variables presented in Table 6, highest and least mean score manifested in quality and cost constructs, respectively. Standard deviation scores for all six variables were reasonably low, ranging between 0.84 and 1.22, signifying low variability in respondent's level of agreement for the various operationalization items. Sampled data satisfied adopted

threshold for normal distribution properties for customer service, flexibility, innovation and cost. Quality violated normal distributions properties, with delivery failing to uphold skewness. It is noted that violation of normality properties does not necessarily disqualify a variable from EFA (Costello & Osborne, 2005), nor is normality an absolute data requirement for EFA analysis (Fabrigar et al., 1999). Nonetheless, 4 of the selected 6 study variables sustained threshold for normal distribution, thus supporting transparency, quality and integrity of data, measurement approach and statistical results obtained thereof (Mohajan, 2017).

4.2.2. Validity and Reliability of Collected Data

Table 7 summarizes survey data's convergent validity and internal reliability properties.

Table 7. Study Variable's Validity and reliavbility properties.

Input Variable	Validity Measures		Reliability measures		
	Items PCA loadings	Items (n) with PCA > 0.4	Cronbach's alpha coeff.	Intraclass correlation coeff.	Koo & Li, 2016 categorization
Quality	0.67 - 0.85	5	0.81	0.81	Good
Delivery	0.61 - 0.81	5	0.79	0.77	Good
Customer service	0.49 - 0.77	5	0.63	0.6	Moderate
Flexibility	0.69 - 0.80	5	0.82	0.82	Good
Innovation	0.67 - 0.82	5	0.81	0.79	Good
Cost	0.27 - 0.83	4	0.57	0.57	Moderate

Perusal of Table 7 shows survey data affirmed convergent validity properties for all operationalization items for the 6 input variables other than 1 item of cost variable. All input variable items satisfied internal reliability threshold, with their multidimensional properties variables categorized as either "good" or "moderate". Accordingly, study affirmed validity and reliability of measurement instrument and collected data.

4.2.3. Suitability and Sufficiency of Data for EFA

Table 8 summarizes adopted evaluation criteria for evaluating suitability and sufficiency of data for EFA approach, respective threshold and obtained results from survey's sample. Perusal of summarized results affirmed suitability and sufficiency of survey data for EFA approach.

4.3. EFA Findings

Application of EFA procedure and considerations for a stable solution produced five latent constructs. Extracted solution satisfied adopted statistical threshold for the various considerations. For instance, reported computed Eigen values (Kaiser criterion) for each extracted constructs were greater than one (Costello & Osborne, 2005; Fabrigar et al., 1999) and were higher than corresponding Eigen

Table 8. Suitability and sufficiency of sampling data for EFA.

Evaluation	Statistical test	Statistical threshold	Survey results	inference
Adequacy of sample size	Sample size (n)	n > 150 (Beavers et al., 2013)	Sample size 216	Sample size adequate
Sampling adequacy of data	Kaiser-Meyer-Olkin (KMO) Test of Sampling Adequacy	KMO > 0.50 (Kaiser, 1974; Tabachnick & Fidell, 2007)	KMO: flexibility, 0.84; innovation, 0.82; delivery, 0.80; quality, 0.80; customer service, 0.73; cost, 0.64	All variables KMO > 0.50. threshold sustained
Inter-correlation matrix properties	Bartlett's test of Sphericity	Statistically significant results implies data sufficiency (Howard, 2016)	Statistically significant results (0.000 sig level) for all input variables	Data properties satisfy threshold
Internal reliability of survey items	Cronbach alpha (α) coefficient.	Cronbach scores > 0.50 (Hinton et al., 2014)	Cronbach alpha (α) scores: flexibility, 0.82; innovation, 0.81; quality, 0.81; delivery, 0.79; customer service, 0.63; cost, 0.57	All 6 variables met threshold
Uni-dimensional properties	Eigen values	1 latent factor per input variable items with Eigen value ≥ 1 (Vaske et al., 2017)	Eigen values for each variable: flexibility, 2.92; innovation, 2.91; delivery, 2.79; quality, 2.71; customer service, 2.15; cost, 1.99.	Adopted threshold sustained

values for parallel analysis (Braeken & Van Assen, 2017; Gaskin & Happell, 2014). This assures that extracted factors exhibit structural variations in the dataset (Gaskin & Happell, 2014; Hayton et al., 2004). Constituent items factor loading scores were > 0.30 (Costello & Osborne, 2005) and placed based on highest factor loading value (Acar GüvendiR & Özer Özkan, 2022). Each extracted factor had at least 3 dimensional items (Costello & Osborne, 2005; Watkins, 2018).

From input data's 30 dimensional items, five were eliminated during the analysis. Of the five dimensions adopted for cost variable, four of them were eliminated while "lower operating costs" was retained as a component item of quality. One item, "personalized service" from customer service was also eliminated. Consequently, extracted constructs comprised 25 dimensional items and accounted for 60% of total data variations. Deriving solution satisfied EFA considerations and thresholds summarized in **Table 3**. Perusal of constituent items and characterization for the five extracted factors identified quality, delivery, flexibility, customer service and innovation. **Table 9** summarizes identified constructs, their dimensional items and EFA statistical indicators.

5. Discussions

5.1. Operations Strategy Content and Characterization

Amongst extracted constructs, innovation has the highest Eigen value (λ = 4.19) and explained variations (16.76%) and dimensional items (7). Extracted items aligned to empirical characterization of innovation (Larios-Francia & Ferasso, 2023; Russell & Millar, 2014; Sellitto et al., 2022; Thürer et al., 2015). On the other hand, empirical studies have classified extracted items differently. For instance, "product innovation" and "product mix" are classified amongst customer service

Table 9. Extracted latent factors statistical characterization and identity.

Dimensional items	Factor Loading scores	Eigen value (λ)		Explained variation	Factor identity
		Kaiser criterion	Parallel Analysis		
Meet varied product needs	0.780				
Continuously develop/introduce new products	0.771				
Wide range of products/services	0.687				
Offer innovative solutions/products	0.620	4.19	1.69	16.76	Innovation
Alter products features	0.604				
Reinventing/improving our products	0.543				
Accommodate order variability	0.530				
High performance products/services	0.734				
provide complete product information	0.656				
Consistent products/services quality	0.641				
Aftersales services to customers	0.629	4.05	1.57	16.21	Quality
Accuracy of order/requirements	0.625				
Reduced waiting time	0.524				
Strive to lowering operating costs	0.429				
Deliver on time	0.699				
Adjustments to quantity demand	0.637	2.55	1.49	10.19	Flexibility
Wide product range	0.499				
Encourage customer feedback	0.745				
Exceed customer expectations	0.612	2.36	1.42	9.44	Customer service
Reduce product/service defects	0.545				
Fast order processing/delivery (agility/speed)	0.410				
Reliable products/services at all times	0.551				
Embrace technological changes	0.546				
Recognize/appreciate customers	0.530	1.91	1.35	7.62	Delivery
Compliance to order requirements/specifications	0.530				

n = 216; Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization; Rotation converged in 21 iterations. % of missing values in dataset = 4.75% (replaced with the mean).

and flexibility item respectively (Longoni & Cagliano, 2015), with "Flexibility in product design", "innovative solutions", and "rapid product development" identified as dimensional items for flexibility (Idris & Naqshbandi, 2019). Overall, evaluation of innovation's extracted items supports its characterization as "fundamental alteration in product, processes or markets" (Russell & Millar, 2014),

thus depicting innovation as "alteration" of entity's offering, and processes by which organizations produce and deliver in the market place.

Quality was identified with an explained variation of 16.21%, Eigen value of 4.05 and 7 dimensional items. These items being operationalization items from quality, cost, customer service and delivery. Derived characterization of quality as product standards, features, functionality, and consistency, resonating well with existing empirical literature (Idris & Naqshbandi, 2019; Longoni & Cagliano, 2015; Prabhu et al., 2020; Sellitto et al., 2022). In effect, derived characterization support definition of quality as a diverse concept (Slack & Lewis, 2017).

Study extracted flexibility with Eigen value of 2.55, 10.21% of data variations and 3 operationalization items. The low number of operational items defies empirical studies (Díaz-Garrido et al., 2011; Idris & Naqshbandi, 2019; Nauhria et al., 2011; Russell & Millar, 2014; Thürer et al., 2015) characterization of flexibility with a broader number of dimensional items. Perusal of extracted items identifies with literature's definition of flexibility as "adjustment capability to fluctuating requirements for firm's product range, design and volume" (Longoni & Cagliano, 2015; Prabhu et al., 2020; Sellitto et al., 2022).

Customer service was extracted with Eigen value of 2.36, accounting for 9.4% of data variations and 4 operational items. These 4 items characterized customer service as "customer engagement", "conformance to customer needs", "low product failure", and "efficient and swift processes". Reported characterization aligns with existing empirical literature (Díaz-Garrido et al., 2011; Longoni & Cagliano, 2015; Prabhu et al., 2020; Sellitto et al., 2022). On the strength of extracted profile, customer services is characterized as "reflection of customer expectations and interactions with an entity's products and processes".

Study extracted and identified delivery with Eigen value of 1.91 and accounted for 7.62% of total data variations. Delivery was extracted with 4 dimensional items that depicted it as "provision of reliable products, adherence to standards, incorporation technological changes while promoting customer recognition". Literature depicts delivery as "fast and reliable deliveries" (Longoni & Cagliano, 2015; Russell & Millar, 2014; Thürer et al., 2015), and as "fast and accurate deliveries" (Sellitto et al., 2022). Extracted items are theoretical dimensions from delivery, innovation, customer service and quality, thus characterizing delivery as a broader concept to "time" (Boyer & Lewis, 2002; Vilkas et al., 2023). Building on extracted characterization, current survey offers delivery as "customer recognition and fulfilment of their needs in a timely and reliable manner".

Obtained solution did not support cost construct, with four of the five dimensional items used to operationalize cost variable eliminated during analysis. Non-extraction of cost from is nonetheless unexpected. MSMEs characterization as limited in resources endowment and rarely capable of operating at optimal levels (Ahmedova, 2015; Ashwini Nand et al., 2013; Durugbo et al., 2021), and varied sample's subsector distribution may have obscured manifestation of statistically significant data variations within the data set. Amongst extracted dimensional

items, "lower operating costs", that is commonly associated with quality was retained and characterized as a constituent item for quality. Incorporation of costs items and perspective with quality is well founded in operations management literature (Crosby, 1992; Garvin, 1988; Juran & Godfrey, 1999), while interaction between the two remains central to operations strategy's theory and empirical research. Against this background, interrogation for survey's lacking empirical support for costs is necessary.

5.2. Contribution and Implications

Survey sought to characterize operations strategy content from MSME sector perspective. Adopted scope of study is a departure and expansion from prior research focus on different sub-sectors in MSME contexts. In addition to initial components of operations strategy (Skinner, 1969), survey evaluates innovation and customer service which were identified from literature as most common elements amongst expanding list of operations performance objectives. As such, adopted approach and findings herein provide a perspective of a different context from existing literature. This is deemed a contribution towards provision of additional and comparative studies, review of existing methodology and in addressing non-generalizability hurdle of operations strategy research in MSME context (Boonitt & Wong, 2016; Durugbo et al., 2021; Grant et al., 2013; Kathuria et al., 2018; Russell & Millar, 2014; Sarmiento, Whelan, & Sprenger, 2018; Sellitto et al., 2022; Vilkas et al., 2023).

Survey findings support customer service, quality, innovation, flexibility and delivery in Kenya's MSME sector. Attained results and ensuing discussions are therefore supportive of application of operations strategy in MSMEs. As such, study provides theoretical and empirical insights into operations strategy as a concept, and its interaction with evolving organizational contexts. Perusal of the extracted operations strategy elements supports their multidimensional properties (Díaz-Garrido et al., 2011). Characterization of extracted constructs manifests fluidity of operationalization items across operations strategy elements, hence lacking consensus as to item selection and prioritization (Hallgren et al., 2011).

Reported characterization of operations performance objectives extracted in this survey is suggested as useful to MSME practitioners and policy makers in their search for elements responsible for organizations operational efficiency, sustainability and success. Attained findings presents managers and policy makers with a toolkit to assess their operational functions from operations strategy standpoint in their endeavor to steer MSMEs plans and productivity metrics. Such information include focus operational goals, performance indicators, as well as basis of comparing and evaluating their operational strategy against peers in the sector.

5.3. Study Limitation and Suggestions for Future Research

Survey findings support operations strategy in MSME context from a wider sector perspective, a departure from prior empirical focus on MSMEs from eco-

nomic sub-sectors. Findings reported characterize innovation, quality, customer service, flexibility and delivery from a MSME sector wide perspective. While survey design and analysis meets statistical threshold, some limitations are noted. First, while survey's attained sample is statistically "adequate", EFA is a large sample procedure (Comrey & Lee, 2013), with sample size greater than 1000 considered "excellent". Replication of the study with large sample is encouraged. Secondly, study relied on convenience sampling. While appropriate operationalization offers good representation of the population and provide useful insights (Doebel & Frank, 2024; Ellis, Savchenko, & Messer, 2023), it is inherently predisposed to sampling biases and systematic error (Golzar et al., 2022). Survey suggests use of probabilistic sampling procedure to validate sampling adequacy and comparison of findings.

While cost variable was included amongst focus operations strategy contents, adopted analytical approach and interpretation thereof does not provide its empirical support. Further interrogation to verify its empirical inclusion or lack thereof is encouraged. Lastly, whereas use of single respondents has been articulated and justified in MSME survey (Cai, 2018; Grant et al., 2013; Jagoda & Kiridena, 2015; Kull, Kotlar, & Spring, 2018; Müller & Voigt, 2018), risks of common methods variance and likelihood of bias and errors cannot be assumed or ignored. As such, replication of the study with multiple respondents, consideration for appropriate remedies and comparison with studies in different contexts (Homburg, Artz, & Wieseke, 2012) is encouraged.

While identified limitations may inhibit generalization of findings, they nonetheless do not diminish survey's ability to provide useful insights on the application of operations strategy in MSME context. Replication of survey and comparison of findings with other studies is encouraged. Investigation of the implications and contributions of operations strategy to MSME sustainability, success and efficiency is supported.

6. Conclusion

Characterization of operations strategy content from a sample drawn from varied MSME subsectors supports application of operations strategy in MSME. In addition, consideration and empirical support for innovation and customer service amongst other operations strategy contents aligns with research paradigm towards evaluation and recognition of an expanded list of operations strategy content. Focus on expanding list and implications thereof is acknowledged as harboring probable and unexplored opportunities towards optimizing operations strategy and its contribution to organizational success (Jagoda & Kiridena, 2015; Vilkas et al., 2023). Lastly, together with existing literature, survey characterization of operations strategy content provides insights to policy makers and practitioners in their quest towards better understanding of operations strategy. Such insights can inform MSME sector's policy direction and individual firm's operational practices and goals.

Author Contributions

Conceptualization, Mwangi, M. and Githii, W.; methodology, Mwangi, M. and Ombati, T.; validation, Ngahu, C. and Ombati, T.; formal analysis, Mwangi, M.; data curation, Mwangi, M.; writing—original draft preparation, Mwangi, M. and Githii, W.; writing—review and editing, Ombati, T. and Ngahu, C.; visualization, Githii, W.; project administration, Mwangi, M.; all authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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