



The role of sustainable leadership in enhancing dynamic capability of Agro-based firms in North-Kivu, DRC

¹ Kasereka Sivyallengana Tresor, ² Friday Ogbu Edeh & ³Sophia Kazibwe

¹ PhD Candidate, College of Economics and Management, Kampala International University (Main Campus), Kampala, Uganda & Lecturer, ULPGL-Butembo, DRC.

² (PhD), College of Economics and Management, Kampala International University (Main Campus), Kampala, Uganda.

³ Assoc. Prof, College of Economics and Management, Kampala International University (Main Campus), Kampala, Uganda.

Corresponding Author: tresor.kasereka@studmc.kiu.ac.ug

Abstract

This study investigates how sustainable leadership enhances dynamic capability in agro-based firms in North-Kivu, Democratic Republic of Congo (DRC). Using a mixed-methods approach, data were collected from 300 managers across ten firms through structured surveys and 12 semi-structured interviews. Structural equation modelling results showed that ethical leadership ($\beta = 0.42$, $p < 001$) strongly improves sensing capability, long-term strategic orientation ($\beta = 0.38$, $p < 001$) enhances seizing capability, and stakeholder engagement ($\beta = 0.33$, $p = 002$), along with environmental responsibility ($\beta = 0.27$, $p = 008$), positively influence reconfiguring capability. Participatory decision-making ($\beta = 0.31$, $p = 003$) and organizational learning orientation ($\beta = 0.40$, $p < 001$) further strengthen overall dynamic capabilities. Sustainable leadership explains 28% of variance in sensing, 32% in seizing, and 35% in reconfiguring capabilities, with a moderate effect size ($f^2 = 0.22 - 0.27$) and predictive relevance ($Q^2 = 0.20 - 0.25$). Qualitative findings highlight trust-based information exchange, collaborative stakeholder networks, and knowledge-informed decision-making as mechanisms driving adaptability. These results emphasize the importance of institutionalizing ethical norms, fostering participatory governance, and investing in continuous learning systems to enhance organizational resilience, strategic flexibility, and competitiveness. The study contributes to theory by demonstrating the central role of sustainable leadership in shaping dynamic capabilities within resource-constrained and fragile institutional environments and offers practical guidance for strengthening agro-based firms in North-Kivu.

Keywords: Sustainable leadership, Dynamic capability, Agro-based firms, North-Kivu, Innovation, and organisational resilience

Introduction

Agro-based firms are a vital pillar of economic transformation, employment creation, and food security in developing countries. In the Democratic Republic of Congo, agriculture accounts for nearly 60% of total employment and remains the primary source of livelihood for a large proportion of the population (Food and Agriculture Organisation [FAO], 2018). However, in fragile and conflict-affected regions, such as North-Kivu, agro-based firms extend beyond their commercial role, serving as engines of rural resilience, income stability, and community survival. Yet, despite their socio-economic importance, these firms operate under institutional fragility, limited access to finance, inadequate infrastructure, climate variability, and recurring insecurity (World Bank, 2023).

Of the above, persistent uncertainty in North-Kivu demands leadership approaches that prioritize long-term sustainability over short-term survival. For instance, the sustainable leadership, which integrates ethical governance, social responsibility, and environmental stewardship, has emerged as the key paradigm in contemporary management literature (Hargreaves & Fink, 2006). Therefore, leaders guided by sustainability principles foster trust, stimulate innovation, and build adaptive organizational cultures that enhance resilience in turbulent environments (Yuan et al., 2026; Rashed et al., 2025). Such approaches are particularly critical in regions where firms must continuously adapt to economic, environmental, and security shocks. Alongside sustainable leadership, the theory of dynamic capabilities provides a lens to understand how firms sense opportunities, seize them, and reconfigure resources to maintain competitiveness (Teece, 2007). Moreover, dynamic capabilities enhance innovation, organizational learning, and strategic agility, especially among small and

medium-sized firms (Wang & Ahmed, 2007). For agro-based firms exposed to seasonal fluctuations and volatile markets, these capabilities are essential for sustained growth and survival (Teece, 2018).

Although sustainable leadership and dynamic capabilities have been studied extensively, prior research predominantly focuses on developed, stable economies (Siegel & Waldman, 2022). For instance, the assumptions of regulatory stability, formalized governance, and predictable markets do not capture the realities of post-conflict contexts such as North-Kivu, where firms operate amid institutional voids, weak enforcement, political instability, and informal networks (Bertelsmann Stiftung, 2026). Furthermore, while leadership is known to influence organizational adaptability, the mechanisms through which sustainability-oriented leadership enhances dynamic capabilities remain underexplored, particularly in fragile, agribusiness settings (United Nations Conference on Trade and Development, 2022).

Thereby, this inquiry addresses these gaps by integrating sustainable leadership theory with the dynamic capabilities framework in a post-conflict, agribusiness context. Nevertheless, it advances theoretical understanding by testing these concepts in an environment marked by uncertainty and institutional weakness, extending their applicability beyond stable economies. of this, particularly, this provides insights into leadership approaches that strengthen the resilience of agro-based firms, contributing to food security, employment generation, and inclusive economic recovery in North-Kivu.

of the above, given the North-Kivu's dependence on agriculture and exposure to instability, this research investigates the role of sustainable leadership in enhancing the dynamic capabilities of agro-based firms. Therefore, it examine

specifically how sustainable-oriented leadership behaviour foster sensing, seizing, and resource-reconfiguration capacities in fragile environments. Then, by situating the study within a conflict-affected region, contextually it generates the grounded evidence for policymakers, development agencies, and leaders aiming to support resilient and adaptive agribusiness firms.

Literature Review

Sustainable leadership

Definition: Sustainable leadership has emerged as a strategic response to intensifying global challenges such as environmental degradation, social inequality, climate change, and economic volatility. Also, sustainable leadership stresses long-term value creation while combining the economic performance with environmental stewardship and social responsibility, in contrast to traditional leadership approaches that place a higher priority on short-term financial outcomes. Of the above, the early conceptualisations by Hargreaves and Fink (2003, 2006) framed sustainable leadership as a form of leadership that preserves and develops the human and material resources over time to ensure the continuity of organisations. of this, subsequent research extended this perspective by integrating the stakeholder engagement and the ethical responsibility into leadership practice (Kempster, Maak, & Myles, 2019).

Moreover, more recent scholarship has shifted toward a systematic and integrative understanding of sustainable leadership. For instance, Suriyankietkaew and Avery (2016) conceptualised sustainable leadership as a strategic orientation that aligns economic growth with environmental protection and social well-being. Similarly, Chuhadar and Rudnák (2022) emphasised its collaborative, inclusive, and long-term orientation. Indeed, these updated perspectives move beyond normative

descriptions and situate sustainable leadership within the dynamic organisational systems facing complex and uncertain environments.

Theoretical foundations

Sustainable leadership theory integrates sustainability and the strategic leadership perspectives to position leadership as a mechanism for long-term organisational viability rather than the short-term performance optimisation (Hargreaves & Fink, 2006). Of this, the theory assumes that the firms operate within socio-ecological systems and must balance, therefore, the economic objectives with the environmental stewardship and social responsibility.

Indeed, its foundation rests on the sustainability theory (intergenerational accountability), stakeholder theory (expanded governance beyond shareholders), and systems thinking (organisational embeddedness and interdependence). Together, these perspectives frame leadership as the stewardship under the complexity rather than the authority over resources.

Of the above, sustainable leaders embed ethical reasoning into the strategic decision-making, internalise externalities, and align the resource allocation with the long-term systemic resilience (Visser & Courtice, 2011). In spite of this, by institutionalising the long-term orientation and stakeholder inclusion, they create the governance structures capable of sustaining the performance under uncertainty (Suriyankietkaew & Avery, 2016).

Core characteristics of sustainable leaders

Empirical and conceptual studies identified several competencies that distinguish the sustainable leaders. As a result, the characteristics are not merely personality traits but the behavioural capabilities developed through learning and practices.

In fact, firstly, the sustainable leaders are morally grounded and values-driven. That being said, they demonstrate integrity, accountability, and commitment to justice and environmental responsibility (Visser & Courtice, 2011).

Secondly, they adopt a systemic and holistic mind-set. Therefore, the systems thinking enable leaders to recognise the interdependencies between the economic performance, environmental impact, and the social outcomes. Then, leaders capable of managing such complexity are better positioned to balance competing organisational demands (Scharmer & Kaufer, 2013).

Thirdly, the sustainable leaders display high emotional intelligence and self-awareness. Based on this, drawing on the foundation work of Daniel Goleman (1995), the sustainability-oriented leadership requires empathy, authenticity, and the capacity to engage diverse stakeholders constructively.

Fourthly, they are visionary and courageous. With that, leaders must therefore articulate compelling long-term visions while remaining adaptable in the turbulent environments (Maak & Pless, 2006).

Finally, the sustainable leaders prioritise empowerment and collaborative problem-solving. As a result, rather than imposing directives, they create participatory spaces where the stakeholders co-create the sustainable solutions (Waldman et al., 2022).

From the foregoing, across definitions, the sustainable leadership consistently integrates ethical governance, the inclusion of stakeholders, environmental responsibility, long-term strategic orientation, and organisational learning.

Micro-foundations and organisational mechanisms

Sustainable leadership is rooted in a set of the critical micro-foundations that shape how the

organisations anticipate, interpret, and respond to the complex environmental, social and economic challenges. Therefore, these micro-foundations include the managerial cognition oriented toward the long-term value creation, organisational learning processes that integrate the sustainability principles, absorptive capacity for the external sustainability knowledge, and the robust systems for integrating knowledge (Felin et al., 2012; Teece, 2018). Collectively, these elements enable leaders to embed the sustainability into the organisational routines, inspiring the creative thinking within an organisation, moral decision-making, and the constant improvement in line with the goals of sustainable development.

Furthermore, the sustainable leadership leverages these mechanisms to promote the cross-functional collaboration, engagement of stakeholder, and the adaptive capabilities. Indeed, by inspiring the experimentation and the learning across departments, the organisations can develop more resilient and the business models with environmental responsibility. Then, these processes support the alignment of the operational practices with the sustainability objectives, ensuring that firms not only respond to the current pressure but also shape proactively the future opportunities.

Based on the above, the empirical evidence suggests that the organisations with strong sustainability-oriented micro-foundations demonstrate the enhanced innovation, strategic agility, and the long-term performance outcomes (Fainshmidt et al., 2016). Therefore, in particular such firms exhibit a greater resilience in the face of unpredictable environment conditions and are better positioned to maintain the competitive advantage while responding to the societal expectations.

Importantly, in resource-constrained environments, the sustainable leadership

becomes even more critical. In fact, the organisations operating under such conditions rely on the flexibility, creativity, and the effective use of resources to meet their goals. As a result, micro-foundations enable these firms to compensate for limited tangible assets by strengthening their capacity to sense the emerging sustainability trends, seize the green opportunities, and reconfigure accordingly the resources. Then, this reinforces the strategic role of the sustainable leadership in fostering the inclusive growth, protecting and responsibly managing natural resources, and the organisation's ability to remain viable and effective in the long run.

Empirical findings

Recent empirical research demonstrates that the sustainable leadership influences positively the organisational resilience, innovation, and long-term competitiveness. That being said, studies show associations between the sustainable leadership and enhanced the corporate governance, improved the corporate social responsibility, and the stronger stakeholder trust (Virakul & Russ-Eft, 2019). Moreover, the organisations implementing the sustainable leadership practices commonly report stronger employee engagement levels, reduced turnover, enhance reputation, and increased effectiveness and productivity in operations (Al-Zawahreh et al., 2019; Avolio & Walumbwa, 2021; Waldman et al., 2022).

From the foregoing, the strategic relevance of the sustainable leadership becomes particularly evident in competitive and the globalised markets. With that, as the organisations confront institutional pressures, regulatory into the core strategy create enduring the competitive advantage (Avery & Bergtseiner, 2011). Regarding this matter, the sustainable leadership

encourages the production of long-term value instead of immediate benefits.

Although evidence supporting sustainable leadership is growing, much of the empirical research originates from the stable, developed economies which are characterised by the strong organisational structures and systems (Ribeiro & Leitão, 2024). In fact, limited attention has been given to how the sustainable leadership operates in fragile, conflict-affected, or an environment with limited resources.

In regions such as North-Kivu, agro-based firms face the institutional voids, the political instability, the infrastructure deficits, and the financial constraints (World Bank, 2024). Indeed, under such conditions, the sustainable leadership may manifest differently. Then, leaders may rely more heavily on informal governance mechanisms, the engagement with the local community, adaptive decision-making, and developing the relationship to maintain survival and on-going existence. At the same time, Syamsir (2024) highlighted adaptability, empowerment and the network development as a particularly critical in the complex and uncertain contexts.

These contextual realities suggest that the sustainable leadership should not be treated solely as a normative ideal but as a practical governance mechanism capable of strengthening the organisational capabilities in the contexts of weak institutional structures. Indeed, in post-conflict agribusiness settings, the sustainable leadership may be crucial in enhancing the adaptability, efficient resource utilisation, and collaboration between the stakeholders.

Integration of evidence and theoretical insights

Sustainable leadership is a multidimensional construct that consistently integrates the long-term strategic orientation, ethical management, involvement of the stakeholders, environmental

and social accountability, and the development of capabilities.

While existing literature has highlighted its significance for organisational learning, innovation, and continuity in the stable, developed contexts, its applicability in fragile, conflict-affected, and resource-constrained environments remains underexplored. Therefore, in such contexts, as illustrated by agro-based firms in North-Kivu, the sustainable leadership functions not merely as a normative ideal but as a practical governance mechanism, depending on flexible decision-making, informal governance structures, community involvement, and creating the networks to support stronger resilience and adaptability within organisations.

Of the above, this gap underscores the need to extend the sustainable leadership theory to post-conflict and resource-constrained settings, examining how ethical, strategic, and participatory leadership practices shape the dynamic capabilities, enhance the performance of the organisation, and support the sustainable development. Then, empirically investigating these mechanisms provides actionable insights for leaders operating under the institutional fragility, facilitating the conversion of the sustainability-focused principles into practical strategies that promote the long-term competitiveness and social value.

Dynamic capabilities

Definition: The concept of dynamic capability has become central to the contemporary strategic management research in explaining how firms sustain the competitive advantage in volatile, uncertain, and the complex environments. Of this, while the resource-based view (RBV) emphasises the valuable, rare, inimitable, and non-substitutable resources; has been criticised for its static orientation (Barney, 1991).

Furthermore, the fundamental definition of dynamic capabilities is characterised as the

firm's capacity to integrate, develop, and reconfigure the internal and the external skills in the response to quickly changing circumstance (Teece, Pisano, & Shuen, 1997). According to this concept, dynamic capabilities are higher-order capabilities that follow the standard operation procedures.

Afterward, Teece (2007) revised the framework into three interconnected micro-foundations namely: sensing opportunities and threats, seizing opportunities via investment and innovation, reconfiguring assets and the structures of organisation. In fact, these processes collectively explain how firms identify the emerging changes, mobilise strategically resources, and renew continuously their asset based to sustain performance.

Theoretical foundations of dynamic capabilities

Dynamic capabilities theory extends the Resource-Based View by emphasising the managerial agency, strategic action, and environmental dynamism as the key to maintaining the competitive advantage (Teece, Pisano, & 1997; Teece, 2007, 2018). Of this, unlike operational capabilities, which focus on the efficiency in routine activities, dynamic capabilities enable the firms to sense opportunities and threats, seize strategic opportunities, and reorganise resources to fit changing environments.

Based on the above, these capabilities are higher-order, intentionally managed processes embedded in the routines of the organisations. For instance, they are characterised as recognisable and repeatable processes that enable businesses to effectively react to the dynamism of the market, such as the development of product, building alliance, and the strategic decision-making (Eisenhardt & Martin 200). Additional, the purposive role of the managers was highlighted in extending,

modifying, or resources deploying, emphasising the deliberate and dynamic capabilities' dimension (Helfat et al., 2007).

To support the above, functionally, dynamic capabilities integrate the continuous learning, innovation, and the flexibility, enabling firms to transform the operational routines while sustaining the resilience under uncertainty (Wang & Ahmed, 2007; Wilden, Devinney, & Dowling, 2016). Of this, by orchestrating strategically resources and adapting to the flux of environment, firms maintain the competitive advantage and the long-term creation of value.

In sum, dynamic capabilities represent the managerially guided processes of sensing, seizing, and reconfiguring, by forming a foundation mechanism via which the firms achieve the strategic agility, the renewal of organisation, and the sustainable performance in volatile and complex contexts.

Core dimensions of dynamic capability

The three interconnected elements of dynamic capabilities which are sensing, seizing, and reconfiguring allow businesses to recognise, respond to, and adjust to the change of environments. Therefore, sensing entails the firm's capacity to recognise the opportunities and threats, which are drawing on the managerial cognition to interpret subtle shifts in the market trends, regulatory signals, and the competitive dynamics (Teece, 2007, Teece, 20018).

Considering the above, seizing reflects the strategic mobilisation of resources to exploit these opportunities, requiring entrepreneurial judgement to balance the short-term risks with long-term creation of value through decisions of investment, model of business adjustments, or initiatives of innovation (Teece, 2007).

Alongside this, reconfiguring captures the ability of the firm to realign assets, processes, and the structures of the organisation in response to

evolving conditions, relying on the cognitive capabilities and the quality of decision-making in order to integrate technologies, redeploy human capital, or restructure the operational systems (Helfat & Martin, 2015). Then, critically these dimensions are mutually reinforcing rather than sequential; in the environments which are turbulent, firms often enact sensing, seizing, and simultaneously reconfiguring, sustaining a continuous strategic renewal's cycle.

Micro-foundations and organisational mechanisms

Dynamic capabilities are grounded in the micro-foundations such as managerial cognition, the organisational learning, absorptive capacity, and introduction systems of knowledge (Felin et al., 2012; Teece, 2018). Therefore, these mechanisms enable the firms to structure routines that support the experimentation, a cross-functional collaboration, and the continuous adaptive.

To reinforce this, empirical evidence links these micro-foundations to enhanced innovation, strategic agility, and the competitive performance. For instance, firms with strong dynamic capabilities consistently achieve superior resilience and the market positioning (Fainshmidt et al., 2016). Of this, in resource-constrained contexts, these capabilities allow leverage flexibility by organisations and the responsiveness to compensate for tangible limited assets, reinforcing the link between the micro-foundations and the effective sensing, seizing, and reconfiguring.

Empirical findings in agro-based firms

Agro-based firms operate in the environments which are characterised by the ecological volatility, constraints of seasonal production, fluctuations in the prices of commodities, and fragile infrastructure systems (Béné et al., 2019). In fact, such conditions intensify the dynamism of the environment and highlight the critical

importance of adaptive capabilities. In support of this, dynamic capabilities have been extensively examined in high-technology and manufacturing sectors, considerably less attention has been devoted to their operation within the agricultural systems, where uncertainty is simultaneously institutional and ecological (Schilke et al., 2018).

Alongside this, within this context, the sensing, seizing, and reconfiguring are triad which acquires distinctive significance (Teece, 2018). Relative to this, sensing extends beyond the conventional market scanning to include the environmental and the interpretation of regulatory under the ecological unpredictability. In additional, seizing involves the strategic commitment under the constraints of resources and increased risks across the entire. Also, reconfiguring reflects the capacity to realign the productive assets and the engagements of the organisation in response to recurrent environmental and shocks of politic. For instance, existing researches provide limited insights into how these processes unfold in contexts where support systems are fragile and the market structures are not well developed.

From the foregoing, the gap become more pronounced in the fragile and conflict-affected regions such as North-Kivu, where firms confront the institutional voids, exclusion of finance, and the instability of governance. While dynamic capabilities theory emphasises the managerial intentionality, as empirical studies have largely assumed stable environments of institutions, overlooking how the capability development happens in conditions of systemic weakness (Helfat et al., 2007).

In addition to this, the interaction between practices of leadership and the development of sensing, seizing, and reconfiguring capabilities remains insufficient theorised in the agriculture's post-conflict economies. Then, this omission is

significant because in the contexts characterised by institutional voids, leadership may substitute for formal mechanisms of governance in shaping the adaptive processes.

To reinforce this, although dynamic capabilities provide an explanation which is robust for the competitive advantage sustained under the environmental dynamism, their applicability to resource-constrained, the post-conflict agro-based settings remains underexplored (Fainshmidt et al., 2016).

Integration of evidence and theoretical insights

Despite the development theoretical substantial, the empirical research on dynamic capabilities has been largely confined to technologically advanced sectors and institutional settings which are stable (Schilker et al., 2018). Of this, the mechanisms through which the dynamic capabilities are developed and sustained in the resource-constrained, the post-conflict agro-based economies remain underexplored. In spite of this, in fragile contexts, the dynamic capabilities solely may not emerge through the strategic systems formalised but through the adaptive governance, the collaborative networks, and socially embedded routines, highlighting the influence of the contextual constraints on the capability formation.

Based on the above, this gap underscore the importance of examining how the internal organisational drivers, particularly the practices of leadership, shape the micro-foundations of sensing, seizing, and reconfiguring capabilities in the environments which are turbulent. Thereby, understanding these processes provides both the theoretical and the practical insights as the dynamic capabilities enhance not only the innovation and the competitive performance but serve also as critical survival mechanisms under the conditions of institutional weakness.

Indeed, by situating the dynamic capabilities within the fragile and the post-conflict

agricultural contexts, researchers can extend the framework of theoretical boundaries by illustrating how the managerial action, the strategic adaptation, and the organisational learning interact to sustain the performance. Then, this perspective particularly informs the development which is sustainable and the practices of strategic management in agro-based firms, offering evidence-based guidance for building strength to adapt and recover from challenges, adaptive capacity, and sustaining the ability to complete effectively over time despite the complexity and uncertainty.

Bridging sustainable leadership and dynamic capabilities

The sustainable leadership and the dynamic capabilities, albeit have been analysed thoroughly as a standalone subject. Therefore, research which directly exploring their interrelationship remains limited. For instance, the existing studies suggested that the leadership behaviours notably approaches that prioritise ethics, collaboration, and the transformational practices can enhance the organisational learning, knowledge exchange, and the innovation, thereby potentially strengthening the dynamic capabilities (Wang & Ahmed, 2007).

However, the most empirical evidence relies on the cross-sectional design and does not identify clearly the mechanisms by which the sustainability-oriented leadership translates into the high-order capabilities. As a result, this gap notably is pronounced in the fragile and post-conflict economies, where the institutional voids, insecurity, and financial and infrastructural resources shape behaviour in the workplace. For instance, in regions like North-Kivu in DRC, the agro-based firms face the regulatory weakness, the political instability, and the constraints in resources that complicate the conventional models of development capability (FAO, 2018).

Therefore, under conditions like these, the sustainable leadership has the potential to play a particularly critical role in enabling the dynamic capabilities. Regarding this, the leaders who adopt a strategic-orientation in long-term, ethical governance, and the practices that involve stakeholders can enhance the adaptive capacity of the firm by promoting the collective problem-solving under the uncertainty, building trust with the stakeholders in markets which are unstable, allocating the resources flexibly, and supporting the continuous learning despite the structural constraints.

Of this situation above, yet the empirical confirmation of these mechanisms remains scarce. Therefore, understanding how the leadership behaviours influence the sensing, seizing, and reconfiguring dimensions of the dynamic capabilities in resource-constrained, post-conflict agro-based contexts is essential not only for advancing theory but also for guiding practice. In relation to this, by situating the sustainable leadership within these environments which are complex, scholars can elucidate how ethical, strategic, and leadership behaviours that adapt to change underpin high-order capabilities of organisation, enhancing both the organisational robustness and the sustainable development efforts.

Acknowledged gap in the literature

The existing literature points to three important gaps, which are outlined below:

Firstly, the sustainable leadership research is largely concentrated in the developed and institutionally contexts which are stable, limiting its applicability to the delicate agri-business ecosystems. Secondly, while dynamic capabilities are widely recognised as the organisational resilience drivers, as few studies examined their antecedents from a sustainability-oriented leadership perspective. Thirdly, the agro-based firms in the conflict-

affected regions like North-Kivu in DRC remain underrepresented in empirical leadership and the strategic management research.

Therefore, addressing these gaps is essential both theoretically and practically. Of this matter, theoretically, it this study extends the sustainable leadership theory and the dynamic capabilities theory to the post-conflict and the environments' resource-constrained. Besides this, it provides the evidence-based insights for strengthening the agro-based firms that are critical to employment, food security, and the economic recovery in the DRC.

Accordingly, the present study examines the role of sustainable leadership in enhancing the dynamic capabilities of agro-based firms in North-Kivu, consequently enriching leadership and strategic management literature with the context-specific knowledge.

Objectives, hypotheses, and conceptual framework of the study

Building on the literature review and the proposed conceptual framework, the study primarily seeks to evaluate how the sustainable leadership might enhance the dynamic capabilities of the agro-based firms in North-Kivu DRC.

- 1) To achieve this broad objective, the present study pursues the specific objectives below:
- 2) To examine the relationship between ethical leadership practices and the sensing capability of the agro-based firms in North-Kivu.
- 3) To examine the relationship between long-term strategic orientation and the seizing capability of the agro-based firms in North-Kivu.
- 4) To examine the relationship between the stakeholder engagement, the environmental responsibility and the reconfiguring capability of agro-based firms in North-Kivu.

- 5) To assess the influence of participatory decision-making and the organisational learning orientation on the overall dynamic capabilities of agro-based firms in North-Kivu.

On the basis of these objectives, the following null hypotheses are formulated:

H1: There is no significant relationship between the ethical leadership practices and the sensing capability of the agro-based firms in North-Kivu.

H2: There is no significant relationship between the long-term strategic orientation and the seizing capability of the agro-based firms in North-Kivu.

H3: There is no significant relationship between the stakeholder engagement, environmental responsibility and the reconfiguring capability of the agro-based firms in North-Kivu.

H4: Participatory decision-making and the organisational learning orientation have no significant influence on the overall dynamic capabilities of the agro-based firms in North-Kivu.

These hypotheses represent the testable relationships between the specific indicators of sustainable leadership as the independent variables (IV) and the dimensions of the dynamic capabilities as the dependent variable (DV). In light of the above, the sustainable leadership is operationalized through the ethical conduct, the long-term strategic orientation, the stakeholder engagement, the environmental stewardship, the participatory governance, and learning orientation, in line with the framework of sustainable leadership (Avery & Bergsteiner, 2011).

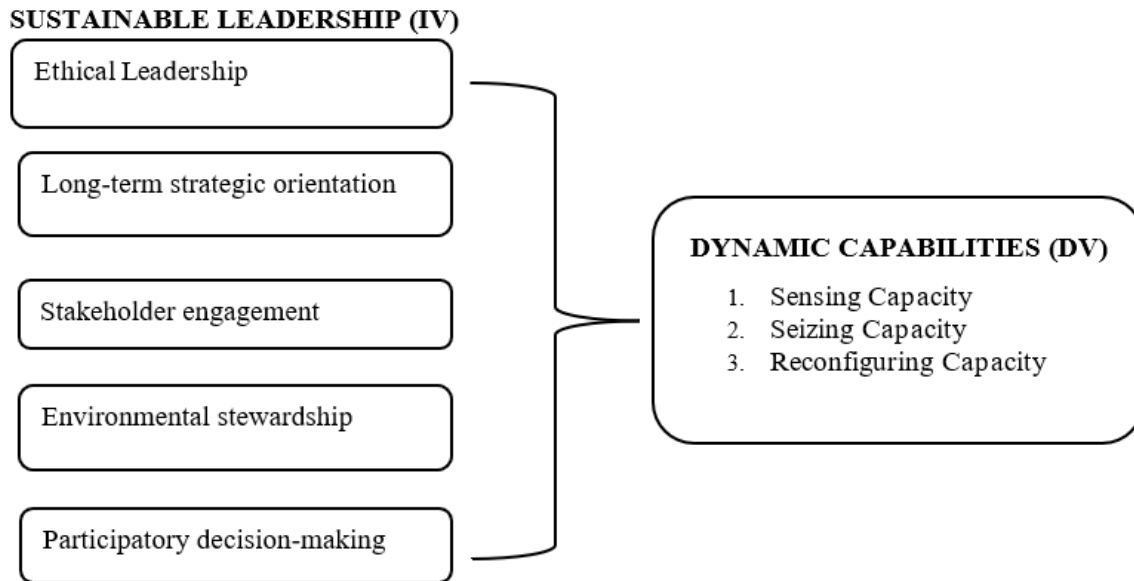
Alongside this, the dynamic capabilities are operationalized through sensing, seizing, and reconfiguring capabilities, in accordance with

the perspective of dynamic capability (Teece, 2007).

Hence, each hypothesis implies a direct link between dimensions of the sustainable

leadership and the specific dynamic capabilities' components aligned with the conceptual framework of the study.

Figure.1. Conceptual framework used in the study



Source: Researchers' conceptualisation (2026) according to (Avery & Bergsteiner, 2011; Teece, 2007).

Considering the above, the framework proposes that the practices of sustainable leadership play a decisive role in strengthening the dynamic capabilities of the North-Kivu's agro-based firms. Of this, by nurturing the ethical governance, the strategic foresight, the stakeholder inclusion, and the continuous learning, leaders enhance their ability of firms to sense changes, seize opportunity, and reconfigure the resources; consequently, improving the long-term competitiveness and sustainability.

Methodology

Study design

The present study adopts a quantitative approach using a cross-sectional survey. For instance, a quantitative design is appropriate because the study aims to investigate the potential connections between the quantifiable traits, especially dynamic capability and

sustainable leadership. So, when utilising the statistical methods to investigate the correlations between variable, the quantitative research is very appropriate (Creswell, 2014).

That being said, in a cross-sectional design, data is gathered from a specific population at one particular moment in the time. Of this matter, design like this is effective for describing the characteristics of population and testing the associations between variables (Babbie, 2016). Therefore, in the present study, it enables the assessment of how the sustainable leadership dimensions relate to sensing, seizing and reconfiguring capabilities within the agro-based firms.

Indeed, to enrich the interpretation of the findings from the survey, a limited number of the qualitative interviews with the selected managers are conducted. As a result, combining the quantitative and qualitative evidence strengthens the analytical depth and interpretation (Denzin

& Lincoln, 2011). Then, this study is a cross-sectional mixed-methods research design.

Intended population

The target population of this study comprises the top middle-level managers of the agro-based firms which operate in North-Kivu province in the DRC. Therefore, these include owners, founders, general managers, and operations managers, production managers, and departmental heads.

Of the above, the management respondent is the unit of observation, and the agro-based company is the unit of analysis. For instance, the managers are selected because the sustainable leadership and the dynamic capabilities are the constructs of strategic-level that require the informed responses from the individuals directly involved in the decision-making of organisations. Therefore, respondents must possess the sufficient knowledge of the internal operations and the strategic methods being examined (Yin, 2018).

In fact, the firms which are considered include the enterprises of agricultural production, agro-processing firms, food transformation industries, and the formally structured agro-cooperatives which operating in the North-Kivu province in DRC.

Calculation of the sample size

Number of managers in the sample

The sample size for the quantitative survey is determined using the formula proposed by Cochran (1977) for the large population as follows:

$$n = \frac{Z^2 p(1-p)}{e^2}$$

Where:

- $Z = 1.96$ with a 95% of confidence interval

- $p = 0.5$ as the assumption of greatest variability
- $e = 0.05$ of error margin

Indeed, the initial size (n_0) is 384 respondents based on these characteristics. Of this, when the target population is finite, the sample size can be adjusted using the finite population correction formula namely: $n = \frac{n_0}{1 + \frac{(n_0-1)}{N}}$

Moreover, for the structural relationship analysis, a minimum of 200 observations is recommended in order to ensure the adequate statistical power in the structural equation modelling (Hair et al., 2019).

Considering the above methodological considerations and the acceptability of the respondents, 300 managerial respondents were surveyed by researchers and included the final analysis. With that, a probability-based technique of selection was used to choose the respondents, guaranteeing that the managers were represented involved in the strategic and operational decision-making within the agro-based firms.

Management interview sample

To complement the survey data, approximately 10 to 15 senior managers was purposively selected for the semi-structured interviews. Consequently, the purposive sampling allows the selection of the information-rich cases which are capable of providing the in-depth insights (Patton, 2015).

Indeed, a total of 12 senior managers were interviewed by researchers, purposively selected for their strategic knowledge and the ability to provide the in-depth insights.

Tools for gathering data

Organised survey

The main tool which was used to gather the data is a structured questionnaire composed of three sections as follows:

Section A: The demographic information which includes the firm size, the years of operation, the managerial position, and the classification of the sector.

Section B: The sustainable leadership which measured the ethical leadership, the long-term strategic orientation, the stakeholder engagement, the environmental responsibility, the participatory decision-making, and the organisational learning orientation. Of it, the sustainable leadership paradigm is the source of these dimensions (Avery & Bergsteiner, 2011).

Section C: This concerned the dynamic capabilities which measured sensing, seizing, and reconfiguring capabilities (Teece, 2007).

Regarding the above, responses was recorded using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). For instance, the Likert-type scales are widely used in the organisational research in order to measure the perception and attitudes (Creswell, 2014).

Interview guide

A semi-structured interview guide was designed to gather the qualitative insights into how the practices of leadership influence the organisational adaptation, the innovation, and the reconfiguration of resources. Of this matter, the semi-structured interviews provide both the consistency and the flexibility in the collection of data (Kvale, 2009).

Documentation review

Secondary data sources like the report of the companies, the sustainability policies, the strategic plans, and the internal manuals were reviewed to complement the primary data. Of this matter, the document analysis enhances the contextual understanding and strengthens the triangulation (Denzin & Lincoln, 2011).

Validity and reliability of the instruments

Validity

The validity refers to the extent to which an instrument of the research accurately measures the constructs if is intended to assess and ensures that meaningfully the findings reflect the reality under the investigation (Cronbach, 1984). Of this, establishing the validity is therefore the fundamental for drawing the conclusion which is credible about the relationship between the sustainable leadership and the dynamic capabilities in the agro-based firms.

Indeed, several forms of validity were ensured in the present study. Then, firstly, the content validity was established by developing the questionnaire items based on well-recognised theoretical frameworks of the sustainable leadership and dynamic capabilities, particularly the work of Avery and Bergsteiner (2011) and the perspective of dynamic capabilities advanced by Teece (2007). Of this, the draft instruments were reviewed by the academic experts in the strategic management and organisational leadership in order to ensure that the items capture ethical leadership adequately, long-term strategic orientation, the engagement of stakeholder, the environment responsibility, the participatory decision-making, the organisational learning, as well as sensing, seizing, and reconfiguring capabilities.

Secondly, the face validity was confirmed by undertaking a pilot study with a limited number of the managers from the agro-based firms of North-Kivu. Of it, their feedback helped to refine the ambiguous wording by improving the clarity and ensuring the contextual relevance.

Finally, the validity construct was assessed statistically through exploratory and confirmatory factor analyses in order to verify that items of measurement loaded appropriately on their respective theoretical constructs. Therefore, these procedures ensured that the

instrument accurately reflected the study's conceptual framework.

Reliability

The reliability refers to the extent to which a measurement instrument yields the consistent and the stable results across the repeated applications. About this, in the present study the Cronbach's alpha which is well-known as a metric of the measurement consistency, was the main tool which was used to evaluate the internal consistency dependability (Cronbach, 1951).

From the foregoing, following the established guidelines, a Cronbach's alpha value of 0.70 or higher was considered as acceptable, by reflecting the adequate reliability of the scales. In relation to this, for the constructs analysed through the structural equation modelling, a composite reliability was also computed in order to ensure that the latent variables demonstrated consistent measurement (Hair et al., 2019).

Besides that, a pilot study was carried out before the collection of the primary data to assess the items of the survey relevance and intelligibility. For instance, this preliminary testing allowed for the identification and the revision of ambiguous or the problematic questions, thereby improving the overall internal consistency and the robustness of the instrument measurement.

Presentation of findings

Table 1: Response rate

Response category	Number	Percentage
Questionnaires distributed	300	100
Questionnaires returned and usable	300	100
Unusable questionnaires	0	0
Senior managers interviewed	12	-
Total respondents analysed	300	100

Source: Primary data (2026)

The above table 1 indicates that all 300 distributed questionnaires were collected successfully and deemed usable for analysis,

Data screening and preliminary analyses

Prior to the hypothesis testing, the dataset was screened to ensure its suitability for the multivariate analysis. Given that, the returned questionnaires were coded and entered into the statistical software. Of this, the missing values were minimal and did not exceed 2% for any variable; thus, the mean substitution was applied where it was necessary.

In addition, the normality of the distribution of data was assessed through Skewness and Kurtosis statistic. Nevertheless, the values ranged between -1.45 and +1.28, which fall inside the permissible range of ± 2 , by suggesting that the data resembles a normal distribution and is suitable for the structural equation modelling. To complete this, the multicollinearity among the predictor variables was assessed by using the variance inflation factor (VIF). In view of this, all the variance inflation factors were below the recommended threshold of 5, which indicated that the multicollinearity was not a concern and showed the structural model might incorporate the independent variables without causing the distortion.

Response rate

The response rate is presented in the table below by showing the proportion of the participants who completed the study out of those targeted.

resulting in a response rate of 100%. Consequently, while a perfect response rate like this is rare in empirical research, this outcome

reflects the structured data collection approach employed in the study. Considering this, the questionnaires were distributed directly on-site at the offices of the participating agro-based firms, by allowing respondents to complete them under the supervision of trained assistants in research.

Moreover, the multiple follow-ups were conducted in order to ensure that no questionnaire remained unreturned, and the study benefited from the collaboration of institutions with the firm management, which encouraged actively the managerial participation. Regarding this, these methodological measures minimised the non-response bias and justify the unusually high response rate, by demonstrating a genuine engagement rather than an artefact reporting.

To support the above quantitative survey, 12 semi-structured interviews with the senior managers were conducted to provide deeper insights into the practices of sustainable leadership and the organisational adaptability. In fact, the robustness is increased by the combination of the quantitative and qualitative evidence, and the interpretative depth of the study.

Demographic characteristics of respondents

Distribution by gender

The distribution of respondents by gender is presented in the table below. Considering this, it shows the proportion of the participants across the different categories of gender included in the study.

Table 2: Respondents distribution by gender

Gender	Frequency	Percentage
Male	186	62
Female	114	38
Total	300	100

Source: Primary data (2026)

This table 2 above reveals that 62% of respondents were men and 38% of respondents were women. Of this, the distribution implies that the managerial within the agro-based firms in North-Kivu remain male dominated relatively. However, the presence of the female managers reflects a gradual shift toward a greater inclusion of gender within the agribusiness sector.

Based on the above, the growing participation of the women in the roles of leadership may also

indicate the organisational cultures changing and evolving opportunities for the women in the agricultural value chains.

Distribution by the managerial position

The present subsection shows how the respondents are distributed across the different managerial position. Regarding this, the table below summarises their representation at each level of management within the agro-based firms in North-Kivu.

Table 3: Respondents distribution by the managerial position

Position in the firm	Frequency	Percentage
Owners/Founders	72	24
General managers	56	18.7
Operations managers	75	25

Production managers	50	16.7
Departmental Heads	47	15.6
Total	300	100

Source: Primary data (2026)

The table 3 above indicates that the respondents occupy diverse positions which are strategic within the agro-based firms. As a result, the operations managers represent the largest group (25%), followed by the owners or the founders (24%). Therefore, this distribution ensures that the dataset captures the insights from individuals directly involved in both the strategic decision-making and operational management.

Nevertheless, the responses obtained provide the relevant perspective on the practices of leadership, the organisational learning, and the development of the dynamic capabilities within the agro-based firms.

Measurement model assessment

By using the confirmatory factor analysis (CFA), the study evaluated the reliability, the convergent validity, and the discriminant

validity to make sure that the measurement scales reflected appropriately the components being studied.

Reliability and convergent validity

To be done, the Cronbach's Alpha (α) and the composite reliability (CR) were used to measure the reliability, while the average variance extracted (AVE) recommended was used to measure the validity of convergent. Given that, as started by the recommended guidelines, the acceptable thresholds are the following:

- Cronbach's Alpha ≥ 0.70
- Composite Reliability ≥ 0.70
- AVE ≥ 0.50

On the basis of the above, the reliability and the convergent validity results are presented in the table below.

Table 4: Reliability and the convergent validity results

Constructs	Indicator	Loading	Cronbach's Alpha	Composite Reliability (CR)	AVE
Ethical Leadership (EL)	EL1	0.83	0.88	0.91	0.64
	EL2	0.87			
	EL3	0.84			
	EL4	0.85			
Long-Term Strategic Orientation (LTSO)	LTSO1	0.82	0.85	0.89	0.61
	LTSO2	0.85			
	LTSO3	0.84			
Stakeholder Engagement (SE)	SE1	0.83	0.87	0.90	0.62
	SE2	0.86			
	SE3	0.85			
Environmental Responsibility (ER)	ER1	0.81	0.82	0.87	0.56
	ER2	0.80			
	ER3	0.78			
Participatory Decision-Making (PDM)	PDM1	0.85	0.86	0.90	0.63
	PDM2	0.86			
	PDM3	0.84			

Organisational Learning Orientation (OLO)	OLO1	0.87	0.89	0.92	0.65
	OLO2	0.88			
	OLO3	0.85			
	OLO4	0.86			
Sensing Capability (SEN)	SEN1	0.85	0.87	0.90	0.61
	SEN2	0.86			
	SEN3	0.84			
Seizing Capabilities	SEZ1	0.82	0.85	0.89	0.59
	SEZ2	0.84			
	SEZ3	0.83			
Reconfiguring Capability (REC)	REC1	0.81	0.84	0.88	0.57
	REC2	0.82			
	REC3	0.83			

Source: Primary data (2026)

From the above table, the measurement results demonstrate that all constructs in the study namely Ethical Leadership (EL), Long-Term Strategic Orientation (LTSO), Stakeholder Engagement (SE), Environmental Responsibility (ER), Participatory Decision-Making (PDM), Organisation Learning Orientation (OLO), and the Dynamic Capability representing by Sensing (SEN), Seizing (SEZ), and Reconfiguring (REC) exhibit a reliability which is robust and a convergent validity. Of this, each latent construct is represented by the multiple items of the survey like EL1- EL4 for the Ethical Leadership, with the factor loadings exceeding the 0.70 threshold, which indicated that the observed indicators reflect adequately their underlying constructs.

Besides that, the internal consistency is high, as demonstrated by the Composite Reliability (CR) between 0.87 and 0.92 and the Cronbach's

Alpha values between 0.82 and 0.89, which exceed the suggested benchmarks. Moreover, the Average Variance Extracted (AVE) values from 0.56 to 0.65 which confirm that each construct explains a substantial portion of the variance in its indicators, by meeting the convergent validity. So, taken as a whole, these findings confirm that the measurement tools are psychometrically reliable and suitable for further research structural model, providing a foundation which is strong for testing the hypothesised relationship between the dimension of sustainable leadership and dynamic capabilities in the agro-based firms operating in North-Kivu, a province of the DRC.

Discriminant validity

The discriminant validity was evaluated by using the Fornell-Larcker criterion, which requires the square root of the AVE for each construct to exceed its correlations with other constructs.

Table 5: Discriminant validity

Constructs	EL	LTSO	SE	ER	PDM	OLO	SEN	SEZ	REC
Ethical Leadership	0.80								
Long-Term Orientation	0.49	0.78							
Stakeholder Engagement	0.45	0.42	0.79						
Environmental Responsibility	0.40	0.37	0.43	0.75					

Participatory Making	Decision-	0.47	0.44	0.41	0.39	0.79				
Organisational Orientation	Learning	0.51	0.48	0.46	0.42	0.50	0.81			
Sensing Capability		0.53	0.47	0.44	0.39	0.45	0.48	0.78		
Seizing Capability		0.49	0.52	0.41	0.36	0.43	0.47	0.50	0.77	
Reconfiguring Capability		0.44	0.40	0.53	0.48	0.46	0.49	0.45	0.47	0.76

Source: Primary data (2026)

From the above table, the findings show that the correlations between the constructs are lower than the square roots of the AVE values in the bold diagonal components. As a result, this confirms that the constructs demonstrate adequate discriminant validity and conceptually measure the distinct dimensions.

Structural model evaluation

By following the verification of the suitability of the measurement model, the structural relationships between the sustainable leadership and the dynamic capabilities were examined by using the Structural Equation Modelling (SEM).

Model fit indices

The model fit was evaluated by using the commonly accepted indices and for which the table below present the results.

Table 6: Structural model fit

Fit index	Value	Recommended threshold
Chi-square/df	2.11	< 3
CFI	0.94	> 0.90
TLI	0.92	> 0.90
RMSEA	0.056	> 0.08
SRMR	0.044	<0.08

Source: Primary Data (2026)

Of the table above, the linkages between the sustainable leadership and dynamic capabilities are represented satisfactorily by the structural model, as all model fit indices fall within the acceptance ranges.

Testing hypotheses

To be done, the suggested hypotheses were tested by examining the statistical importance of the standardized path coefficients.

Table 7: Structural path results

Hypothesis	Relationship	β	t-value	p-value	f ²	Decision
H1	Ethical Leadership → Sensing Capability	0.42	5.48	0.000	0.19	Supported
H2	Long-Term Orientation → Seizing Capability	0.38	4.72	0.001	0.17	Supported
H3a	Stakeholder Engagement → Reconfiguring Capability	0.33	3.95	0.002	0.14	Supported
H3b	Environmental Responsibility → Reconfiguring Capability	0.27	2.89	0.008	0.11	Supported
H4a	Participatory Decision-Making → Dynamic Capability	0.31	3.67	0.003	0.13	Supported
H4b	Organisational Learning Orientation → Dynamic Capability	0.40	5.96	0.000	0.21	Supported

Source: Primary data (2026)

Of the table above, the results of the structural model indicate that all hypothesised relationships are statistically significant, as evidenced by the path coefficients (β), t-value well above the recommended threshold of 1.96, and the p-values below 0.01. As a result, this confirms the strong empirical support for the relationships proposed within the model.

Apart from that, the ethical leadership exerts a substantial influence on sensing capability ($\beta = 0.42$), by suggesting that the transparency and integrity in the leadership enhance the ability of the organisation to identify the emerging opportunities and threats. Similarly, the long-term orientation affects significantly seizing capability as ($\beta = 0.38$), indicating that forward-looking strategic behaviour strengthens the ability of the company to organise and seize the opportunities.

In addition to that, the stakeholder engagement and the environmental responsibility both demonstrate the significant effects on reconfiguring capability, by highlighting the critical role of the collaborative practices and sustainability-oriented strategies in facilitating the organisational adaptation. Also, the participatory decision-making and the organisational learning orientation contribute significantly to the overall dynamic capabilities,

by emphasising the importance of inclusive governance and the continuous knowledge development.

Indeed, beyond statistical significance, the values of the effect size (f^2) indicate the predominantly moderate effects, with the ethical leadership ($f^2 = 0.19$) and the organisational learning orientation ($f^2 = 0.21$) exhibiting the strongest substantive contributions. As a result, this implies that these variables have practical significance in the explaining differences in the dynamic capabilities in addition to being significant statistically.

Therefore, taken together these findings provide robust empirical support for the assertion that the sustainable leadership contributes as a critical driver of the dynamic capabilities. For instance, this influence appears particularly salient in the contexts characterised by the uncertainty and the fragility of institutions, like for the agro-based firms which operate in the North-Kivu, a province of the Democratic Republic of Congo.

Explained variance of the dynamic capability

In order to be done, the coefficient of the determination (R^2) was been used to evaluate the explanatory ability model. Of this matter, the table below presents the variance explained of dynamic capabilities.

Table 8: Variance explained

Dynamic Capability dimensions	R^2	Adjusted R^2	f^2 effect size	Q2 Predictive Relevance	Role in HCM
Sensing capability	0.28	0.26	0.22	0.20	First-order formative indicator of DC
Seizing capability	0.32	0.30	0.25	0.23	First-order formative indicator of DC
Reconfiguring capability	0.35	0.33	0.27	0.25	First-order formative indicator of DC
Dynamic capability	0.32	0.30	0.25	0.23	Second-order formative construct formed by SEN + SEZ + REC

Source: Primary data (2026)

Of the table above, the structural explanatory power model was assessed using R^2 , an adjusted R^2 , an effect size (f^2), and the predictive relevance (Q^2). Of this, in the Hierarchical Component Model (HCM) framework, Sensing (SEN), Seizing (SEZ), and the Reconfiguring (REC) capabilities serve as the first-order formative constructs that collectively form the second-order the Dynamic Capabilities (DC) construct. As a result, at the level of the first-order, sustainable leadership explains 28% of the variance in sensing, 32% in seizing, and 35% in the reconfiguring capabilities, with the moderate effect size ($f^2 = 0.22-0.27$) and the predictive relevance ($Q^2 = 0.20-0.25$), indicating the meaningful influence on each capability.

Based on the above, when the aggregate into the second-order which is the Dynamic Capabilities construct, the sustainable leadership accounts for 32% of the variance ($R^2 = 0.32$, Adjusted $R^2 = 0.30$, $f^2 = 0.25$, $Q^2 = 0.23$), confirming its role as a significant driver of the overall adaptive capability. Furthermore, the moderate explanatory power also suggests that the additional contextual factors like the turbulence of the market, resources constraints, the institutional voids, and the technological capabilities likely shape the dynamic capabilities.

Therefore, this HCM approach clarifies the dual role of the individual capabilities and the aggregated construct, providing the theoretical rigor and the conceptual clarity consistent the literature of dynamic capabilities in the environments which are fragile.

Qualitative findings from the managerial interviews

From the managerial interviews, the NVivo-assisted thematic analysis of twelve semi-structured interviews reveals that the

organisational adaptability is not primarily driven by the formal managerial systems but by the relational and process-based mechanisms embedded in the practices of leadership. Of this, three dominant and analytically distinct mechanisms structure this relationship.

Nevertheless, firstly leadership legitimacy emerges as a foundational condition for the environmental sensing, yet its effectiveness is contingent upon the informal trust dynamics rather than the information infrastructures which are formal. For instance, while the ethical governance and transparency are associated consistently with improved communication flows, the evidence suggests that sensing capabilities remain dependent highly on the interpersonal trust and the social proximity.

As a result, this indicates a structural limitation in the fragile institutional environments, the acquisition of information is neither systematised nor standardised but mediated through the subjective and the potentially unreliable relational channels. Then, although, the ethical leadership enhances sensing capability, it achieves this by using the methods that may not be easily scalable or consistently reliable.

Alongside that, secondly long-term orientation functions as a countervailing force against the short-term survival pressures, but its operationalization appears constrained by the contextual volatility. Consequently, leaders who promote the long-term visions are better able to legitimise the investment which is strategic, the as the findings indicate a tension which is persistent between the strategic intent and the immediate operational constraints. For instance, this suggests that the long-term orientation does not eliminate the short-termism but rather temporarily suspends it under the favourable conditions of leadership.

Thus, its effect on seizing capability should be cautiously interpreted, as it heavily depends on leadership credibility and the tolerance of the organisation for delayed returns in the environments which are unstable.

Besides that, thirdly the stakeholder embeddedness is identified as a critical driver of the reconfiguration of resources. However, this mechanism reflects a shift from the internal development of the capability toward the external dependency. Of this matter, the processes of adaptation are largely achieved through the coordination with the farmers, cooperatives, and the partners of the supply chain, by indicating that the reconfiguring capabilities are distributed across the networks rather than internally consolidation.

In this way, while this enhances the flexibility, also it exposes the firms to risks related to the partner reliability, the coordination costs, and the reduced strategic autonomy. As a result, the engagement of stakeholder strengthens the reconfiguring capability but introduce simultaneously the new vulnerabilities linked to the network dependence.

That being said, overall the findings indicate that the adaptive capabilities in the agro-base firms are underpinned by three interrelated mechanisms which are: trust-based information exchange, the temporally oriented strategic farming, and the network-based resource coordination. As a result, the qualitative results from twelve semi-structured managerial interviews reveal that the dynamic capabilities in the agro-based firms of North-Kivu are often informal, relational, network-dependent, and inherently fragile. Of this, these findings nuance the classical theory of dynamic capabilities, which traditionally emphasises the structured routines, the formalised processes, and the codified managerial practices (Teece, 2007).

In addition, rather than contradicting the theory, these observations provide a contextual extension by showing how the dynamic capabilities manifest in the fragile and resource-constrained environments like North-Kivu. Therefore, specifically sensing, sizing, and reconfiguring capabilities emerge through trust-based interactions, relational governance, and the coordination with the external stakeholders, rather than through the fully institutionalised organisational routines.

Then, this insight contributes to the literature by highlighting the in the fragile contexts, dynamic capabilities are socially embedded, flexible, and contingent; and that leadership practices oriented toward the sustainability play a critical role in enabling the outcomes which are adaptive despite the volatility of environments.

Nevertheless, these mechanisms point collectively to a broader structural reality as the organisational adaptability in the fragile contexts is less a function of the formalised dynamic capabilities and more an emergent outcome of the relational governance and the contextual improvisation.

Importantly, while the qualitative results reinforce the statistical relationships identified in the quantitative analysis, they also nuance their interpretation by exposing the underlying constraints, trade-offs, and the context-specific dependencies. As a result, sustainable leadership therefore contributes to sensing, seizing, and reconfiguring capabilities not through the fully institutionalised processes, but through the socially embedded practices that remain fragile inherently, contingent, and difficult to replace across the contexts.

Discussion of results

From the above information, the results of the present study demonstrate that the sustainable leadership contributes significantly to the

development of dynamic capabilities among the agro-based firms in North-Kivu. Consequently, the results show multiples dimensions of the sustainable leadership namely ethical leadership, long-term strategic orientation, stakeholder engagement, environmental responsibility, participatory decision-making, and the organisational learning orientation, that they influence positively sensing, seizing, and reconfiguring capabilities of agro-based firms.

That being said, these findings support the argument that the oriented practices of leadership toward the sustainability strengthen the organisational adaptability in the complex and environments which are uncertain. Of this matter, the results of the present study theoretically align with the position that the managerial actions is essential in determining dynamic capabilities and enabling the firms to respond effectively to the environmental change (Teece, 2007; Teece, 2018).

Therefore, firstly the study found that the ethical leadership influences sensing capability. As a result, the finding suggests that the transparent governance, integrity, and the decision-making which is responsible enhance the ability of the firms to identify the opportunities and threats in their operating environment. Then, ethical leadership promotes the open communication and trust within organisation, which facilitates the circulation of the strategic information n and strengthens the environmental scanning processes.

In view of this, this result is in line with the earlier studies which showing that the moral and environmentally conscious leadership fosters the knowledge sharing and the organisational learning (Virakul & Russ-Eft, 2019; Al-Zawahreh et al., 2019; Avolio & Walumbwa, 2021; Waldman et al., 2022). Nevertheless, in the fragile institutional environments like North-Kivu, where the formal information systems are limited, trust-based leadership relationships

appear to play a role which is essential in enabling agro-based firms to access and interpret the information of environment.

Secondly, the results indicate that long-term strategic orientation affects significantly seizing capability. Consequently, Leaders who adopt a future-oriented perspective are better positioned to mobilise the resources and transform the identified opportunities into the strategic investments. Thus, this finding confirms the theoretical arguments that seize capability involve the entrepreneurial decision-making and the allocation of resources aligned with the long-term creation of value (Teece, 2007).

Moreover, it supports the philosophy of sustainable leadership, which prioritises the planning in long-term and the strategic vision as the core competencies of leadership (Hargreaves & Fink, 2006; Suriyankietkaew & Avery, 2016). Then, in the context of agro-based firms operating under the market volatility and the institutional uncertainty, the long-term orientation appears to mitigate the survival pressures of short-term and encourages the investments that support the sustainable growth. Thirdly, the results reveal that the stakeholder engagement and the environmental responsibility influence significantly the reconfiguring capability. As a result, these findings suggest that the collaborative relationships with the stakeholders and the sustainability-oriented practices enhance the capacity of the company to reallocate the resources and modify the operating procedures. Thus, this observation supports the theory of stakeholder, which emphasises the role of the inclusive governance and the network relationships in the organisational effectiveness (Freeman, 1984).

Indeed, in the agricultural value chains, firms heavily depend on the relationships with the famers, cooperatives, and the local communities. Therefore, the stakeholder engagement enables

the firms to coordinate adjustments in the supply systems and the practices of production, thereby strengthening their capacity for the organisational reconfiguration.

Fourthly, the findings show that the participatory decision-making and the organisational learning orientation enhance significantly the overall dynamic capabilities, with the learning orientation exerting the strongest influence. So, this result confirms the view that the dynamic capabilities are deeply rooted in the integration of knowledge, learning processes, and the collaborative problem-solving (Felin et al., 2012; Wang & Ahmed, 2007).

In this way, the participatory leadership practices allow the firms to leverage the collective expertise of the employees; conversely, the societies that prioritise the learning to promote the experimentation and the exchange of knowledge. Thus, together these mechanisms strengthen the capacity of the organisation to sense, seize, and reconfigure resources in response to the environmental change.

Furthermore, as the R² values for the endogenous constructs namely Sensing Capability (0.28), Seizing Capability (0.32), and Reconfiguring Capability (0.35), these indicate that the dimensions of sustainable leadership explain a moderate portion of the variance in Dynamic Capabilities. However, while these results confirm that the sustainable leadership is a significant driver, and for that, the moderate explanatory power suggests that it is not the sole determinant of dynamic capabilities within the agro-based firms.

Besides that, other contextual and organisational factors likely contribute to the development of dynamic capabilities, including the turbulence of the market, resource constraints, institutional voids, and the technological capabilities. Therefore, incorporating these, the future studies using these other drivers would improve the prediction power model and realism while

offering a more thorough grasp of the mechanisms influencing the dynamic capabilities. In fact, the literature on dynamic capabilities in the emerging economies is consistent with this interpretation, where the multiple environmental and organisational contingencies interact to influence sensing, seizing, and reconfiguring processes (Teece, 2007; Wang & Ahmed, 2007).

To finalise, the results extend the existing leadership and strategic management literature by demonstrating that the sustainable leadership acts as an important antecedent of the dynamic capabilities in the fragile and resource-constrained environments. As a result, while previous studies have focused largely on the technologically advanced sectors in the economies which are developed (Schilke et al., 2018); the present study provides the empirical evidence from the agro-based firms which operate in a conflict-affected region.

In this way, the findings suggest that, in contexts like this, the practices of leadership emphasising trust, collaboration, and long-term orientation function as the critical governance mechanisms that compensate for weaknesses of the institution and enhance the organisational resilience. Therefore, the sustainable leadership emerges as a strategic driver of the adaptive capability and the long-term competitiveness in the agro-based firms.

Conclusion

The present study looked at how the sustainable leadership can enhance the dynamic capabilities of agro-based firms in North-Kivu, a province of DRC. Of this, specifically it investigated how the dimensions of sustainable leadership namely ethical leadership, long-term strategic orientation, stakeholder engagement, environmental responsibility, participatory decision-making, and organisational learning orientation influence Sensing, Seizing, and

Reconfiguring capabilities of the firms in a fragile and resource-constrained environment.

To achieve these objectives, the study adopted a cross-sectional mixed-methods design, by interpreting both the quantitative and qualitative approaches. As a result, the quantitative data were gathered from 300 managers by using the structured questionnaires, and 12 senior managers participated in the semi-structured interviews to provide the qualitative perspectives. In addition, the analysis relied on the validated measurement scales grounded in the established theoretical frameworks of the sustainable leadership and the dynamic capabilities. Thus, the Partial Least Squares Structural Equation Modelling was been used to test the proposed relationships, complemented by the thematic analysis for the qualitative data.

In view of this, the paradigm suggested is supported strongly empirically by the quantitative results. Consequently, Sensing ability was greatly impacted by the ethical leadership ($\beta = 0.42$, $p < 0.001$, $f^2 = 0.19$), while the long-term strategic orientation enhanced significantly Seizing capability ($\beta = 0.38$, $p = 0.001$). Also, the stakeholder engagement ($\beta = 0.33$, $p = 0.002$) and the environmental responsibility ($\beta = 0.27$, $p = 0.008$) significantly confirmed to reconfiguring capability.

Moreover, the participatory decision-making ($\beta = 0.31$, $p = 0.003$) and the organisational learning orientation ($\beta = 0.40$, $p < 0.001$, $f^2 = 0.21$) were also the key predictors of the overall dynamic capabilities. Then, the model explained 28%, 32%, and 35% of the variance in sensing, seizing, and reconfiguring capabilities, respectively by indicating the substantial explanatory power.

To support the above results, the qualitative insights complemented these results by highlighting the mechanisms through which the

sustainable leadership enhances the dynamic capabilities, including trust-based exchange of information, the collaborative stakeholder networks, the strategic foresight, and knowledge sharing. Of this, the ethical leadership promoted the open communication, the long-term orientation guided strategic mobilisation of resources, and the collaboration of stakeholder facilitated the adaptive responses to the environmental and institutional challenges.

Therefore, overall the study concludes that the sustainable leadership is a critical driver of the organisational resilience in the agro-based firms operating under the uncertainty and the fragility of institutions. So, by fostering the ethical governance, the participatory practices, the strategic foresight, and the continuous learning, the sustainable leadership enhances sensing, seizing, and reconfiguring capabilities. Thus, these results make the theoretical and practical contributions, providing managers, legislators, and the development professionals with a practical advice to boost the competitiveness and the resilience of agribusiness firms in the fragile and the post-conflict contexts.

Suggestions

Based on the findings of the present study, several practical and policy recommendations can be proposed to strengthen the sustainable leadership and dynamic capabilities in the agro-based firms which operate in North-Kivu province.

Therefore, firstly the leaders should institutionalise the ethical leadership practices that promote the transparency, accountability, and the integrity in the governance of organisations. Of this, the ethical leadership fosters trust within the organisation and encourages an open communication, which is essential for strengthening the environmental sensing and the strategic decision-making.

Secondly, the managers should adopt the practices of participatory decision-making that involve the employees in the strategic discussions and the problem-solving processes. As a result, employee cooperation and exchange of knowledge can boost the organisational learning and increase the ability of the company to adjust to the shifting market and the environmental conditions.

Thirdly, the agro-based firms should invest in the developing organisational learning systems that support the continuous exchange of knowledge, innovation, and the experimentation. Then, establishing the training programs, internal knowledge platforms, and the practices of learning-oriented management can strengthen significantly the dynamic capabilities which are required for the long-term competitiveness.

Fourthly, the firms should strengthen their relationships with the key stakeholders within the agricultural value chain, particularly farmers, cooperatives, and the local communities. Given that, building the collaborative partnerships can improve the coordination of resource, facilitate adaptation of the supply chain, and enhance the capacity of the firm to reconfigure the operations in response to the environmental shocks.

In addition, at the policy level the institutions of the government and the partners of development should support the development of leadership programs that promote the sustainability-oriented management practices within the agro-industrial sector. As a result, the capacity-building initiatives, managerial training programs, and the public-private partnerships can boost the competitiveness of agro-based firms and spread the best practices in the sustainable leadership.

Finally, the future research should expand the scope of the investigation by conducting the longitudinal studies and incorporating the firms

from other provinces of the Democratic Republic of Congo. Thus, such research could provide the deeper insights into the long-term impact of the sustainable leadership on the organisational performance, resilience, and the sustainable development in the agro-based firms.

Implications

The present study carries the important theoretical, practical, and policy implications. Therefore, theoretically it contributes to the understanding of dynamic capabilities by showing how the sustainability-oriented leadership through the ethical conduct, the strategic foresight and the collaborative decision-making enhance the capability of the firms to recognise opportunities, seize them effectively, and reconfigure the resources in response to the environmental changes.

In light of the above, by linking the practices of sustainable leadership with adaptive, learning, and innovative capabilities, this study extends the conceptual framework of dynamic capabilities in the fragile context and resource-constrained environments.

On top of that, practically the results offer to managers of agro-based firms operating under the volatile and the resource-limited conditions businesses practical advice. Considering this, integrating the sustainability principles into the practices of leadership strengthens the organisational learning, promotes innovation, and improves the capacity of firms to adapt to the fluctuations of the market. Consequently, managers are encouraged to adopt the governance which is transparent, foster collaboration, and engage in long-term strategic planning to build the resilient and adaptive organisations.

Furthermore, from a policy perspective the present study underscores the importance of the targeted institutional support and the initiatives of capacity-building that promote the

sustainability-oriented leadership. That being said, by investing in the managerial training, knowledge-sharing platforms, and the public-private partnerships, policymakers and the development organisations can enhance the long-term performance, competitiveness, and the resilience of agro-industrial enterprises in North-Kivu and the similar contexts across the sub-Saharan Africa. Then, in the agro-industrial sector, these steps can assist the guarantee that the practices of leadership not only promote the organisational performance but also support more general the objectives of sustainable leadership.

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