

Climate change and agribusiness entrepreneurship in Tanzania: The mediating role of adaptation strategies

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ABSTRACT

Agribusiness entrepreneurship in Tanzania operates within a climate-vulnerable agricultural economy in which rising temperatures, erratic rainfall and recurrent extreme weather events threaten production and business continuity. However, the mechanism through which climate change is transmitted into entrepreneurial outcomes specifically the role played by adaptation strategies remains empirically under examined in the Tanzanian context. This study therefore pursued two objectives: (i) to examine the direct effect of climate change on agribusiness entrepreneurship, and (ii) to assess the mediating role of adaptation strategies in this relationship, drawing on Dynamic Capabilities Theory to frame adaptation strategies as capability-building responses to environmental disruption. A quantitative, cross-sectional design was employed to collect primary data from 252 agribusiness entrepreneurs (smallholder farmers, small and medium enterprises, and start-ups) in Morogoro and Dodoma regions, selected through stratified random sampling. Data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM). The measurement model satisfied recommended thresholds for indicator reliability, internal consistency, convergent validity and discriminant validity. The structural model revealed that climate change had a significant negative direct effect on agribusiness entrepreneurship ($\beta = -0.143$, $t = 3.192$, $p = 0.001$) and a significant positive effect on adaptation strategies ($\beta = 0.335$, $t = 3.559$, $p < 0.001$); adaptation strategies, in turn, exerted a strong positive effect on entrepreneurship ($\beta = 0.922$, $t = 40.643$, $p < 0.001$). The bootstrapped indirect effect of climate change on entrepreneurship through adaptation strategies was positive and significant ($\beta = 0.309$, $t = 3.331$, $p = 0.001$), confirming partial mediation. These results indicate that although climate change constrains agribusiness entrepreneurship directly, its net effect depends substantially on entrepreneurs' capacity to adopt adaptive practices that convert climate pressure into resilience and performance. The study extends Dynamic Capabilities Theory to agribusiness entrepreneurship in a developing-economy setting and provides evidence to support policies that strengthen access to climate-resilient technologies, extension training and adaptation finance for agribusiness entrepreneurs, particularly smallholders, women and youth.

Keywords: Adaptation Strategies, Agribusiness Entrepreneurship, Climate Change, Dynamic Capabilities Theory, PLS-SEM, Tanzania

I. INTRODUCTION

Increasing temperatures, erratic rainfall and more frequent extreme weather events are placing increasing pressure on agricultural systems around the world, which endanger food security and the economic stability of rural communities (Intergovernmental Panel on Climate Change [IPCC], 2023). These climatic stresses have been compounded by declining crop productivity in many tropical regions since the turn of the century, with the burden falling disproportionately on low-income countries whose farming systems are still predominantly rain fed (FAO, 2022). Agribusiness entrepreneurship, including the use of adaptive technologies, diversification of income sources and reorganisation of production in changing environmental conditions, is increasingly being promoted to encourage farmers and other agricultural actors to develop resilience to these shocks. However, the empirical processes through which adaptation converts climate pressures into entrepreneurial responses are poorly understood, especially in developing regions where the evidence base on scalable, climate-responsive business models is still limited (Mazenda et al., 2026).

Sub-Saharan Africa is expected to be among the regions most affected by this transition. Successive IPCC assessments project substantial reductions in agricultural output across the region over the coming decades as rainfall becomes less predictable and dry spells lengthen (IPCC, 2023). Smallholder farmers are especially exposed because of their dependence on traditional, rain-fed production systems and their limited access to credit, insurance and adaptive technologies. Where adaptation practices such as agroforestry and drought-tolerant crop varieties have been adopted, yield and income gains have been documented in neighbouring East African contexts; the harder and less-studied question is whether, and how, these adaptive practices scale into viable agribusiness ventures rather than remaining subsistence-level coping mechanisms.

Tanzania offers a particularly relevant setting in which to examine this question. Agriculture contributes close to a quarter of national GDP and remains the primary source of livelihood for the majority of the workforce (United Republic of Tanzania [URT], 2023). At the same time, increasing rainfall variability, recurrent drought in the central corridor, and periodic flooding along the coast continue to erode agricultural productivity and rural livelihoods, with smallholder farmers, women and youth bearing much of the risk (Tanzania Meteorological Agency, 2024). National climate-smart agriculture policy has begun to respond to this reality, but implementation on the ground remains uneven, leaving a gap that entrepreneurial approaches combining adaptation with income generation could plausibly fill.

Emerging evidence from Tanzania suggests that adaptation is already reshaping how agribusiness entrepreneurs operate. Studies of smallholder technology adoption show that crop and livestock diversification, irrigation and agroforestry are taken up unevenly across regions, with resource access and gender strongly shaping who adopts what (Kurgat et al., 2020). Work on climate-smart strategy adoption among Tanzanian farm households links such practices directly to improved household food security outcomes (Brüssow et al., 2017), while more recent evidence confirms that adaptation strategies improve food security for farming households facing climatic stress (Gebre et al., 2023). Parallel to this, agribusiness actors are beginning to adopt digital and operational innovations, such as digital marketing among agricultural marketing cooperatives in Morogoro, partly in response to the same environmental and market pressures (Mramba & Msuya, 2024). Collectively, this literature indicates that Tanzanian agribusiness entrepreneurs are not passive recipients of climate risk; many are actively reconfiguring their practices in response to it.

Despite this existing evidence, the literature remains split along two largely separate focuses: one strand documents the direct effects of climate change on agricultural productivity and enterprise performance, while a second strand examines the adoption of specific adaptation practices in isolation. What is missing is an integrated account of the transmission mechanism, that is, whether and to what extent adaptation strategies mediate the relationship between climate change and agribusiness entrepreneurship by converting environmental pressure into resilience, innovation and market-oriented performance. The recent evidence from agro-processing enterprises South Africa revealed that adaptation-related capacities have been shown to carry the effect of climate risk exposure through to enterprise-level adaptation outcomes (Mazenda et al., 2026). Whether a similar mediating mechanism holds for agribusiness entrepreneurship specifically, and in the Tanzanian setting, has not been directly tested.

This gap matters because a large share of Tanzania's land area is semi-arid and agribusiness remains central to employment, food security and rural livelihoods. In such a context, adaptation strategies are unlikely to be purely defensive; they are better understood as potential entrepreneurial pathways through which climate-exposed actors stabilise production, diversify income and access emerging markets. The present study responds directly to this gap by investigating the mediating role of adaptation strategies in the relationship between climate change and agribusiness entrepreneurship among smallholder farmers, SMEs and startups in Morogoro and Dodoma regions, Tanzania.

1.2 Research Objectives

- i. To examine the direct effect of climate change on agribusiness entrepreneurship among agribusiness entrepreneurs in Morogoro and Dodoma regions, Tanzania.
- ii. To assess the mediating role of adaptation strategies in the relationship between climate change and agribusiness entrepreneurship among agribusiness entrepreneurs in Morogoro and Dodoma regions, Tanzania.

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Dynamic Capabilities Theory

The study employs the Dynamic Capabilities Theory (DCT) which describes the manner in which firms sense opportunities and threats, seize them through resource reconfiguration, and transform routines to sustain advantage under changing conditions (Teece et al., 1997; Teece, 2007), defined as tangible, observable processes, not an abstract firm trait (Eisenhardt & Martin, 2000). DCT is preferred here to the resource-based view from which it evolved, because that view accounts for advantage from a firm's existing stock of valuable, rare resources (Barney, 1991) but says little about how firms adapt when the environment itself is changing the very condition climate change poses for agribusiness entrepreneurs. Zahra et al., (2006) extended dynamic capabilities theory to entrepreneurial ventures, as it was largely developed around resource rich firms. They argued that resource constrained firms depend even more on sensing and reconfiguration, a condition closer to the smallholder agribusinesses studied here than to the large corporations on which the theory was originally built. Its use for climate change has similarly focused on established, developed-economy firms outside agriculture (Linnenluecke & Griffiths, 2010; Linnenluecke, Griffiths, & Winn, 2013). We extend this reasoning to agribusiness entrepreneurship in a climate-vulnerable developing economy, where adaptation strategies; resilient crop varieties, agroforestry, and precision farming are treated as dynamic capabilities: deliberate, resource-constrained responses through which entrepreneurs convert climate shocks into entrepreneurial outcomes. DCT

therefore provides the key lens for understanding the mediating role of adaptation strategies, as it focuses on the process by which climate exposure translates into performance, rather than taking the outcome as given.

2.2 Empirical Review

2.2.1 Climate Change and Agribusiness Entrepreneurship

IPCC (2023) extensively describes how increasing temperatures, erratic rainfall and extreme weather events disrupt crop cycles, destabilise supply chains and increase production uncertainty for agricultural producers. For instance, farm household data from Tanzania provides an explicit connection between exposure to drought and rainfall variability to lower yields and weaker food security, the impact being strongest for households with low adaptive capacity. Gebre et al. (2023) using a national sample of Tanzanian farm households, found that exposure to climatic stress consistently lowered food security outcomes among households that had not adopted any coping response. Brüssow et al., (2017), in a survey of 900 smallholders across the semi-arid Dodoma and semi-humid Morogoro regions, the same study areas covered here, found that unmitigated exposure to drought and erratic rainfall reduced both crop output and household income stability. To summarise, this literature is consistent with the main thesis of vulnerability theory that environmental shocks hit resource-constrained actors harder and provides the foundation for the first hypothesis of this study: climate change has a significant negative direct effect on agribusiness entrepreneurship (H1).

2.2.2 Mediating Role of Adaptation Strategies

The relationship between climate change and agribusiness entrepreneurship is unlikely to be adequately captured by a single direct path, because adaptation behaviour plausibly sits between the two: climatic stress creates the uncertainty that pushes entrepreneurs toward adaptive responses, and it is those responses, rather than the stress itself, that go on to shape entrepreneurial performance. Kurgat et al. (2020), assessing the uptake of crop diversification, irrigation, fertiliser use and agroforestry among Tanzanian smallholders, found that exposure to climatic risk was one of the strongest and most consistent predictors of a household's search for adaptive technologies, even though the specific technology adopted varied with resource endowment and gender. Brüssow et al. (2017) extended this logic a step further within the same Tanzanian regions, showing that farmers who adopted climate-smart strategies such as crop-portfolio changes and drought-tolerant varieties achieved measurably better food security than non-adopters, while Gebre et al. (2023) confirmed the same pattern: adaptation converted climatic exposure from a purely negative shock into a partially manageable one.

Comparable evidence from outside the agricultural sector reinforces the plausibility of this pathway Mazenda et al. (2026), applying structural equation modelling to agro-processing enterprises in Gauteng, South Africa, found that climate-related participation shaped adaptation outcomes only indirectly, through the enterprise's underlying adaptive capacity, rather than exerting any direct effect of its own. Although the study sits outside Tanzania and outside agribusiness, it demonstrates the same structural logic being proposed here: exposure works through adaptation, not around it. This body of evidence supports the second and third hypotheses of this study that climate change positively influences the adoption of adaptation strategies (H2), and that adaptation strategies in turn positively influence agribusiness entrepreneurship (H3) and, taken together with Dynamic Capabilities Theory's account of sensing, seizing and transforming as the mechanism by which firms convert environmental turbulence into performance, justifies treating adaptation strategies as a mediating variable between climate change and agribusiness entrepreneurship (H4).

III. METHODOLOGY

3.1 Research Design

The study adopted a quantitative, cross-sectional survey design to examine the relationships among climate change, adaptation strategies and agribusiness entrepreneurship. A quantitative approach was appropriate because the study set out to test hypothesised relationships and quantify their strength using measurable indicators such as perceived rainfall variability, adoption of adaptation practices, and enterprise performance (Saunders, Lewis, & Thornhill, 2023). The cross-sectional design allowed data on climate exposure, adaptation behaviour and entrepreneurial outcomes to be collected at a single point in time, which is a practical and widely used approach for policy-relevant research in resource-constrained settings (Clark et al., 2021).

3.2 Study Area

The study was conducted in Morogoro and Dodoma regions of Tanzania. The two regions were purposively selected because of their contrasting agro-climatic profiles: Morogoro is characterised by mixed farming systems and comparatively higher uptake of agroforestry, while Dodoma is predominantly semi-arid and drought-prone, with heavier reliance on drought-tolerant crops and adaptive farming practices. Both regions are priority areas under Tanzania's climate-smart agriculture programming, which enhances the policy relevance of the findings.

3.3 Target Population

The target population comprised agribusiness entrepreneurs operating in Morogoro and Dodoma regions, including smallholder farmers cultivating less than five acres of land, agribusiness SMEs such as processors and input suppliers, and startups engaged in innovative activities such as irrigation technologies and climate-advisory services. This population was selected because of its direct exposure to climate variability and its central role in local decision-making on adaptation and enterprise development.

3.4 Sampling and Sample Size

The minimum sample size was estimated using Krejcie and Morgan's (1970) formula for a population of approximately 15,000 agribusiness entrepreneurs across the two regions, at a 95% confidence level and a 6% margin of error, yielding a minimum requirement of approximately 262 respondents. This exceeded the minimum sample-size threshold recommended for PLS-SEM (10 times the largest number of structural paths directed at any construct), which required at least 240 respondents given three latent constructs. After data screening and the removal of incomplete responses, 252 valid questionnaires were retained for analysis, a usable sample that remained adequate for PLS-SEM given the parsimonious three-construct model and the acceptable reliability and validity of the measurement model. Stratified random sampling was used to ensure proportional representation of the population by enterprise type, followed by simple random sampling within each stratum:

The sample size for this study was determined using Krejcie and Morgan's (1970) formula, which is appropriate for large populations and ensures adequate representation at a given confidence level. The formula is expressed as:

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

Where:

n = required sample size

N = population size (15,000)

Z = z-value at 95% confidence level (1.96)

p = population proportion (0.5, assumed for maximum variability)

q = 1 – p (0.5)

e = margin of error (0.06)

Substituting the values:

$$n = \frac{(1.96)^2 \times 0.5 \times 0.5 \times 15,000}{(0.06)^2(15,000 - 1) + (1.96)^2 \times 0.5 \times 0.5}$$

$$n = \frac{3.8416 \times 0.25 \times 15,000}{0.0036 \times 14,999 + 0.9604}$$

$$n = \frac{14,406}{53.9964 + 0.9604}$$

$$n = \frac{14,406}{54.9568}$$

$$n \approx 262$$

Table 1
Sample Size

Stratum	Proportion	Sample selected
Smallholder farmers	70%	176
SMEs	20%	50
Startups	10%	26
Total	100%	252

3.5 Data Collection Instruments and Procedures

Data were collected using a structured questionnaire consisting of closed-ended, five-point Likert-scale items (1 = strongly disagree; 5 = strongly agree), administered both physically and through KoBoToolbox. All constructs were operationalised as reflective latent variables: Climate Change (CHE) was measured through items on temperature variability, precipitation change and extreme-weather frequency; Adaptation Strategies (AS) through items on the adoption of resilient crop varieties, agroforestry and precision-farming technologies; and Agribusiness Entrepreneurship (AE) through items on business growth, market scalability and performance outcomes. The instrument was piloted with 30 respondents prior to the main survey to assess clarity and reliability; feedback from the pilot was used to refine item wording. During measurement-model assessment of the main dataset, four indicators (AE1, AE5, AS1 and AS3) were subsequently removed because they did not meet acceptable indicator-retention criteria; their removal improved

construct reliability and validity without weakening the theoretical coverage of the respective constructs (Hair et al., 2019).

3.6 Data Analysis

Data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM), given its suitability for complex mediation models and prediction-oriented research with moderate sample sizes (Hair et al., 2011, 2019). Analysis proceeded in two stages. The measurement model was assessed for indicator reliability (outer loadings), internal consistency reliability (Cronbach's alpha and composite reliability ≥ 0.70), convergent validity (Average Variance Extracted ≥ 0.50) and discriminant validity (Heterotrait-Monotrait ratio < 0.90) (Henseler et al., 2015). The structural model was then assessed for path coefficients (β), statistical significance via bootstrapping (5,000 subsamples; t- and p-values), the coefficient of determination (R^2), and effect sizes (f^2) and predictive relevance (Q^2). The mediating role of adaptation strategies along the path Climate Change $\rightarrow$ Adaptation Strategies $\rightarrow$ Agribusiness Entrepreneurship was tested through bootstrapped indirect effects, following the logic set out by Baron and Kenny (1986): mediation was supported where climate change significantly predicted the mediator, the mediator significantly predicted the outcome, and the indirect effect was itself statistically significant, with partial mediation confirmed where the direct effect remained significant but attenuated relative to the total effect.

3.7 Ethical Considerations

Ethical clearance and research permits were obtained before data collection. Participation was voluntary and all respondents were provided with informed consent forms explaining the purpose of the study, the nature of their participation and their right to withdraw at any stage without any consequence. The questionnaire was translated into Swahili to make sure the respondents understand it well. All data collected were anonymised, with identifying information such as names and exact location coordinates removed prior to analysis, and data stored securely and used solely for the purposes of this study. Key findings were disseminated to relevant local government authorities to contribute to evidence-based climate and agri-business policy formulation.

IV. FINDINGS & DISCUSSION

4.1 Demographic Characteristics of Respondents (N = 252)

This study involved 252 agribusiness entrepreneurs from Morogoro and Dodoma regions. The findings concerning demographic characteristics provide that their age ranged from 18 to 58 years, with a mean age of 32.5 years ($SD = 8.047$), indicating that most participants fell within the economically active age group. Male respondents constituted 69.8% of the sample compared with 30.2% female; suggesting that agribusiness entrepreneurship in the study areas remains male-dominated, likely reflecting broader structural constraints on women's access to land, finance and productive resources. Regarding education, most respondents had attained secondary education (54.8%), followed by certificate-level education (24.6%), indicating a moderately literate entrepreneurial population well placed to engage with climate information and adaptive technologies. Crop farming was the dominant entrepreneurial activity (34.9%), followed by agro-processing (19.0%), mixed farming (15.9%), livestock keeping (15.1%) and agribusiness trading (15.1%). Regionally, 56.0% of respondents were drawn from Dodoma and 44.0% from Morogoro, reflecting the two regions' differing agro-ecological conditions and levels of climate exposure.

Table 2
Demographic Characteristics of Respondents (N = 252)

Variable	Category	Frequency	Percentage (%)
Sex	Male	176	69.8
	Female	76	30.2
	Total	252	100.0
Education	No formal education	9	3.6
	Primary education	43	17.1
	Secondary education	138	54.8
	Certificate	62	24.6
	Total	252	100.0
Entrepreneurial activity	Crop farming	88	34.9
	Livestock keeping	38	15.1
	Agro-processing	48	19.0
	Agribusiness trading	38	15.1
	Mixed farming	40	15.9
	Total	252	100.0
Region	Morogoro	111	44.0
	Dodoma	141	56.0
	Total	252	100.0

Source: Field Data, 2026. Age: Min = 18, Max = 58, Mean = 32.5, SD = 8.047.

4.2 Measurement Model Assessment

The measurement model was assessed for indicator reliability, internal consistency reliability, convergent validity and discriminant validity, aligned with the three key study variables: Climate Change (CHE), Adaptation Strategies (AS) and Agribusiness Entrepreneurship (AE). As shown in Table 2, most indicators exceeded the recommended outer-loading threshold of 0.70. AS2 and CHE4 recorded comparatively lower loadings of 0.626 and 0.683 respectively; both were retained because they remained statistically significant ($p < 0.001$) and their removal did not materially improve construct validity.

Table 3
Outer Loadings

Indicator	Construct	Loading	T-statistic	P-value
AE2	AE	0.921	96.496	0.000
AE3	AE	0.924	101.486	0.000
AE4	AE	0.890	67.619	0.000
AS2	AS	0.626	7.355	0.000
AS4	AS	0.862	43.022	0.000
AS5	AS	0.847	32.633	0.000
CHE1	CHE	0.904	18.469	0.000
CHE2	CHE	0.916	20.488	0.000
CHE3	CHE	0.859	14.855	0.000
CHE4	CHE	0.683	6.901	0.000

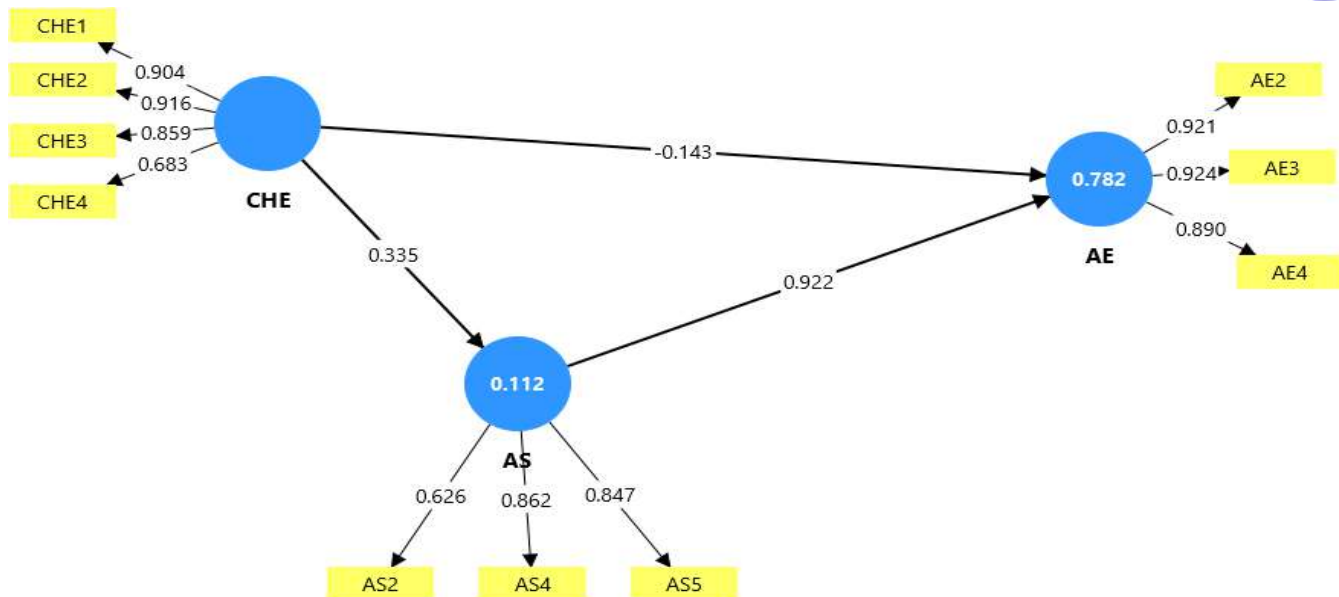


Figure 2
Graphical Output with Outer Loadings

Table 4
Construct Reliability and Validity

Construct	Cronbach's Alpha	rho_a	rho_c	AVE
AE	0.898	0.900	0.936	0.831
AS	0.681	0.716	0.826	0.617
CHE	0.862	0.887	0.908	0.715

All three constructs exceeded the recommended composite-reliability threshold of 0.70 and the AVE threshold of 0.50, confirming adequate internal consistency and convergent validity. The Cronbach's alpha for Adaptation Strategies (0.681) fell marginally below the conventional 0.70 benchmark; however, because Cronbach's alpha is a conservative estimator that is sensitive to the number of retained indicators, and because AS met the composite-reliability and AVE thresholds required by PLS-SEM, the construct was retained for structural analysis (Hair et al., 2019).

4.3 Discriminant Validity

Discriminant validity shows the extent to which a construct is empirically distinct from other constructs in a PLS-SEM model. In other words, indicators measuring one latent construct should not measure another construct more strongly. For this study, Heterotrait-Monotrait Ratio (HTMT) was employed to explain the discriminant validity. The results are provided on Table 5

Table 5
Heterotrait-Monotrait Ratio (HTMT)

Construct	AE	AS	CHE
AE	—		
AS	0.810	—	
CHE	0.183	0.490	—

All HTMT values were below the recommended threshold of 0.90, confirming that Climate Change, Adaptation Strategies and Agribusiness Entrepreneurship are empirically distinct constructs. The comparatively higher HTMT between AE and AS (0.810) reflects their theoretically close relationship without indicating a lack of discriminant validity.

4.4 Structural Model: Hypothesis Testing

The structural model was assessed for path coefficients, explanatory power, effect size and predictive relevance. Table 6 and Figure 3 present the direct-effect results.

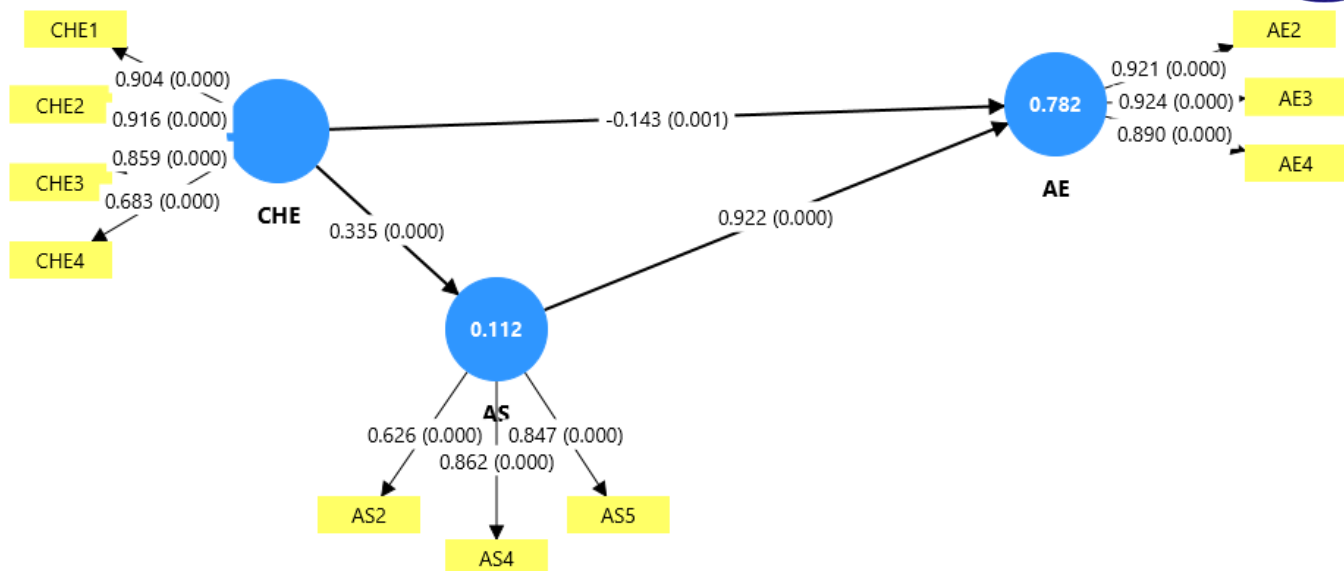


Figure 3
Graphical Output with Significance Values (Bootstrapped *t*-statistics)

Table 6
Direct Effects

Hypothesis	Path	β	STDEV	T-statistic	P-value	Decision
H3	AS $\rightarrow$ AE	0.922	0.023	40.643	0.000	Supported
H1	CHE $\rightarrow$ AE	-0.143	0.045	3.192	0.001	Supported
H2	CHE $\rightarrow$ AS	0.335	0.094	3.559	0.000	Supported

Source: Field Data, 2026. *N* = 252; bootstrapping with 5,000 subsamples.

Table 7
Indirect (Mediation) Effect

Hypothesis	Path	β	STDEV	T-statistic	P-value	Decision
H4	CHE $\rightarrow$ AS $\rightarrow$ AE	0.309	0.093	3.331	0.001	Supported (Partial Mediation)

Source: Field Data, 2026. *N* = 252.

All four hypotheses were supported. Adaptation Strategies had a strong, positive effect on Agribusiness Entrepreneurship ($\beta = 0.922$, $t = 40.643$, $p < 0.001$), the largest coefficient in the model. Climate Change had a significant negative direct effect on Agribusiness Entrepreneurship ($\beta = -0.143$, $t = 3.192$, $p = 0.001$) and a significant positive effect on Adaptation Strategies ($\beta = 0.335$, $t = 3.559$, $p < 0.001$). The bootstrapped indirect effect of Climate Change on Agribusiness Entrepreneurship through Adaptation Strategies was positive and significant ($\beta = 0.309$, $t = 3.331$, $p = 0.001$). Because the direct effect of CHE on AE remained significant (rather than being reduced to non-significance) once AS was included in the model, the results indicate partial rather than full mediation: adaptation strategies carry a substantial positive pathway from climate change to entrepreneurship, but they do not fully eliminate the constraining direct effect of climate change.

Table 8
Explanatory Power, Effect Size and Predictive Relevance

Construct/Path	R^2	Adjusted R^2	f^2	Q^2 predict	Interpretation
AE	0.782	0.780	—	0.016	High explanatory power
AS	0.112	0.109	—	0.095	Modest explanatory power
AS $\rightarrow$ AE	—	—	3.458	—	Large effect
CHE $\rightarrow$ AE	—	—	0.083	—	Small effect
CHE $\rightarrow$ AS	—	—	0.126	—	Small-to-moderate effect

Source: Field Data, 2026.

The model explained 78.2% of the variance in Agribusiness Entrepreneurship ($R^2 = 0.782$), indicating strong explanatory power, while Climate Change explained 11.2% of the variance in Adaptation Strategies, suggesting that climatic exposure is one of several drivers of adaptation decisions alongside socio-economic and institutional factors not captured in this model. Adaptation Strategies exerted the strongest effect on entrepreneurship ($f^2 = 3.458$),

reinforcing its centrality as the key transmission mechanism identified in this study. Both Q^2 predict values exceeded zero, confirming acceptable out-of-sample predictive relevance for the structural model.

4.5 Discussion

4.5.1 Climate Change and Agribusiness Entrepreneurship (H1)

Climate change had a significant negative direct effect on agribusiness entrepreneurship ($\beta = -0.143$, $t = 3.192$, $p = 0.001$), supporting H1. This agrees, in direction, with Tanzanian household evidence showing that drought and rainfall variability erode farm output and undermine livelihood security (Gebre et al., 2023; Brüssow et al., 2017). But the present finding also qualifies that literature rather than simply reproducing it. Gebre et al. (2023) and Brüssow et al. (2017) model climate exposure as the primary explanatory variable for food-security or output outcomes, which by construction cannot separate a "pure" direct effect from an effect that operates through adaptation. Once adaptation strategies are modelled explicitly as a mediator, as done here, the direct constraining effect of climate change shrinks to a small effect size ($f^2 = 0.083$). This suggests that earlier single-pathway studies may have overstated the standalone damage of climate exposure by folding an adaptation-mediated effect into what looked like a pure direct effect. In that sense, this finding does not contradict the vulnerability-theory prediction that shocks harm resource-constrained actors, but it narrows the claim: climate change constrains agribusiness entrepreneurship on its own, yet only modestly once the adaptive response of entrepreneurs is accounted for.

4.5.2 Climate Change and Adaptation Strategies (H2)

Climate change had a significant positive effect on adaptation strategies ($\beta = 0.335$, $t = 3.559$, $p < 0.001$), supporting H2. This agrees directionally with evidence that Tanzanian households facing greater climatic risk are more likely to adopt diversification, drought-tolerant varieties and related practices (Brüssow et al., 2017; Kurgat et al., 2020; Gebre et al., 2023). The present result extends this literature in one specific respect: climate change explained only 11.2% of the variance in adaptation strategies ($R^2 = 0.112$), with a small-to-moderate effect size ($f^2 = 0.126$). Because Kurgat et al. (2020) and similar studies were not designed to partition variance across multiple predictors, they could report that climate risk *predicts* adaptation without being able to show how much of adaptation behaviour climate risk actually accounts for. This study's result indicates that climatic exposure is a real but comparatively modest driver, implying that non-climatic factors, such as access to finance, extension services, land tenure and market access, plausibly explain a larger share of adaptation decisions. This is a meaningful qualification rather than a contradiction: it does not overturn the established climate–adaptation link, but it cautions against treating climate exposure as the dominant lever for adaptation policy.

4.5.3 Adaptation Strategies and Agribusiness Entrepreneurship (H3)

Adaptation strategies had a strong, statistically dominant positive effect on agribusiness entrepreneurship ($\beta = 0.922$, $t = 40.643$, $p < 0.001$; $f^2 = 3.458$), supporting H3. This is broadly consistent with evidence that enterprise-level adaptive capacity strengthens climate-adaptation outcomes for agro-processing enterprises (Mazenda et al., 2026) and with reported gains from operational and digital innovation among Tanzanian agribusiness cooperatives (Mramba & Msuya, 2024). What the present finding adds, however, is a difference in magnitude that the existing literature does not anticipate. In the adjacent food-security literature, adaptation strategies are associated with meaningful but incremental gains (Gebre et al., 2023); here, the effect of adaptation on entrepreneurial performance is the largest coefficient in the entire model, roughly six times the effect size of climate change on adaptation itself. This suggests that adaptation strategies may carry disproportionately larger returns when the outcome of interest is entrepreneurial performance, business growth and market scalability, rather than household food security. That distinction is not visible in studies that only examine food-security outcomes, so this finding extends rather than merely confirms the existing evidence base.

4.5.4 The Mediating Role of Adaptation Strategies (H4): Discussion of the Indirect Effect

The major contribution of this study is the positive indirect effect of climate change on agribusiness entrepreneurship via adaptation strategies ($\beta = 0.309$, $t = 3.331$, $p = 0.001$), which supports H4 and also establishes adaptation strategies as a real mediating mechanism instead of a simple parallel predictor. The mediation is partial, as the direct effect of climate change on entrepreneurship remained significant and negative after the inclusion of adaptation strategies in the model. Climate change exerts a modest direct constraining effect on entrepreneurship, but a much larger proportion of the total effect is transmitted positively through the adoption of adaptation strategies. In reality, the net overall effect of climate change on entrepreneurship in this sample is positive when the effects of indirect pathways are taken into account (direct $\beta = -0.143$ versus indirect $\beta = +0.309$). This means that, for this sample of agribusiness entrepreneurs, adaptive capacity more than compensates for the direct constraining impact of climate exposure.

This result adds to the mediation evidence found for agro-processing enterprises elsewhere in Sub-Saharan Africa, where the capacities of enterprise adaptation were also shown to carry the effect of climate risk exposure through to enterprise outcomes (Mazenda et al., 2026) and is broadly consistent with Tanzanian household evidence where adaptation strategies are found to be the operative channel linking climate exposure to food-security and livelihood outcomes (Gebre et al., 2023; Brüssow et al., 2017). Seen through the lens of Dynamic Capabilities Theory (Teece, 2007), this pattern can be read as evidence that agribusiness entrepreneurs in Morogoro and Dodoma are not simply exposed to climate shocks; they are sensing the threat, seizing the opportunity to adopt resilient crop varieties, agroforestry and precision-farming practices, and reconfiguring their operations in ways that turn environmental pressure into a source of competitive advantage, and the entrepreneurial-opportunity-recognition perspective that regards adaptation as opportunity exploitation instead of pure defence (Shane & Venkataraman, 2000).

At the same time, in one important respect the finding qualifies, rather than simply confirms, the wider literature. A significant proportion of the existing Tanzanian evidence on adaptation strategies is framed around protecting household food security or farm yield (Gebre et al., 2023; Brüssow et al., 2017; Kurgat et al., 2020). Such framing positions adaptation as a coping mechanism. The size of the indirect effect found here, and especially the very large direct path from adaptation strategies to entrepreneurship ($\beta = 0.922$), suggests another thing: in this sample, adaptation strategies are less a defensive buffer and more a growth-enabling capability, closely aligned with the dynamic-capabilities framing of adaptation as a source of entrepreneurial reconfiguration and value creation rather than risk reduction. This distinction is of practical importance, as it implies that the design of policies and programs for agribusiness entrepreneurs should not only present adaptation as a way of avoiding losses but explicitly as a route for business growth and market access.

Overall, the pattern of direct and indirect effects found in this study, a modest negative direct effect of climate change on entrepreneurship, a positive effect of climate change on adaptation, and a very strong positive effect of adaptation on entrepreneurship, is coherent empirical support for treating adaptation strategies as the key transmission mechanism through which climate-exposed agribusiness entrepreneurs in Tanzania convert environmental pressure into resilience and performance.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The study examined the direct effect of climate change on agribusiness entrepreneurship and the mediating role of adaptation strategies among 252 agribusiness entrepreneurs in Morogoro and Dodoma regions, Tanzania. Climate change was found to have a direct constraint on agribusiness entrepreneurship but this was modest relative to the strong positive pathway of climate exposure stimulating adoption of adaptation strategies which in turn enhanced entrepreneurial performance substantially. The large partial mediation indicates that adaptation strategies are not merely protective responses to climatic risk, but rather, for this sample, they are capability-building mechanisms through which agribusiness entrepreneurs convert environmental pressure into resilience, productivity and business growth. The high explanatory power of the model for agribusiness entrepreneurship ($R^2 = 0.782$) and the dominant effect size of adaptation strategies ($f^2 = 3.458$) underscore the centrality of adaptive capacity to entrepreneurial outcomes in this climate-vulnerable agrarian economy. The modest amount of variance in adaptation strategies explained by climate change alone ($R^2 = 0.112$) suggests that climatic exposure is only one of several forces shaping whether and how entrepreneurs adapt, at the same time. Overall, the study reframes the climate change entrepreneurship relationship in these two regions from a purely threat-based narrative to one that recognises the agency of entrepreneurs whose adaptive responses are a critical determinant of whether climate pressure results in business decline or in enhanced resilience and growth.

5.2 Recommendations

Given that adaptation strategies emerged as the dominant driver of agribusiness entrepreneurship in this study, while climate change alone explained only a modest share of the variance in adaptation uptake, policymakers, financial institutions and entrepreneurship-support organisations in Morogoro and Dodoma should shift emphasis from awareness-raising about climate risk toward removing the practical barriers that prevent entrepreneurs from acting on that awareness, particularly limited access to affordable finance, extension advice, and climate-resilient inputs such as drought-tolerant varieties and precision-farming technologies. Given the modest direct effect of climate exposure, resources are likely to be better spent expanding access to adaptation-enabling services (credit, advisory support, resilient inputs) than on climate-awareness campaigns alone.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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