Indigenous risk management practices and their effects on small agribusiness firm growth amid economic crisis in Ghana

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ABSTRACT

This paper estimates the effect of indigenous risk management practices (used by entrepreneurs) on small firm growth amid the current economic crisis in Ghana. The paper hypothesizes that indigenous risk management practices positively affect the growth of informal micro and small agri-food processing firms during the current economic crisis in Ghana. Cross–sectional and limited panel data (covering four years – from the end of 2019 to the end of 2022) have been used in the analysis. Firm Growth has been estimated using sales volume and the number of employees. Findings indicate that apart from savings for business purposes as an indigenous risk management strategy, diversification of economic activities, subscription to formal insurance, forward contracting, cooperative marketing, borrowing, sale of assets, and temporary wage employment outside the business exert a positive influence on small firm growth in terms of sales. Subscription to formal insurance and temporary wages outside the entrepreneur's business positively influence firm growth as related to growth in employee size. We recommend that policymakers design and implement policies that initiate and facilitate the development of marketing cooperatives to negotiate fair prices. This essential tool can help mitigate marketing risks to the agri-food processing entrepreneur. The police should facilitate rolling out skills development programs to increase entrepreneurs' capacities in forward contracting arrangements. Again, entrepreneurs of agri-food processing firms in the wider Ghanaian population should be educated on the need to subscribe to formal insurance to insulate them in times of property loss or personal accidents.

Introduction

The fact that some African economies have not yet recovered from the effects of the COVID-19 pandemic, coupled with the consequences of the Russian-Ukraine war, confirms suggestions that the continent's target to achieve the Sustainable Development Goals by 2030 may be a mirage [1]. In Ghana, the consequences of the two events have resulted in severe economic challenges. The nation is battling high inflation, a depreciating local currency and high public debt. Due to increased energy and food prices, inflation

stood at 42.2 % - as of May 2023 [2]. Ghana's currency was adjudged the worst-performing currency among 140 countries tracked by Bloomberg in 2022, having depreciated by 45 % [3]. All sectors in the Ghanaian economy, including agribusinesses (agri-food processors), are also severely affected. The difficulties agribusinesses have encountered include increased business expenditure, disruptions in the supply of inputs leading to increased output prices, and subsequent difficulty in meeting monthly revenue targets, which have resulted in difficulty in payment of salaries and wages in the private sector [4].

The agribusiness sector in Ghana is vital in economic development in terms of job creation and bridging the poverty gap. According to [5], data from Ghana's Registrar General's Department show that Micro, Small, and Medium-scale enterprises make up about 92 % of all registered companies and provide 85 % of jobs in the country. The facts above prove the importance of that sector in the Ghanaian economy. However, the agribusiness sector faces numerous constraints, and these constraints have been exacerbated by the current economic crisis, especially emanating from the effects of the COVID-19 pandemic, which have exposed them to risks and invariably may lead to their failure or, at best, stifle their Growth [6]. The ability of entrepreneurs to address the dynamics of the Ghanaian market is largely influenced by their ability to carefully identify and analyze the type of risks their businesses face and examine the strategies necessary to manage them.

The working definition of Micro and Small Enterprises (MSEs)used in the Ghanaian context is hinged on a definition by the Regional Project on Enterprise Development Ghana (RPED), which classifies them into micro-enterprises as firms with less than five employees and small enterprises as firms with employees between five and twenty-nine. Despite their importance, there is evidence [7–11,] to show that most of them fail to survive the first few years of their existence, and the probability of their failure is even more certain now than ever due to the increased risk they face in the current economic crisis. Studies that have examined the nexus between risk management and firm Growth in Ghana have highlighted the effects of Enterprise Risk Management (ERM)on firm growth. For example, Harvey and Ankamah [12] examined the effects of ERM on firm performance indicators -Return on Asset (ROA), Tobin Q, and Return on Equity (ROE)as proxies of growth. They concluded that ERM impacts firm performance positively and significantly. Yusheng et al. [13] examined the relationship between (ERM) and firm performance in Ghana using risk management practices such as board size, board independence, audit committee size, and risk disclosure, among other practices. They showed that ERM is a fundamental requirement for firm growth, and the effect is felt most significantly among firms facing financial difficulties plausibly because such firms, most importantly, need to manage the risks they face very well to stay afloat. Other authors [14] have also assessed risk management practices along the precincts of knowledge and attitudes towards risk *identification, Risk Assessment, Risk Response, and Risk monitoring* used by small and Medium Scale Enterprises (SMEs) owners in Ghana. They concluded that the proper practice of risk management by SME managers or owners influences the performance (Growth) of the firm.

Extant literature [12,14] that have studied the nexus between risk management practices and firm Growth in Ghana have either tilted toward risk management practices akin to those practiced in the Western world or those practiced by domestic formal firms as against risk management practices with local contextual importance. In other words, studies focused on risk management practices used by Micro and Small (MS) entrepreneurs with an indigenous touch in the Ghanaian context are scant. The style of MSE management, especially for those in the informal sector in the non-western world, differs significantly from the conventional methods used by the Western world [15]. Amaeshi et al. [16] conclude that local managers combine different contextual approaches instead of purely Western managerial practices in small business management in Kenya. The decisions and capabilities of entrepreneurs greatly influence the failure or success of Micro and Small Enterprises the world over. Their different management strategies and skills manifest it. MSEs in Ghana face many risks in their ventures, which is especially aggravated among those whose operations are directly related to agriculture (agri-food processing firms) because the progress of their production activities is contingent on primary agricultural production, which is prone to many natural disasters. Again, the price volatility of farm output (as raw materials) is of significant concern to entrepreneurs in agri-food processing since the former directly affects the cost of production of entrepreneurs in agri-food processing.

These bring to the fore the issue of risks that many agribusiness MSE entrepreneurs face, which is complicated because they operate in an environment characteristic of weak markets [17]. They need access to sufficient support institutions to help them cope with risks. Among the remedies prescribed for business operators to manage risk is a subscription to risk-sharing institutions like insurance and credit schemes that help reduce the burden of risk to society [18]. However, insurance penetration in Ghana is generally low and stood at about 3 % as of 2019 [1], owing to low levels of insurance literacy among the majority of the Ghanaian population [19]. Private sector insurance products in agriculture and related sectors are not well developed and rolled out in Ghana, compelling MSE entrepreneurs to choose self-insurance strategies that include social mechanisms and diversification of production activities for coping with risk. Many informal sector players, including agri-food processors, also borrow from their immediate relations (family and friends) as risk management strategies to mitigate the effects of financial risks on their businesses [1].

The foregone raises an important question: Do indigenous[1] indigenous risk management practices on firm Growth in Ghana. The risk management practices are termed indigenous because they are the typical practices local entrepreneurs use. They are mostly uncommon in nascent literature as used by entrepreneurs in the West. Therefore, this study focuses on indigenous risk management practices of small firms in the Ghanaian context and hypothesizes that indigenous risk management practices positively affect firm growth.

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[1] Therefore, the primary objective of this paper is to estimate the impact of risk management practices that affect firm growth.

Literature review

The entrepreneur in the theory of firm growth

According to the static competitive equilibrium theory, firm size is contingent on the efficient allocation of given resources, including human resources (entrepreneurial skills), under available technology [20]. The theory postulates that the firm's size at a given time is its efficient size owing to the minimization of the cost of production in the long run. Therefore, the firm will grow until its optimum size, where long-run marginal costs and price are at par. There are different schools of thought (theories) on firm growth as hypothesized by different researchers. For example, Lucas [21] indicates that the small firm and the entrepreneur or manager are assumed to be the same, and, therefore, the firm's output is a function of the entrepreneur's managerial ability, capital, and labor. In this sense, entrepreneurs (and managers) of firms with superior managerial abilities will have lower marginal costs and produce higher output (i.e., higher efficiency levels) with the same quantity of inputs compared to firms with entrepreneurs with lower managerial skills, implying that the entrepreneurial skills of the business owner are essential for the firm's growth. This assertion is supported by Block et al. [22], who link firm performance (Growth) to the entrepreneur's capabilities (good administration of resources and capacities, including financial knowledge and soft skills), which may not be tangible but very critical for firm growth. The other school of thought contends that the entrepreneur's involvement in the firm's overall growth is not sacrosanct, arguing that growth dynamics (and not necessarily only the entrepreneur's abilities) contribute to firm Growth [23]. Empirical evidence from current literature [24, 25] supports theoretical leanings which argue that risk management increases firm value (Growth) while reducing return and cash flow volatility among firms. This stresses that risk management practices entrepreneurs use can subsequently influence firm growth. Entrepreneurs will utilize risk management practices that are easily accessible to them, are popular, and can be used with minimal cost in the jurisdiction of the firm.

Small firm growth and the heterogeneity of firm growth

Growth signals a change (positive) in size from a particular period under consideration to another [26]. Small firm growth represents an increase in sales, profit, employees, or a change in the size of assets [27]. Firm Growth is a multi-dimensional phenomenon. In this multi-dimensionality, Gibrat's law is the most popular way to test the theory of firm Growth [26,27]. Gibrat's law postulates that the firm's size at any given time is the product of a series of random growth rates in the firm's history. This implies that the period within which the firm's growth is measured is independent of its size when the firm was formed. Several factors have been considered responsible for firm growth, and these include the size of the firm expressed as growth in the number of employees, age of the firm, financial resources, technology level adopted for operations, and positive change in the volume of sales of the firm's products. These highlight the presence of heterogeneity in firm Growth [28,29]. Heterogeneity in small firm growth has been explained by theories bordering on the Dynamic Capabilities Theory (DCT), the Upper Echelon Theory (UET), the Resource-Based Theory (RBT), the Knowledge-Based Theory (KBT), and the Resource-Dependency Theory (RDT). The RBT of small firm Growth shows that firms can grow by attaining a competitive advantage through the acquisition and exploitation of valuable, rare, inimitable, and non-substitutable resources [30,31]. The KBT of firm Growth is hinged on the fact that small firm growth can be achieved by emphasizing the acquisition, assimilation, and application of knowledge to influence firm Growth [32]. The DCT is quite close to the KBT in terms of the requirement for growth – developing dynamic capabilities manifested through the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments by highlighting knowledge management to foster firm Growth [33–35]. The UET places emphasis on the influence apex management brings to bear on firm growth. The theory states that the characteristics and decisions of the firm's top management have a telling impact on firm growth. Last, the RDT submits that firms depend on external resources and relationships for their growth. It postulates that firms that can manage their external relationships effectively are more likely to grow and succeed.

The theories enumerated above are particularly important in the context of indigenous risk management and firm growth in several ways. For example, the KBT known to be hinged on the intellectual capital of the entrepreneur, can contribute to lower transaction costs, improve efficiencies, and result in exceptionally good customer benefits, culminating in firm growth. These will manifest in increases in sales volume because customers will be satisfied with the firm's products. The KBT therefore, is critical in organizational innovations, which subsequently influence management (including risks) of the firm [36]. The RBT is also important because it encapsulates the entrepreneur's tangible and intangible resources. These resources reflect the ability to recognize new opportunities and assemble resources for the firm, including human resources, which is also reflected in the type of risk management strategies they take. These eventually have effects on the growth of the firm. The DCT of firm growth sheds light on understanding the role of flexibility in firm growth as reflected in its innovation capacity and ability to adjust to changes (especially economic and political) in the environment. This ability provides the platform for the firm to adopt indigenous risk management practices to insulate itself from market and other forms of risks, for instance, by driving micro and small firms to stay aligned with market needs. The ramifications associated with the DCT are reflected in consumer satisfaction and subsequent increases in sales volumes. The RDT is very useful as a managerial framework to determine vital resources for a firm to achieve a sustained competitive advantage and growth. The managerial framework angle encompasses the ability to use locally tried and tested (indigenous) strategies to manage risks [37]. The UET indicates that the characteristics of entrepreneurs, including their diverse educational backgrounds and relevant experience, bolster them to make informed decisions about the firm's growth trajectory [38]. They further consider the potential impact of their decision-making (especially on risk management) on employee size and other relevant growth metrics.

Empirical perspectives of firm growth

Growth is a phenomenon that inevitably ensues over time for firms that survive. Ideally, firm growth has to be analyzed longitudinally at any rate so that evaluation of the explanatory variables leads to appraisal of the dependent variable. Regardless of this information, many studies on growth were, in reality, cross-sectional. This denotes that scholars have been engaged in 'prediction of the past' or have made persuasive postulations in relation to contributory or pivotal order and non-changeability of the predictors over time. For instance, a study by Chandler et al. [39] effectively used transaction cost theory to predict the direction of the relationship between growth in sales and employment. Their results indicated that the relationship between the two indicators at certain periods in the firm's life is mixed – mono-directional at one point and bidirectional at other times. This consolidates the view that the two indicators of firm growth may not always have a positive correlation. An alternative would be to consider one growth indicator that best suits the theory of the firm. There is consensus that sales growth should be preferred in cross-industry studies [40–42]. This is because it is the most general of all the alternative indicators for growth since all commercial firms need sales as a fundamental element for survival. Indeed, sales growth is most popular among entrepreneurs of small firms in developing economies [43]. Again, the argument is that other firm growth indicators usually follow sales - the increase in sales translates into asset acquisition, larger employee size, and growth in profits or market share [44]. Employment growth is the next popular indicator of firm growth and is very important to public policymakers because of its importance to economic growth. Employment growth is also often applied in firm growth analysis because of the ease of data availability.

Other indicators of firm growth are less commonly used and, therefore, not as frequently applied. The 'market' in market share computation may be immaterial for small firms in the Ghanaian setting, and equating values of shares for firms functioning in diverse markets could be invalid. The worth of assets is different with the capital intensity of different industries, and it becomes challenging to assess firm growth, especially where the crucial asset being assessed as an indicator for firm growth is knowledge because knowledge is intangible. While sales (in terms of volume) may be the most universally applicable growth indicator, it does not always give the best results [45], as corroborated by Penrose [29], who stated that "there is no way of measuring an amount of expansion or even the size of a firm, that is not open to serious conceptual objections." For example, high technology firms (which are capital-intensive rather than labor-intensive) with relatively long expansion times (for example, biotech organizations) are not able to exhibit any growth in sales or returns for elongated periods. Yet, throughout this period, they might still increase regarding assets— including knowledge assets such as patents. The preceding brings to the fore the many ways firm growth is measured. Owing to the plethora of factors considered in firm growth, this study uses the most popular indicators – Growth in employee size and growth in sales volume. A combination of indicators of firm growth is considered better than the use of only one indicator to measure firm Growth [46].

Risk management and firm growth

Small firms employ fewer formal risk identification and evaluation procedures than large ones. The entrepreneur is responsible for all managerial decisions, which depend much more on their experience. They may also learn more about risk management from colleagues [47]. Literature detailing the relationship between the firm's risk management and performance (Growth) is mixed. Nocco and Stulz [48] suggest that risk management is linked to firm growth. An entrepreneur who understands the risk the firm faces can command the resources required to engage in productive ventures that underpin the firm's growth. Improvement in risk awareness within the firm helps make better operational and strategic decisions, enabling management to meet strategic goals, reduce earnings volatility, and increase profitability, culminating in firm Growth [49]. Risk management can minimize the volatility of reported income accrued to the firm. Other studies [50,51] conclude that firm risk management enhances the firm's value and improves the firm's price-to-earnings ratio, indicating firm growth. Managerial decisions taken by entrepreneurs of micro and small firms on risk management practices that affect firm growth cannot be delinked from their household decisions. This is especially conspicuous for resource-constrained households since such decisions can contribute to the income-smoothing strategies of the household.

Methodology

Theoretical framework

Dhliwayo [52] shows that the growth of small firms is wrapped around four main aspects: financial growth, strategic growth, structural growth, and organizational growth. The financial aspect of small firm growth manifests in increases in sales, investments, profits, and increases in the value of the firm's assets [53]. The organizational growth aspects encompass changes in the organizational process as related to roles played by the entrepreneur and the policies, plans, and budgets of the firm. These growth aspects also embody knowledge acquisition [54], reduction in administrative and transaction costs [55], and increases in employee numbers [52]. The financial and organizational aspects of firm growth, which are translated to growth in sales volume and increases in employee size, respectively, are based on the Resource-Based Theory (RBT) from which the Penrosean view of small firm growth is grounded [32]. The theoretical basis of this study is hinged on the RBT. The RBT is the most popular and widely used theoretical framework to unearth the underpinnings of the growth of small firms. The RBT is grounded in the fact that the foundation of a firm's competencies is contingent on firm-specific resources [36]. Flamholtz [44] argues that sales often precede other firm growth indicators because the increase in sales triggers other measures of small firm growth – asset acquisition, larger employee size, growth in profits, and market share. While Sales growth is very popular in the small firm growth literature, employment growth is another critical measure of firm growth, especially to public policymakers, because it is viewed as one of the overarching indicators of economic growth. The literature

has predicted small firm growth using demographic characteristics (the entrepreneur is intricately linked to the operations of the small firm), firm characteristics, and risk management practices used by the entrepreneurs.

Measuring Micro and Small (MS) firm growth

This paper measures small firm growth from two perspectives – **Growth in the number of employees** and **growth in the volume of sales** [56].

Growth in the number of employees

The average growth in the number of employees (2019–2022) was estimated by the following equation

$$AvGr_i = \frac{\left[\frac{Ne_t - Ne_{t-1}}{Ne_{t-1}}\right]}{3} \, x \, 100\% \tag{1}$$

where,

$AvGr_i$ = average annual (t) growth rate of employee numbers of the *ith* firm for the period 2019 to 2022 expressed as a percentage.
Ne_t = number of employees in the current year.
Ne_{t-1} = number of employees in the previous year.

The relative change in a firm's number of employees from 2019 to 2022, expressed as a percentage on an annual basis, was used to measure firm growth. The change in the number of employees as a measure of firm growth is essential because it's quite popular in the extant literature. Considering the context of this study (micro and small firms in the Ghanaian context), the decision by the entrepreneur to employ more is a highly discretionary management decision [57]. Smoothing of the growth rate was done, and this meant that a percentage change between the number of employees in a year and the following year was used to measure firm growth (by employee size). The mean growth rate over the period was estimated as the growth of employee size and used as the dependent variable in the model to be estimated. Smoothing of the growth rate was done to avoid bias in estimations for the growth in employee sizes because it would have been misleading, considering there could be fluctuations in the rate of growth over the period. Smoothing involved estimating the growth rate on an annual basis and finding the mean growth rate over the period rather than estimating the composite growth rate between the initial year and the end year as the basis of growth over the period

Growth in volume of sales

The second measure of firm growth was estimated as an increase in the volume of sales. This is often a response to market demand [39]. Consider a firm with only one output (all firms in the study produced only one product), total sales volume is given by:

$$S = \sum_{i=1}^{M} q_i \tag{2}$$

where, *S is the* total volume of sales over a certain time *m*, and *q* the quantity of output sold.

Then the firm growth rate *g* represented by the change in *S* is given by:

$$g = \frac{\Delta S}{\Delta t} = \frac{\Delta \sum_{i=t}^{M} q_i}{\Delta t} \tag{3}$$

where, Δt is the time *t* of measuring firm growth (from December 2019 to December 2022). This equation is a modified version of Machek and Machek [58], who used both price and quantity of sales to measure firm growth and introduced the number of customers and the frequency of their visits as a composite equation for measuring firm growth. The estimation of the change in the volume of sales followed the same procedure as that for the change in employee size and was done over the period (2019 to 2022) to ensure consistency in results.

Firm growth in the context of risk management

The effects of the following risk management practices on firm growth were estimated: Diversification of economic activities; Borrowing; Subscription to formal insurance services; Forward contracting; Cooperative marketing; Savings for business purposes; Sale of business assets; and Temporary wage employment outside of the firm. Entrepreneurs enumerated these risk management practices during a pre-survey exercise. They fit as indigenous risk management practices, especially as the sample of this study were entrepreneurs of informal agribusiness firms that do not use laid down (formal) enterprise risk management (ERM) practices but have adopted risk management practices that suit their local risk situations [59]. Entrepreneurs were asked to rank the enumerated risk management practices listed above – 1 being the most critical risk management practice and 8 being the least important.
Hypothesis

This paper hypothesizes that indigenous risk management practices increase firm growth.

Description of variables

By including demographic and firm characteristics alongside risk management practices as independent variables in the linear regression model that estimates firm growth, we can better understand the factors that influence firm growth (Table 1). Several studies, including those by Yembi Renault et al. [60], Tarfasa et al. [61], and Bojica et al. [62], have included these variables in their models to predict firm growth. We have also included these variables to provide a more nuanced understanding of the relationship between risk management practices and firm growth.

Age

Several studies have estimated the effects of the entrepreneurs' (owners') personal characteristics on small firm growth. Varga [63] and Jones and Weinberg [64] showed that age positively affects firm growth, indicating that older firm owners tend to have more experience and, by extension, knowledge in the industry where the firm operates. These help them make better decisions, which eventually positively impact firm growth. However, Pevan et al. [65] show that age has a negative effect on firm growth.

Sex

Evidence suggests that the influence of the gender of the entrepreneur on firm growth is mixed – both negative and positive. While Pevan et al. [65] indicated that Gender (sex of the firm owner) exerts a negative influence on firm Growth, Crane [66] has shown that entrepreneurial firms in developing countries that are female-owned run shoulder to shoulder in terms of performance (Growth) with male-owned ones but the case is different in developing countries where results showed that male-owned firms significantly outperform female-owned firms. The empirical literature has shown that the education of the entrepreneur (owner of the small firm) influences firm growth positively, as evidenced by Arun and Rogers [67] and

Education

The entrepreneur's educational level (in terms of years of formal education) has been shown to exert a positive influence on firm growth. Several studies [68,69] concluded that firms owned and managed by entrepreneurs with higher formal education experience higher growth than their counterparts with lower levels of formal education.

Firm age

Barba Navaretti et al. [70] showed that younger firms grow faster compared to older ones, and this is affirmed by Coad et al. [71], who indicated that firm age positively influences firm growth. However, Guzzo et al. [72] show that age tends to serve as a restrictive growth factor for young SMEs but does not influence the growth of old SMEs. The above shows that the influence of firm age on small firm growth is mixed.

Area

The area in which the firm is located, whether in a rural or urban setting, is an important factor influencing firm growth. This is because the economic activities prevalent in these locations are different and could affect firm growth, especially as related to the measures of firm growth in this study. Rural areas are typically located outside towns and cities and are characterized by low population density, which translates into low economic activity, especially in the Ghanaian setting. On the other hand, urban areas are densely populated, which usually results in robust economic activity. Pevan et al. [65] found that the firm's location significantly determines the probability of the firm being high-growth. Vaz [73] also indicated that the location of the firm has a positive effect on firm growth, and this is important because of the level of economic activity prevalent in the jurisdiction of the firm.

Years of experience (of the entrepreneur in the agri-food processing industry)

The effect of the entrepreneur's experience in the industry of their operations has been shown to be positively related to firm performance (Growth). For example, Gifford et al. [74] and Tarfasa et al. [61] found that the experience of the entrepreneur, expressed as the 'length in operation of the entrepreneur in the industry, is tantamount to a learning curve which presumes those with longer years of experience have a higher probability of learning from their experiences which positively impacts firm growth.

Specified Empirical model

Following Valaskova [75][2] who used a similar multiple linear regression model to investigate the relationship between risk management and sustainable development of firms in Slovakia, the empirical model is given as:

$$Y^g = \alpha_0 + \beta_1 age + \beta_2 sex + \beta_3 educ + \beta_4 area + \beta_5 yr\_exp + \beta_6 firm\_age + \beta_7 div + \beta_8 brrw + \beta_9 ins + \beta_{10} fwdcont + \beta_{11} coopmkt + \beta_{12} save$$
$$+ \beta_{13} salaset + \beta_{14} tempwg + \epsilon$$

where, Y^g = firm growth (Growth in number of employees; Growth in sales volume) -as dependent variables estimated separately.

age= Age of entrepreneur, *sex* = Gender of entrepreneur, *educ*= Education level attained by entrepreneur, *area*= Area of firm location (rural or Urban), *yr_exp* =Years of experience of the entrepreneur in the agri-food processing industry, *firm_age*= Age of the firm, div =Diversity of economic activities by the entrepreneur, brrIw = Borrowing, *ins* = subscription to formal Insurance, *fwdcont* = Forward contract, *coopmkt* = cooperative marketing, *save*= Savings, *salaset*=sale of assets by entrepreneur, *tempwg*= Temporary wages employment outside the firm

α_0 = Intercept
β1−β14: Coefficients of the independent variables

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[2] The model is modified to suit the peculiarity of the current study.

Table 1
Description of variables *and A Priori* expectations from model estimates.

Variable category	Variable	Description	*a priori* expectation
Demographic characteristics of entrepreneur	Age of entrepreneur	Continuous variable (years)	-/+
	Sex of the entrepreneur	Dummy variable: Male =1, female =0	-/+
	The educational level of the entrepreneur	No. of years in formal education	+
Firm characteristics	Years of Experience	Years of experience in the business area	–
	Area firm is located (Rural or urban)	Dummy variable (Urban=1, rural=0)	+/-
	Age of the entrepreneur's firm	Continuous variable (years)	+/-
Risk management practices	Diversification of economic activities over period (2019 to 2022)	(1= Yes, 0=otherwise)	+
	Borrowing for related business activities over period (2019 to 2022)	(1= Yes, 0=otherwise)	+
	Subscription to formal insurance – related to the firm over period (2019 to 2022)	(1= Yes, 0=otherwise)	+
	Forward contracting over period (2019 to 2022)	(1= Yes, 0=otherwise)	+
	Cooperative marketing of the firm's products over period (2019 to 2022)	(1= Yes, 0=otherwise)	+
	Savings toward investment in the firm over period (2019 to 2022)	(1= Yes, 0=otherwise)	+
	Sale of assets over period (2019 to 2022)	(1= Yes, 0=otherwise)	+
	Temporary wage employment over period (2019 to 2022)	(1= Yes, 0=otherwise)	+

Source: author compilation, 2023.

ε: Error term

Data reliability tests

Data reliability tests were performed on all variables specified in the OLS model to ensure that the assumptions in using the OLS regression method were not violated.

Presence of perfect collinearity or Multicollinearity

Multicollinearity among explanatory variables in a regression model poses a challenge with accurate interpretation of the effect of each variable on the dependent variable. The variance inflation factor (VIF) can detect the *presence of multicollinearity*. It shows which variables in a model exhibit the presence of multicollinearity and reveals how the presence of multicollinearity *inflates* the variance of an estimator. Daoud [76] suggests that a VIF value equal to 1 indicates no multicollinearity, and values up to 5 are also acceptable, implying that a VIF value above 5 shows the presence of multicollinearity. None of the explanatory variables in the specified model reported VIF values above 5.00 and were deemed acceptable to be included in estimating a rigorous empirical model. The mean VIF for all the variables specified in the model is 2.65 (Table 2)

Heteroskedasticity

In testing for heteroskedasticity among the variances of error terms of the explanatory variables, the Breusch-Pagan / Cook-Weisberg test was used. This test is appropriate for linear forms of heteroskedasticity. It is used to test the null hypothesis that there are equal variances among the error terms of the explanatory variables in the model versus the alternate hypothesis that the variances of the error terms are a multiplicative function of one or more variables. We only accept the null hypothesis if there are no issues of *Heteroskedasticity*. The results from testing for heteroskedasticity showed a chi-square value of 17.18 at *a p*-value of 0.3740, indicating that there is no significant heteroscedasticity in the regression model.

Research design

Study area

The data for this study were taken from two regions of Ghana (Greater Accra and Ashanti regions). The choice of these two regions was based on the fact that they are the two largest economically important regions and control more than half of all economic activities in the country. These two regions have the highest concentration of micro and small firms involved in agri-food processing in Ghana [77]. The Greater Accra Region houses Ghana's political and commercial capital - the city of Accra. Among the 16 administrative regions of Ghana, it is one of the smallest with regard to land size. it occupies a total land surface of 3245 km^2, equivalent to 1.4 % of the total land area of Ghana, and a population size of 4,010,054 [78]. Sampled firms in this study are located in the following administrative districts: Accra metropolis, Ashaiman, Ga West, Ga East, Ga South, and Tema. The region's economy is largely informal private sector-driven, although there are many formal private sector businesses. The agricultural industry is very prominent in terms of the provision of employment. Within this industry, agri-food processing firms involved in the production of animal-based and crop-based products are predominant [79].

Table 2
VIF values of variables used in estimating firm growth- increases in employee size.

Variable	VIF	1/VIF
Years of experience (of entrepreneur)	4.90	0.204150
Sale of assets	4.35	0.229809
Age of entrepreneur	4.20	0.238366
Cooperative marketing	3.54	0.282255
Temporary wage employment	2.89	0.345837
Diversification of economic activities	2.71	0.368936
Forward contracting	2.59	0.385790
Borrowing	2.56	0.391054
Firm age	2.35	0.424667
Subscription to formal insurance	2.14	0.467679
Savings	1.39	0.718951
Area firm is located (Rural, Urban)	1.34	0.747064
Level of education	1.23	0.812785
Sex of entrepreneur	1.18	0.844492
Mean VIF	**2.65**	

Source: author estimations, 2023.

The Ashanti region is located in the center of Ghana, with the Kumasi Metropolis as its capital. Kumasi is Ghana's second most commercially important city after the national capital, Accra. It is the most populous region with a population size of about 4,780,380, according to the 2010 housing and population census. The primary economic activity in all the districts in the region is agriculture (crop and animal production), save for the Kumasi metropolis, where commerce is the major economic activity. The majority of the economically active population are self-employed, mainly in the private informal sector, and engage in both agricultural and non-agricultural economic activities. Like the Greater Accra region, one of the significant agriculture-related activities is agri-food processing. The districts sampled in this region included Kumasi metro, Ejisu-Juaben, AtwimaNwabiagya and Atwima Kwanyoma.

Sampling procedure

A combination of purposive and snowballing sampling techniques was used to select the sample for this study. This technique was deemed appropriate given the nature of the study (targeting only owners of micro and small firms in agri-food processing). The sampling procedure involved an initial purposive selection of the Greater Accra and Ashanti Regions because these two regions house most of the agri-food processing firms in the country.

Data

The analysis was based on both panel and cross-sectional data using a structured questionnaire. Limited panel data covering a period of 4 years (end of 2019 to end of 2022) were collected on sales volume and the number of employees. These data were used as the basis for measuring firm growth. The data collection process was preceded by a pre-test of the survey instrument to ascertain suitability for the sample and to ensure all salient data required for analysis were adequately captured. The results from that exercise informed the data collection team of the kind of risk management practices used by entrepreneurs of micro and small informal firms in Ghana and included in the questionnaire. In all, 159 firms were sampled and used in this study.

Results and discussion

The study conducted an enterprise survey and involved only owners (entrepreneurs) of the firms in the sample. The mean statistics of demographic and enterprise characteristics disaggregated by the regional location of the firms and the gender and age status (youth and aged)of entrepreneurs are reported (Table 3). Youth were defined as those entrepreneurs aged 18 to 35 years and those older as aged. Ownership of firms was dominated by females across age status. Females owned 56 % of firms among youthful entrepreneurs and 62 % among the aged. This result identifies with GSS [80], which reports that 90 % of women and 81 % of men work in the informal sector in Ghana. There was a statistically significant difference between equity in firms owned by the aged and those owned by the youth. Firms owned by the aged showed a mean owner equity of GH¢ 24,700 compared to GH¢ 4600 among the youthful entrepreneurs. This may be explained by the relatively longer years of experience of the aged entrepreneurs, with an average of 20 years compared to about 6 years of experience by youthful entrepreneurs. On average, firms opened for operations throughout the year (11.7 months). The average number of months the firm operates throughout the year is important to determine the months of non-activity. This could explain possible inconsistencies in indicators that measure firm growth. Youthful female entrepreneurs in the Ashanti region committed more work hours (64.5 h) per week to their businesses than their counterparts in the Greater Accra region (12.5 hours per week). This is reflected in the percentage firm growth of 50 % and 30 % for the same groups, respectively.

Risk management practices ranked

The results show that saving for business purposes is largely the most important risk management practice ranked by entrepreneurs across age status and gender, with the least mean scores between 1.37 and 1.81 (Table 4). The deduction here is that entrepreneurs are

Table 3

Descriptive statistics of demographic and firm characteristics (mean).

Age status	Ashanti				Greater Accra				overall		
	Male		Female		Male		Female				
	Youth	Aged	Youth	Aged	Youth	Aged	Youth	Aged	Youth	Aged	t value
Age (years)	28.8	49.7	30.8	51.6	29.9	46.7	28.5	46.4	29.3	48.8	−6.42***
	(5.5)	(10.1)	(3.3)	(10.3)	(3.9)	(11.3)	(3.9)	(6.9)	(4.0)	(10.0)	
Household Size	3.0	6.0	3.0	6.0	3.0	6.0	2.0	404	3.0	5.0	−0.64
	(1.3)	(2.4)	(1.0)	(1.9)	(1.6)	(2.1)	(1.4)	(1.7)	(1.4)	(2.0)	
No. of Yrs in Education	7.8	9.6	6.7	5.6	12.7	10.2	9.1	7.7	9.8	7.8	−1.20
	(2.1)	(6.6)	(6.1)	(6.7)	(3.4)	(3.1)	(3.2)	(4.8)	(4.1)	(5.7)	
Owner's equity in the business (GH¢ '000)	16.9	37.1	1.4	37.8	5.9	21.2	1.1	2.5	4.6	24.7	2.50**
	(14.8)	(67.2)	(1.8)	(159.6)	(6.7)	(59.0)	(0.9)	(2.9)	(8.0)	(105.2)	
No. of years of experience in the business (entrepreneur)	5.7	23.2	6.7	22.4	5.9	18.4	5.8	16.6	5.9	20.0	−0.01
	(3.9)	(15.0)	(3.9)	(12.6)	(3.3)	(12.2)	(2.7)	(10.2)	(3.1)	(12.3)	
Number of months business normally operates in year	12.0	12.0	11.5	11.4	11.6	11.8	12.0	11.8	11.8	11.7	0.76
	(0.0)	(0.0)	(1.2)	(1.3)	(1.1)	(1.3)	(0.0)	(1.0)	(0.8)	(1.1)	
Average No. of work hours/week (entrepreneur)	32.8	35.8	64.5	33.7	34.1	43.6	12.5	12.9	28.3	31.5	−0.87
	(27.1)	(31.5)	(49.9)	(26.7)	(27.6)	(37.9)	(12.9)	(17.3)	(30.5)	(30.7)	
Average No. of work hours/week (employee)	51.0	55.3	56.0	49.1	50.8	58.0	49.1	48.7	0.3	0.3	−0.61
	(10.6)	(10.9)	(12.4)	(4.8)	(9.6)	(11.8)	(4.3)	(4.8)	(0.3)	(0.5)	
Average monthly salary of employee (GH¢ '000)	2.7	2.9	2.2	2.7	2.9	2.8	2.1	2.1	1.9	2.2	1.46
	(1.6)	(2.0)	(0.4)	(1.5)	(2.1)	(1.9)	(0.4)	(0.5)	(1.5)	(2.0)	
Number of permanent workers by end 2022	2.9	2.3	1.3	1.8	2.1	2.2	1.5	2.4	1.8	2.1	−0.57
	(2.3)	(1.7)	(0.5)	(2.6)	(1.7)	(1.8)	(0.9)	(1.4)	(8.3)	(8.9)	
Average percentage growth in employee size (2019 to 2022)	0.2	0.3	0.5	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.16
	(0.3)	(0.2)	(0.1)	(0.3)	(0.3)	(0.8)	(0.3)	(0.3)	(1.4)	(1.5)	
Age of the firm (years)	12.5	24.0	6.8	16.5	6.7	9.6	5.6	9.2	7.0	13.7	1.50
	(10.4)	(14.1)	(2.9)	(11.2)	(3.5)	(7.3)	(1.2)	(6.7)	(4.6)	(10.7)	

Source: survey results; standard deviations are in parentheses.

Table 4

Average score and ranking of risk management practices (level of importance).

	Male				Female				Mean comparison	
									Male- Female youth	Male- Female Aged
	Youth	Rank	Aged	Rank	Youth	Rank	Aged	Rank	t value	t value
Savings for business purposes	1.81	1	1.43	1	1.37	1	1.59	1	1.510	−1.11
Temporary wage employment	3.10	2	3.81	2	3.22	2	3.83	2	−1.131	−0.63
Diversification to other activities	5.33	7	5.50	7	6.04	8	5.39	7	−1.103	0.11
Subscription to formal insurance	5.95	8	5.24	5	5.41	6	5.77	8	0.920	−1.37
Forward contracting	5.00	5	5.48	6	5.67	7	5.16	6	−0.921	0.60
Cooperative marketing	5.34	6	5.98	8	5.19	5	5.04	4	0.129	2.87***
Borrowing	4.71	3	4.43	4	3.96	3	4.09	3	1.325	0.97
Sale of Assets	4.76	4	4.14	3	5.15	4	5.13	5	−0.596	−2.21**

Source: author's computation.

mitigating the effects of financial risk. Temporary wage employment elsewhere is the second most important risk management practice ranked by entrepreneurs. Other risk management practices include diversification of the entrepreneur's own economic activities, subscription to formal insurance packages, forward contracting, cooperative marketing, borrowing and sale of assets. A test of the differences in the mean scores indicate that across the board, there were no significant differences in the rankings of the risk management practices except the rankings by male and female aged people on cooperative marketing and sale of assets. This is reflected in the importance any of these groups place on the risk management practices. Male aged entrepreneurs rank cooperative marketing as least important as against aged female entrepreneurs who rank this risk management practice as number four. This means that while aged male entrepreneurs can negotiate better prices for their products, their female counterparts prefer to sell their products through the cooperative marketing system to increase their bargaining power. The difference in ranking of sale of assets to offset firm debt or to meet some household obligations is attributed to divergent behavioral tendencies between males and females as regards retention of household assets – males are more likely to sell off assets compared to females in the Ghanaian society. This reflects the ranks attached by males (3) as more important to that of females (5).

Effects of indigenous risk management practices on firm growth

Risk management practices have a significant positive influence on firm Growth (Table 5), and it is therefore expected that risk

Table 5
Indigenous risk management practices and their effects on firm growth.

		(1) Growth in employee size	(2) Growth in sales
Variables			
Demographic characteristics	Age of entrepreneur	**0.0109****	0.000202
		(0.00521)	(0.000228)
	Sex (1=.male, 0=female	0.106	**−0.00497****
		(0.0729)	(0.00319)
	Level of education	−0.00557	0.000130
		(0.0125)	(0.000547)
	Regional location (1=Ashanti,0=Accra)	0.0346	0.000720*
		(0.0251)	(0.00110)
Enterprise Characteristics	Area (1=urban, 0=rural)	0.0862	0.00416
		(0.0904)	(0.00396)
	Years of experience	**0.00603****	−0.000322
		(0.00567)	(0.000248)
	Firm age	0.00169	0.000141
		(0.00468)	(0.000205)
	Diversification of economic activities	**0.0160***	**0.000425***
		(0.0171)	(0.000747)
Risk management Practices	Borrowing	0.0707	**0.00190***
		(0.0232)	(0.00101)
	Subscription to formal insurance	**0.0503*****	**0.000771****
		(0.0183)	(0.000801)
	Forward contracting	0.0245	**0.05515****
		(0.0200)	(0.000875)
	Cooperative marketing	0.0427	**0.01113***
		(0.0316)	(0.00138)
	Savings	−0.0175	−0.000191
		(0.0308)	(0.00135)
	Sale of assets	**0.0477***	**0.00312****
		(0.0242)	(0.00106)
	Temporary wage employment	**0.0311***	**0.00121****
		(0.0284)	(0.00124)
	Constant	−1.428*	0.284***
		(0.754)	(0.0330)
	Observations	*159*	*159*
	R-squared	*0.5453*	*0.5053*
	Prob > F	*0.0377*	*0.0192*

Source: author's computation.
Standard errors are in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

management practices will positively affect firm growth. The following risk management practices are most commonly used by entrepreneurs: Diversification of economic activities; Subscription to formal insurance; Forward contracting; Cooperative marketing; Borrowing; Savings for business purposes; Sale of assets; and Temporary wage employment outside the business. In the context of this paper, the risk management practices are those taken by the entrepreneur which are not the typical enterprise risk management decisions found in most literature (e.g. Ng'ang'a, Muthusi, and Nassiuma [81], Wanjohi and Ombui [82]) but those considered indigenous[3] to Ghanaian entrepreneurs.

Owner age

Our results show that an increase in the age of the entrepreneur by one year will trigger firm growth (increases in employee size) by 1 %. This could be attributed to the fact that older firm owners have built a broader pool of experience, knowledge, and social capital than younger entrepreneurs, which gives them the confidence to navigate the challenges of operating and growing their firms compared to the ability of younger firm owners to do the same. Our result deviates from the findings of Amran [83], which point to the negative relationship between the age of the firm owner and firm growth.

Sex

The result from the empirical model suggests that firms with male owners are associated with decreased firm growth, implying that, on average, male-owned firms experience about 0.5 % less growth in sales compared with female-owned firms. Although this result is positive in that it shows the ingenuity of female entrepreneurs, it is inconsistent with previous studies [66,84], which suggest that firms owned by females are less successful in terms of growth compared to those owned by males in developing economies while they are at par with male-owned firms in terms of growth in developed countries.

Firm age

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[3] The risk management practices in this study have been named to suit the Ghanaian context with respect to entrepreneurs in micro and small firms.

Firm age has no significant effect on firm Growth although years of experience of the firm owner exerted a positive influence on firm growth in terms of increases in employee size (an additional year in operating the firm with respect to the firm owner will result on 0.06 % increase firm growth. Our results agree with findings from

Risk management practices

Diversification of economic activities

There are basically two distinct forms of diversification - diversification of product composition (product diversification) and diversification to other markets [85]. However, these forms of diversification were not utilized by entrepreneurs. In the context of this study, diversification refers to the entrepreneur's practice of engaging in other productive enterprises that are not necessarily part of their business (i.e., agri-food processing). This involves investment in more than one portfolio, including engaging in primary agricultural production of food crops and selling fresh vegetables and fruits (especially during peak harvest periods). Other entrepreneurs also engaged in non-agricultural enterprises, which helped lower the variants of income from only agriculture-related activities. Diversification is a crucial risk management tool for firm growth and positively relates to risk management. The argument is that diversification can be used as a means of spreading perceived risk such that the impact of unfavorable outcomes that can lead to total failure of the firm is minimized.

Entrepreneurs engaged in income-smoothing strategies to reduce *ex-ante* risk exposure of the firm and secure a smooth income flow to the firm and, by extension, to their households. The firms were more or less operated as family businesses. Hence, treating the entrepreneur's household and business as two fully distinct entities was complex since business decisions also affected the household. Considering that most of the entrepreneurs in this study operated low-income firms, they would be harder hit by severe consequences in the event of a loss in a decision concerning the firm. To mitigate these effects, diversification was used by entrepreneurs as a risk reduction practice. The economic portfolio of the entrepreneur included activities of economic value and these activities were either agricultural or non-agricultural. Diversification of the entrepreneur's economic portfolio showed a significant effect on both measures of firm growth (increases in employee size and sales). The coefficients associated with increases in employee size and sales growth are 0.0160 and 0.000425, respectively, at a 10 % significance level, implying that the entrepreneur's decision to diversify their economic portfolio will enhance growth in employee numbers by about 1.6 % and about 0.04 % in sales of the firm. Although our result concurs with the findings from Mashiri and Sebele [86], who showed that there is a positive linear relationship between diversification and firm performance (as a proxy for growth), it is at variance with results from Mitra Bose and Chakraborty [87], who showed that diversification does not have any significant effect on firm performance. Entrepreneurs in the Ashanti region diversified their economic activities by engaging in primary agricultural production like the cultivation of tree crops (cocoa, oil palm), and annual crops (maize, cassava, and vegetables). On the other hand, entrepreneurs in the Greater Accra region engaged explicitly in the retailing of food (small grocery shops for finished goods) and non-food items, including the sale of plastic products.

Borrowing

Access to credit (borrowing[4] is a critical insurance mechanism that can be relied on for consumption smoothing. Results from the empirical model indicate that borrowing (as an insurance mechanism for production smoothing) is a risk management practice that influences firm growth (both in growth in volume of sales and increases in employee size). While borrowing (to invest in production) increases sales (as a measure of firm growth) by some 0.2 %, growth in employee size is not affected. The logic underpinning this result emanates from the fact that the firm needs to grow in sales significantly enough to accommodate increases in employee size. Any firm growth maximization objective that hinges on borrowing for payment of salaries has a higher tendency of failure because the foundation of such growth would not be based on growth in production. The primary source of borrowing was informal (from family and friends). Results from the study conducted by Nnoko and Maeda [88] in Sub-Saharan Africa and Japan demonstrated that borrowing affects corporate performance and confirm the results of this study.

Subscription to formal insurance services

Subscription to formal insurance products is also an essential part of risk management. Entrepreneurs subscribed to two insurance products: Personal accident and illness insurance and commercial property insurance. Personal accident and illness insurance covers the entrepreneur against illness and accidents in business operations, while commercial property insurance covers the loss or damage to the business' property. None of the firms in this study subscribed to any insurance coverage for their employees. The effect of subscription to formal insurance products (as a risk management practice) positively affects both measures of firm growth. Subscription to insurance products increases firm growth (in terms of increase in employee size) by about 5 % and increases volume of sales by about 0.08 %. The positive effect of subscription to insurance on firm growth can be attributed to the assurance entrepreneurs have concerning their security and that of their firms. Minimized exposure to personal and especially property risk means the entrepreneur is more likely to engage in risky decision-making with high expected outcomes.

Forward contracting

This risk management practice is an agreement between the entrepreneur and some specific buyer on the delivery of a specific quantity of the firm's product (to the buyer) at some pre-arranged price. Among the types of forward contracts, the fixed price contract, which requires the entrepreneur to commit to deliver a certain quantity of products with a specified quality to the buyer, was used. Payment was made at the time of delivery. This is a risk management practice in that price volatility (predominantly downward movement) as concerns the firm's product is avoided and the assurance of anticipated price is secured. However, the entrepreneur carries the opportunity risk of losing potential gains when market prices rise. Results indicate that forward contracting had no

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[4] Borrowing is mainly from family and friends rather than from formal sources like commercial banks or savings and loans institutions.

significant effect on employee size (as a measure of firm growth), while it significantly affected sales growth positively – engaging in a forward contract with a trading partner is expected to increase sales by approximately 5.5 %. Backward contracting, which involves contractual agreements with raw materials suppliers as a risk management practice, was not necessary to entrepreneurs. The main reason was that there were no difficulties accessing raw materials for processing.

Cooperative marketing

This risk management practice was widespread among entrepreneurs with firm locations in rural areas (and especially among processors of tuber – *gari* and palm oil). The practice reduces market risk and risk associated with unfavorable pricing since the firm's products are sold through the cooperative, which has stronger bargaining power compared to the individual entrepreneur's. Although cooperative marketing is positively related to employee growth as a measure of firm growth, it is not statistically significant. On the other hand, the effect of marketing the firm's products through a cooperative positively affects sales growth and, by inference, increases revenue accruing to the firm [89] and is significant (implying that engaging in cooperative marketing increases firm Growth (Growth in sales) by about 1.1 %).

Savings for business purposes

Savings is treated as building a self-insurance mechanism by entrepreneurs in the event of a loss or dire need for investment in the business. This self-insurance mechanism is built by entrepreneurs when faced with conditions of imperfect markets for labor, credit, and insurance. Saving purposely for the business was expected to significantly affect firm growth (because it is treated as a store of resources meant for reinvestment in the business). Although it positively relates to the two measures of firm growth, it is not statistically significant. The irony associated with this risk management practice is the fact that it was ranked the most critical risk management practice by all entrepreneurs. Further research is required in this case, given that it is a risk management practice that could involve a plethora of decision-making choices by the entrepreneur.

Sale of assets

This risk management practice is also considered a self-insurance mechanism since entrepreneurs liquidate their assets as a coping strategy in times of exposure to financial risk. The sale of assets, which are held primarily as stores of value, serves the purpose of providing avenues for reinvestment in the firm when there is difficulty in accessing funding. The sale of assets is positively related to both measures of firm growth, such that a unit sale of assets of the firm will result in firm growth by increases in employee size by 4.7 % and in sales growth by 0.3 %. This result resonates with Lang et al. [90], who suggest that asset sales can significantly impact firm performance, explaining that this risk management practice may be good news for the firm in periods of financial difficulties.

Temporary wage employment outside the firm

This reversible mechanism involves the entrepreneur seeking wage employment, albeit temporarily, as a coping strategy to deal with financial risk, especially income loss due to poor sales or non-fulfillment of a forward contract agreement with a partner. This risk management practice has a two-pronged effect – as a consumption-smoothing mechanism for the entrepreneur's household and for investment in the firm. The result from the empirical model indicates that seeking temporary wage employment is positively related to firm growth (both an increase in employee size and an increase in sales volume). The result is inconsistent with those from Lisi and Malo [91], who found that temporary employment negatively impacts firm productivity growth, which invariably results in firm growth.

Conclusions

This paper has defined indigenous risk management practices as those activities that are popular and undertaken by entrepreneurs in informal agribusiness firms in Ghana and are not the typical risk management practices used by formal firms. Apart from savings (ranked as the most critical risk management practice), which did not exert any significant impact on firm growth, other indigenous risk management practices like diversification of entrepreneur's economic activities, subscription to formal insurance, sale of assets, and temporary wage employment impact positively on both measures of firm Growth (Growth in employee size and growth in sales). Marketing the firm's products through a cooperative positively affects the growth in sales (as a measure of firm growth) and, by inference, increases revenue accruing to the firm. Entrepreneurs engaged in income-smoothing strategies to reduce ex-ante risk exposure of the firm and secure a smooth income flow to the firm and, by extension, to their households. Forward contracting is a risk management practice that can help informal agri-food processors in Ghana minimize the effect of price volatility and secure anticipated better prices for their products. The sale of assets is a self-insurance mechanism that entrepreneurs use to liquidate their assets as a coping strategy in times of exposure to financial risk. Other interesting findings indicate that older entrepreneurs are more likely to grow their firms compared with younger entrepreneurs because they (older entrepreneurs) have built a broader pool of experience, knowledge, and social capital that gives them the urge to risk management compared to younger entrepreneurs. Female-owned firms show a slight tip over male-owned ones in terms of growth (by sales).

Based on the conclusions of this study, policymakers should focus on designing and implementing policies that promote skills development to encourage the growth of micro and small agribusiness firms in Ghana. The skills development programs could help build entrepreneurs' knowledge of their firms' general management and enlighten them on strategies they could adopt in diversifying their economic portfolio, such as income or consumption smoothing strategies, in times of difficulty. The skills development programs should also factor in opportunities to build entrepreneurs' capacities in drafting fair but binding agreements in forward contracts. Initiating and facilitating the development of marketing cooperatives to negotiate fair prices are essential tools that can help mitigate marketing risks to the entrepreneur, especially during periods of economic challenges like what pertains to Ghana presently. Subscription to formal insurance packages as a risk management tool by entrepreneurs showed a positive influence on firm growth and is attributed to the feeling of security by entrepreneurs in terms of insurance of business premises. This security affords them the peace of

mind to develop new business ideas that eventually impact firm growth. The National Insurance Commission of Ghana should conduct targeted education on the importance of subscription to insurance packages and the inherent benefits to alert entrepreneurs of the need to insure their businesses.

Ethics approval/consent

The research that led to the preparation of this manuscript did not involve investigation into anything related to the health of respondents, and therefore, the ethics approval was automatic. However, the express consent of respondents was sought, and they were not coerced in any way to participate. The following Informed consent

Statement was read to each respondent to solicit their consent before interviews commenced.

'We are a team of researchers from the University of Ghana and are conducting research on risk attitudes, risk management, and business success of micro and small informal agribusiness entrepreneurs in Ghana with a focus on agri-food processors. Among other objectives, we are investigating how your risk management practices affect your firms' growth in the country's current economic situation. Participation in this study is completely voluntary, and you may leave the discussion at any time. There are neither known risks nor direct benefits associated with participating in this research Also, you are free to refuse to answer any questions you feel are not appropriate, or that make you feel uncomfortable. You may ask us any questions about the study at any point during the discussion. Be assured that any information we take from you will strictly be used for purposes of this research by members of the research team only and Your identity will be kept confidential at all material times. We (the research team) may benefit professionally if the results of the research are presented at meetings or in scientific journals.

Thank you for consenting to participate in this research.

Data statement

The datasets generated during and/or analyzed during the current study are not publicly available due to the fear harbored by respondents to the extent that they reported their financial data. They are afraid that such data could be used by third parties especially government to target them. But are available from the corresponding author on reasonable request.

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Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used Microsoft's Bing AI to search for literature and format references. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

CRediT authorship contribution statement

Alfred Asuming Boakye: Conceptualization, Investigation, Validation, Methodology, Formal analysis, Writing – original draft, Visualization. **Daniel Adu Ankrah:** Methodology, Investigation, Validation, Formal analysis, Writing – original draft. **Andrew Agyei-Holmes:** Methodology, Formal analysis, Investigation, Validation, Writing – original draft. **Isaac Baidoo:** Methodology, Investigation, Validation, Formal analysis, Writing – original draft. **Daniel Bruce Sarpong:** Writing – review & editing, Supervision, Investigation, Validation.

Declaration of competing interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

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