

THE EFFECT OF INDUSTRY STRUCTURE, CONDUCT AND PERFORMANCE ON THE ADOPTION OF MACADAMIA NUTS FARMING IN ZIMBABWE

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Abstract

There is slow adoption of macadamia nuts farming in Zimbabwe. Thus, the current study sought to investigate the effect of industry structure, conduct, performance and value addition affect the adoption of macadamia nuts farming in Zimbabwe. Through a cross-sectional survey, data were collected from 115 macadamia nuts farmers. Purposive sampling method was used to come up with a sample size. A structured questionnaire with Likert type questions was physically distributed to macadamia nuts farmers. Hypotheses testing was done using the structural equation modelling (SEM) in AMOS V22. The current study established that industry structure, conduct, performance and value addition influence the adoption of macadamia nuts farming. Thus, industry structure, conduct, performance and value addition directly influence the uptake of macadamia nuts farming. The current study extends our understanding of factors that influence the adoption of macadamia nuts farming in Zimbabwe. Previous studies did not focus on the effect of industry structure, conduct, performance and value addition on the adoption of macadamia nuts farming; hence this study intends to close this gap.

Keywords: Industry Conduct, Industry Performance, Industry Structure, Value Addition, Macadamia, Adoption, Emerging Markets

1. INTRODUCTION

Macadamia nuts farming business is fast growing with farmers realising good profits from the value addition of the crop (Quiroz et al., 2020). Macadamia nuts thrive in subtropical climates with plenty of sunshine and rain. The crop is primarily grown in Zimbabwe, Australia, South Africa, Kenya, Guatemala, Malawi, and Brazil. In Zimbabwe, Macadamia nuts production began around the year 2000 in the Eastern border highlands. Most of the macadamia nuts farming in Zimbabwe is done by smallholder farmers. There is slow adoption of macadamia nuts farming in Zimbabwe as some farmers are opting for fast cash crops like maize and cotton among other crops. Zimbabwe's macadamia nuts are being produced by both smallholder farmers and a few large-scale producers.

Globally, macadamia nuts producers are faced with various challenges that include lack of cultivars adapted to various agro-ecological zones, a lack of drought-resistant, high yielding (Loots et al., 2021), and early maturing varieties, high cost of available good quality planting materials, as well as pests and diseases that affect nuts (Stimpson et al., 2019). Moreover, the macadamia nuts farmers in emerging markets like Zimbabwe are not realising good profits. In Zimbabwean macadamia nuts are sold as Nut-In-Shell (without being cracked). It is therefore critical to establish value chains and improve macadamia agro-processing (Bandason et al., 2021). Despite the limited value additions on the macadamia, experts see opportunities for growth in international markets for the nuts, such as Europe (Fan et al., 2018). Zimbabwean farmers can take advantage of these opportunities if buyers' quality standards are met.

Also, the food and agriculture commodity supply chains in developing and transition countries experienced changes in the structure in recent years (Preez, 2015). Structure of agriculture food and fibre is now very different from what it used to be years back, showing the influence of internal and external factors such as institutional, societal, technological, economical, human capital and financial causes (Samaksaman et al., 2021). Macadamia nuts production is one crop with an industry structure that is not stable. The conduct of players within the macadamia nuts industry seems to affect potential and existing farmers. The industry players are challenged by price setting, buying practices, selling practices (Chikazhe et al., 2022) and barriers to entry into macadamia nuts farming business (Zuza et al., 2021). On the other hand, performance of macadamia nuts on the market is another factor considered by potential farmer when deciding to venture into the macadamia nuts farming activity.

Factors embedded in the macadamia nuts industry can only be revealed by careful assessment of the industry. Existence of bottlenecks along the macadamia nuts value chain could be affecting the overall performance of macadamias industry in Zimbabwe and this has reduced benefits to farmers and the country at large. The industry has also witnessed unstable prices, behavioural differences, low product quality, lack of production efficiency, increased costs of inputs, lack of proper handling facilities resulting in poor conduct along the value chain of the macadamia nuts, low quality in shell nut and high rejection rate at marketing. Although the macadamia nuts orchards are expanding yearly, yields and quality are decreasing due to lack of research that comes up with appropriate varieties suitable for the country and extension services with vast knowledge about the macadamias. Major players' conduct seems to set difficult market conditions in terms of pricing strategies. Intervention by the government is now very critical to improve the performance of the industry. Among the issues to be improved are research and extension, structural issues, conduct that promote establishment of firms that process (value addition) the nuts into high value quality products. If addressed the macadamia sector can become a pillar in bringing foreign currency and creating employment for many people. Literature shows that there is a scarcity of studies that have focused on the influence of structure, conduct and performance the adoption of macadamia nuts farming (Soratto, 2016; Preez, 2015), especially in emerging markets like Zimbabwe. Thus, the

current study sought to assess how the macadamia nuts industry (structure, conduct and performance) influences the adoption of the crop by farmers.

2. THEORETICAL FRAMEWORK, DEVELOPMENT OF RESEARCH HYPOTHESES AND RESEARCH MODEL

2.1 Theory underpinning the study

The theoretical framework section defines and briefly explains the major components that comprise the study. The contributions of various researchers were taken into account when defining and explaining the study constructs. Also, the study was underpinned by structure-conduct-performance (SCP) model. The structure-conduct-performance (SCP) paradigm, developed by Joe S. Bain and first published by economists Edward Chamberlin and Joan Robinson in 1933, is a model in Industrial Organization Economics that provides a causal theoretical explanation for firm performance through industry structure, economic conduct on incomplete markets. According to the SCP paradigm, market structure influences firm behaviour, which in turn influences performance. A number of factors, including the number of competitors in an industry, product heterogeneity, and the cost of entry and exit, can be used to determine market structure (Sibulali, 2018). It assumes that there is a link between Structure and Conduct, and between Conduct and Performance. The SCP model is a framework for analysing industry situations that provides a good explanation of industry structure, player behaviour, and competitive performance over a given time period. The framework assumes that company performance is a result of the company's behaviour and industry structure (Loots et al., 2021), and the model is a tool for understanding the industry and providing a dynamic perception of industry structure.

The model has been used to examine how price conduct affects industry structure and explains the concept that structure influences both performance and conduct. It also fits in when attempting to explain how industry consolidation works and describing the impact of attractive industry structure on their performance. The SCP model is used in industrial organisation economics to analyse interactions between organisational structure (environment), organisational conduct (behaviour), and organisational performance (achievements). The SCP paradigm is regarded as the strength of industrial organisation theory, with structure and behaviour having significant influences on market performance.

2.2 Industry structure

Samaksaman et al. (2021) described organizational structure as developing a series of linkages between various units. The term structure refers to the construction, formation, and composition of an industrial organisation (Gaura et al., 2021). It also describes the environment in which an organization or market operates. Dang et al. (2019) added that structure refers to various units within a system that work together to produce a final product/service for the consumer. Industry structure is difficult to predict due to the complex behaviours of buyers and sellers, as well as the various definitions and

extensions of markets and their structure (Loots et al., 2021). The macadamia industry is organised into subunit facilities that enable macadamia nuts to be produced, harvested, processed, reprocessed, and distributed (Dang et al., 2019). Production structure, according to Loots et al. (2021) is a complex of subunits and how they interconnect during the production. Different stages of production occur in various areas of specialisation known as work places, where different value is added to a product. The combination of these work places results in shops. The shop is where the product is finished or partially produced, and when the shops combine, they produce blocks. These structures, according to Sibulali (2018) may evolve over time.

2.3 Conduct

Industry conduct is defined as behaviour within a specific business environment (Bandason et al., 2021). Conduct in marketing refers to the behaviour of both buyers and sellers in response to market structure (Buthelezi et al., 2019). The conduct in the macadamia industry refers to the methods that farmers use to carry out various activities along the entire value chain, such as how they plant, spray, apply fertilizer, harvest nuts, dry nuts, grade nuts, crack nuts, sort nuts, store, and market their nuts. Industry conduct is also considered as the behavioural differences which are observed along the value chain processes from material to product in the market (Chang et al., 2022; Samaksaman et al., 2021). The decision about operational modalities i.e., physical location, choice of product/market, pricing model, distribution channels, production technologies, sourcing of raw materials, product development, linkages, network linkages and agglomeration of the firm are all conducts issues (Buthelezi et al., 2019).

2.4 Industry Performance

Performance examines the accomplishments, or results in a specific market (Nhantumbo et al., 2017). It considers product quantity, product quality, and production efficiency as measured by comparison to industry standards (Chang et al., 2022). Furthermore, Challa (2013) defines performance as how an activity was completed in terms of its schedule, use of allocated resources, and meeting the expected standards. Performance is also described as a metric for meeting an activity's stated objectives (Buthelezi et al., 2019).

Performance can be measured against standard industry indicators and compared to competitors (Marconato et al., 2021). In the macadamia industry, performance should include market performance, such as price stability, price levels, profit levels, cost efficiency, quantity and quantity of macadamia nuts sent to market (Nhantumbo et al., 2017). One of the key issues on performance is quality which is a combination of several characters that brings appearance, flavour and kinaesthetic to a product (Liu et al., 2022). Farmers should supply high quality products at competitive prices and integrate international distribution channels by satisfying the norms and standards set out by the market (Muljono & Setiyawati, 2019).

2.5 Value addition

Value-addition occurs when a company adds enhancements to a product or service before it is offered to customers (Quiroz et al., 2019). The enhancement of a product's value, usually through the manufacturing process, is referred to as value addition (Chikwere et al., 2022; Jan et al., 2020). The difference between the price of a product or service and the cost of producing it is the value-added to a product (Quiroz et al., 2019). It also refers to the extra features that a company may add to a product or service in order to give it a sense of increased value to customers or clients (Barrueto et al., 2018). Chikazhe et al. (2022) added that this could include changing the product's design or adding extra features to boost consumer perceived value. The current study understands value addition as the extra value created over and above the original value of a product. In other words, it is an improvement made to a product or service by a company/individual prior to offering it for sale to the end customer.

The advantages of value-added foods include improved nutrition for children and mothers, increased income for producers, access to new markets, and new packaging and storage processes to reduce waste and ensure food safety (Musara et al., 2019). A product, service, process, or an entire business can gain value through value addition. Value can be added by providing better or additional services such as after-sales support and customer service (Mwandifura et al., 2022). Value can also be added to a product by improving it in some way or including extras with it.

Creating a successful business entails looking for ways to add value (Chikwere et al., 2022). Marketing a unique product, filling a market niche, simplifying the supply chain, providing a service, lowering costs are all examples of ways to provide value (Chikazhe et al., 2021). The greater the value provided, the greater the return from the marketplace. Value-added agriculture focuses on production or manufacturing processes, marketing, or services that increase the value of primary agricultural commodities, possibly by increasing consumer appeal and willingness to pay a premium over similar but undifferentiated products (Musara et al., 2019). A value addition is usually a worthwhile investment because it generates a higher return, allows entry into a new, potentially high-value market, extends the production season, or helps to create brand identity or brand loyalty.

3. DEVELOPMENT OF RESEARCH HYPOTHESES AND RESEARCH MODEL

Generally, the industry structure plays an important role in influencing farming activities (Dang et al., 2019; Loots et al., 2021; Schoeman, 2020; Yadav & Jha, 2021). In a related study, Zuza et al. (2021) studied the production of macadamia nuts in Malawi. Their findings indicate that the synthesis of the macadamia sub-sector provides an understanding of the vital contributions of macadamia to an economic growth and improves of livelihoods for people. Also, Scheepers (2018) investigated the vertical coordination and integration, market power, and price transmission in the South African macadamia value chain. The study concluded that there is no information flow in the

market and producer and wholesale prices have no influence on one another. However, the current study intended to understand whether the industry structure positively affects macadamia nuts farming in an emerging market like Zimbabwe. Thus, it can be proposed that:

H₁: Industry structure has a positive influence on the adoption of macadamia nuts farming

Quiroz et al. (2019) examined the value chain analysis of macadamia nuts. The study results show that the industry conduct is considered by potential macadamia nuts farmers in making farming decisions. Likewise, Bandason et al., (2021) conducted a study on unlocking the potential of value chains as climate change resilience strategies on macadamia nuts. It was concluded that farming of macadamia nuts is likely to affect by the behaviour of players within the same industry. On the other hand, this study sought to have a deeper understanding of the effect of industry conduct in influencing macadamia nuts farming in Zimbabwe. Hence it can be hypothesised that:

H₂: Industry conduct positively influence the adoption of macadamia nuts farming

Sibulali (2018) investigated the competitive performance of the subtropical fruit industry in the global markets. From this study, it is shown that farmers are motivated to conduct farming activities by the performance of their industry. Likewise, Stimpson et al. (2019) investigated the research and development programs for improved productivity and profitability in horticulture. Results suggest that farmers come into the industry expecting good performance of the industry which could lead to realising of good profits. Similarly, Bacsi (2021) investigated factors that influence agricultural firms' performance. The study results confirm that the performance of firms in agriculture varies significantly in terms of total assets, sales revenues, labour force, and labour productivity. Thus, it can be hypothesised that:

H₃: Industry performance has a positive and significant effect on the adoption of macadamia nuts farming.

Israel et al. (2019) studied the value addition benefits of Tamarind, an economically important fruit/spice of India. The study results indicate that value addition process increase the market efficiency of the product. Greenville et al. (2019) investigated the effect of value addition in the agriculture sector. The evidence presented suggests that agricultural value addition generates more business. Asrol et al. (2020) explored profit distribution in the sugarcane agro-industry supply chain while taking value addition into account. According to the study's findings, stakeholders earned their profit share based on their marginal contribution, risk potential, and value-added contribution. Hence the current study sought to understand whether value addition of macadamia nuts can influence its farming adoption. Thus, it can be hypothesised that:

H₄: Value addition has a positive and significant effect on the adoption of macadamia nuts farming

Based on the preceding arguments, the following conceptual framework is proposed:

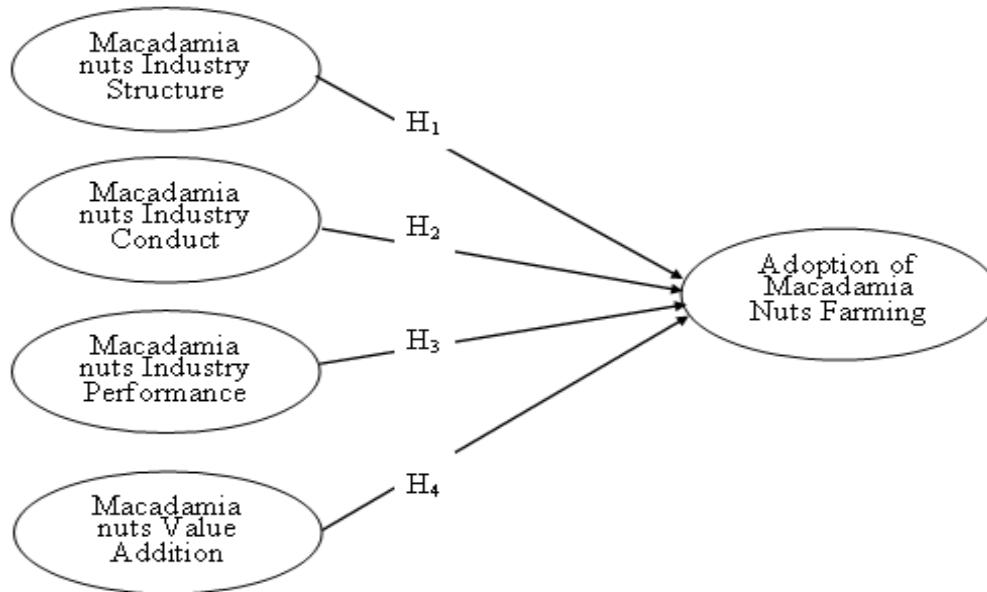


Fig I: Conceptual framework

4. MATERIALS AND METHODS

A cross sectional survey was used to collect primary quantitative data for the current study in Manicaland Province, Zimbabwe. Data were collected from 115 macadamia farmers during the period between July and September 2022 with the assistance of Agriculture Extension Services Department of Zimbabwe who provided a list of macadamia farmers within the province. A structured questionnaire was physically administered to respondents who were allowed up to three working days to respond to questions. The instrument had four sections (industry structure - INST, industry conduct - INCO, macadamia nuts industry performance – MNP, macadamia nuts value addition - MNVA and adoption of macadamia nuts farming - AMNF) each with Likert scale type questions ranging from 1-Strongly disagree to 5-Strongly agree. A pilot test was first conducted before the actual physical distribution of questionnaires. This was to improve reliability and validity of the instrument as corrections were effected to improve it. Items used in the instrument were borrowed from related studies (Bandason et al., 2021; Ferdi & SPIA. 2016; Magrizos et al., 2021; Roach et al., 2018; Sibulali, 2018; Stimpson et al., 2019; Zuza et al., 2021) and they were modified to be suitable for use in the current study.

5. RESULTS

5.1 Respondents

Out of the 120 questionnaires distributed, 115 (95.8%) were returned and were usable. Of the 115 respondents that participated in the study, 83% were males and 17% were

females. Majority of respondents 97.8% had between 5-10 years' macadamia farming experience. Half the respondents (50%) were trained in macadamia nuts farming through attending workshops held within Zimbabwe. From a total of 115 respondents who participated in the study, the majority (91%) were farm owners and the remainder (9%) were farm managers.

5.2 Descriptive statistics

Confirmatory factor analysis, discriminant validity and convergent validity were used to validate the scale before hypothesis testing by structural equation modeling (SEM). SPSS V22 and AMOS V22 were used to analyse data. Sampling adequacy was measured using Kaiser-Meyer Olkin (KMO) measure and Bartlett's Test of Sphericity. The results are shown in Table 1 below:

Table 1: KMO and Bartlett's Test Results

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.785
Bartlett's Test of Sphericity	Approx. Chi-Square	16258.146
	Df	416
	Sig.	0.000

The sampling adequacy results indicated in Table 1 show that minimum conditions were satisfied (Heale and Twycross, 2015). Thus, it was possible to proceed with validation process. Convergent validity was measured using model fit indices, standardised factor loadings, reliability, critical ratios, and average variance extracted (AVE). CMIN/DF (2/DF), Goodness of fit index (GFI), Adjusted GFI (AGFI), Normed Fit Index (NFI), Tucker-Lewis Index (TLI), Comparative fit index (CFI), and Root mean square error of approximation (RMSEA) were the measurement model fit indices measured. Results for the measurement model fit indices are presented in Table 2.

Table 2: Measurement model fit indices

Fit indices	Measurement model	Recommended values	Sources
χ^2/DF	1.78	≤ 3.000	Field (2009) Hair et al. (1998) Heale and Twycross (2015) Henseler et al. (2014)
GFI	0.899	> 0.900	
AGFI	0.901	> 0.900	
NFI	0.913	> 0.900	
TLI	0.897	> 0.900	
CFI	0.905	> 0.900	
RMSEA	0.39	< 0.080	

For all constructs, Cronbach's alpha and composite reliabilities were greater than 0.7. All items had standardised factor loadings greater than the 0.6 a cut-off point suggested by Fornell and Larcker (1981). The critical ratios were high and significant ($p < 0.001$). Because their extracted average variance was greater than 0.5, all constructs met the minimum necessity criteria.

5.3 Discriminant validity measurement

Discriminant validity is measured by comparing average variance extracted (AVEs) against squared inter construct correlations (SICCs). AVEs must be greater than corresponding SICCs for the results to meet minimum conditions of to be satisfactory. Thus, conditions for discriminant validity were met since all AVEs were greater than the matching SICCs (Field, 2009; Henseler et al., 2014) as shown in Table 3.

Table 3: Discriminant validity measurement

Construct	INST	INCO	MNP	MNVA	AMNF
Industry Structure (INST)	0.643				
Industry Conduct / Behaviour (INCO)	0.411	0.711			
Macadamia Nuts Performance (MNP)	0.393	0.369	0.633		
Macadamia Nuts Value Addition (MNVA)	0.365	0.412	0.369	0.702	
Adoption Of Macadamia Nuts Farming (AMNF)	0.298	0.412	0.289	0.421	0.599

Diagonal elements in bold represent AVEs

5.4 Hypotheses test results

AMOS V22 was used to test H₁ – H₃. The structural model was estimated using Maximum Likelihood Estimation (MLE). Table 4 shows the hypotheses test results for H₁ – H₄.

Table 4: Results for hypotheses tests H₁ – H₄

Hypotheses	Hypothesised Relationship	SRW	CR	Remarks
H ₁	Industry structure → Adoption of macadamia nuts farming	0.294	16.945***	Supported
H ₂	Industry conduct → Adoption of macadamia nuts farming Performance	0.301	13.008***	Supported
H ₃	Industry performance → Adoption of macadamia nuts farming	0.249	17.285***	Supported
H ₄	Value addition → Adoption of macadamia nuts farming	02.57	9.876***	Supported

Notes: SRW standardised regression weight, CR critical ratio, *** significant at p < 0.001

The model fit indices results for hypotheses test H₁ – H₄ were acceptable (CMIN/DF=3.463, GFI=0.908, AGFI=0.912, NFI=0.897, TLI=0.914, CFI=0.887 and RMSEA=0.031) (Heale & Twycross (2015). Results for hypotheses tests for H₁ – H₄ shown in Table V indicate that industry structure, industry conduct, industry performance and value addition have a positive influence on the adoption of macadamia nuts farming. Therefore, all proposed hypotheses H₁ – H₄ were supported by the standardised regression weights above 0.2 as recommended by Heale and Twycross (2015) and Henseler et al. (2014). Additionally, the critical values were satisfactory and significant at p<0.001.

6. CONCLUSIONS AND IMPLICATIONS

Globally, some farmers are considering macadamia nuts farming business especially those in developing markets like Zimbabwe. However, earlier studies have ignored the effect of industry structure, conduct, performance and value addition on the adoption of macadamia farming whilst these variables affect the adoption of macadamia nuts farming within developing economies (Bandason et al., 2021; Liu et al., 2022; Quiroz et al., 2019; Zuza et al., 2021). Thus, the current study was conducted to narrow this gap within the marketing and entrepreneurship literature by establishing whether industry structure, conduct, performance and value addition influence the adoption of macadamia nuts farming. In order to have a deeper understanding, the current study tested quantitatively the effect of industry structure, conduct, performance and value addition on the adoption of macadamia nuts farming.

Related studies have been conducted in other sectors of the economy and in many developed countries around the world. As a result, this type of research is critical because it adds to and validates existing knowledge about the effect of industry structure, conduct, performance, and value addition on the adoption of macadamia nut farming. The current study extends our understanding on industry structure, conduct, performance and value addition with regards to the adoption of macadamia nuts farming within emerging markets like Zimbabwe.

6.1 Theoretical implications

There is an overall understanding in extant literature that industry structure, conduct and performance influence business performance (Apriyanti & Manik, 2018; Begum, 2018; Chakraborty & Chattopadhyay, 2019; Maghfuriyah et al., 2019). The current study established that industry structure, conduct, performance and value addition influence the adoption of macadamia nuts farming. Thus, industry structure, conduct, performance and value addition have direct relationship with the adoption of macadamia nuts farming. The results imply that macadamia nuts farmers consider the industry structure, conduct, performance and value addition for them to venture into macadamia nuts farming. This is buttressed by prior studies by Banson et al. (2018) and Begum (2018) who settled for almost similar results. Hence, the study results imply that for macadamia nuts farming to be successful, the industry should be efficient, both farmers and buyers must behave well to each other and that farmers ought to have access to arable land with start-up-cost being reasonable. Moreover, the study results are in line with the SCP model which assumes direct relationships among structure, conduct and performance. Thus, the study concluded that macadamia nuts farmers consider structure, conduct, performance and value addition as they make macadamia nuts farming decision.

6.2 Practical implications

The study results underscore the importance of understanding factors that influence the adoption of macadamia nuts farming. The agricultural sector should take cognisance of

the effect of industry structure on macadamia nuts farming. Macadamia nuts farming could be improved by ensuring that macadamia nuts farmers have access to large farms with arable land. Macadamia nuts farming is also capital intensive; thus the government need to ensure that macadamia nuts farmers have access to loans so that they cater for high start-up-costs. The period leading to harvesting time for macadamia nuts is long; hence macadamia nuts farmers should be afforded direct farm ownership.

On the conduct of macadamia nuts industry, the government need to help in the marketing of macadamia nuts for farmers so that they realise better profits. The Zimbabwean macadamia nuts market has few buyers who connive to offer very low prices for the product. The government could also assist by funding macadamia nuts farmers through availing of subsidised inputs. This could result in the macadamia nut product fetching better price and allowing the product to be exported to better performing markets.

As regards to macadamia nuts industry performance, there is currently more demand than supply, but it is difficult to increase macadamia nuts volume to meet this rising demand. The macadamia trees take eight to ten years to mature and to produce well, so it is a long-term investment. This calls for the government's intervention to cushion macadamia nuts farmers during the waiting period. Farmers can be afforded loans with low interest rates and payable after period equal to the harvesting period. Through such support, the Zimbabwean macadamia nuts industry can be efficient and profitable and attract more farmers.

6.3 Future research implications

The study focused on one product line within one province in Zimbabwe. This makes generalisation of results difficult. Future studies could be conducted in other economic sectors using other products to establish if industry structure, conduct, performance and value addition influence production adoption.

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