Publisher
Singh Publication
www.singhpublication.com

E-ISSN:2583-1747

Management Journal for Advanced Research

Research Article
Solar Milling Plant

2025 Volume 5 Number 1 February

The Effect of Entrepreneurial Orientation on Performance of Agriculture Cooperatives: A Study of Solar Milling Plant Cooperatives in Southern Province of Zambia

Godfrey M Munyoro[1*], Harrison Daka[2]

DOI:10.5281/zenodo.15210430

[1*] Godfrey M Munyoro, Graduate School of Business, University of Zambia, Lusaka, Zambia.
[2] Harrison Daka, Graduate School of Business, University of Zambia, Lusaka, Zambia.

The Solar Powered Milling Plants Project, a cornerstone of Zambia's Presidential Milling Initiative, was introduced to boost the economy and improve rural livelihoods by providing sustainable milling solutions. Despite substantial support from the government, stakeholders, and donor agencies, the performance of agricultural cooperatives especially in Zambia's Southern Province has remained suboptimal. With agriculture contributing only 2.74% to the country's GDP and cooperatives accounting for 12% of agricultural GDP, there was a clear gap between potential and realized impact, raising concerns about the effectiveness of these cooperatives in meeting economic and social objectives. This study examined the influence of entrepreneurial orientation (EO) on the business performance of solar milling cooperatives in Southern Province of Zambia, aiming to uncover strategies to enhance their success. The research employed an embedded mixed-methods design, primarily focusing on quantitative data while incorporating qualitative insights. Data were gathered from 364 cooperative members using survey tools and semi-structured interviews. Convenience and purposive sampling techniques ensured targeted participant engagement, with 308 respondents forming the final analysis group. Among these respondents, 70.5% were female and 25.3% were male, reflecting the significant role of women in cooperative operations. The study revealed that EO dimensions, including innovation, pro-activeness, and risk-taking, had a measurable and positive effect on cooperative business performance. A strong positive correlation ($p < 0.01$) was identified between EO and performance, suggesting that entrepreneurial practices could drive significant improvements in cooperative outcomes. Further, the study examined the interplay between internal and external business environments and cooperative performance. The findings demonstrated a robust positive relationship between these environments and performance, with a correlation coefficient of 0.947. Combined, internal and external factors explained 89.7% (R-Square: 0.897) of the variance in business performance, underscoring their critical role. Internally, cooperatives faced challenges related to operational costs, leadership capabilities, and technical skills, while externally, government policies, market accessibility, and raw material availability emerged as key influencers. The thematic analysis also highlighted that cooperatives capable of organizing their grain supplies and engaging in commercial milling achieved better financial results than those relying on toll milling. This finding emphasized the need for skill development programs, particularly in entrepreneurship and equipment repair, to enhance operational efficiency. The study concluded that EO, alongside both internal and external environmental factors, plays a pivotal role in determining the success of solar milling cooperatives. Key recommendations included fostering innovation, promoting entrepreneurial training, and addressing external barriers such as market access and policy restrictions. By strategically leveraging EO dimensions and improving their internal and external operational frameworks, cooperatives can enhance their financial performance and sustainability. This research contributes valuable insights into improving the efficiency and resilience of agricultural cooperatives, aligning with Zambia's broader goals of rural development, economic diversification, and food security.

Keywords: entrepreneurial orientation (eo), agricultural cooperatives, business performance, internal environment, external environment

Corresponding Author

Godfrey M Munyoro, Graduate School of Business, University of Zambia, Lusaka, Zambia.
Email: mgmunyoro@gmail.com

How to Cite this Article

Godfrey M Munyoro, Harrison Daka, The Effect of Entrepreneurial Orientation on Performance of Agriculture Cooperatives: A Study of Solar Milling Plant Cooperatives in Southern Province of Zambia. Manag. J. Adv. Res.. 2025;5(1):105-125.
Available From https://mjar.singhpublication.com/index.php/ojs/article/view/201

To Browse

Manuscript Received	Review Round 1	Review Round 2	Review Round 3	Accepted
2025-01-09	2025-02-01			2025-02-28

Conflict of Interest	Funding	Ethical Approval	Plagiarism X-checker	Note
None	Nil	Yes	2.46	

1. Introduction

Background of the Study

A significant portion of Zambians works in the agricultural sector, which accounts for 70% of the workforce in the nation. Nevertheless, agriculture's contribution to the economy continues to average less than 3% of the country's GDP, and in 2019, the proportion of agriculture in Zambia's gross domestic product was 2. 74%, while industry contributed roughly 42. 12%, and the services sector made up about 50. 03% (O'Neill, 2021). With cooperatives producing around 12% of agricultural GDP (Yaluma, 2018), this suggests that something is either lacking or not functioning properly. Cooperatives have been regarded as vital catalysts for rural industrialization and the development of rural areas, a priority reflected in the 7th NDP and, more recently, the 8th NDP, which leaves no ambiguity about the Government's intentions and vision.

Cooperatives are recognized for their significant impact on global economy (Munyenyembe, 2015; Yaluma, 2018; Kabwe, 2021). These enterprises are owned collectively and managed democratically by a group of members (Benos and Kalogeras, 2016). The International Cooperative Alliance (ICA) defines them as autonomous associations formed voluntarily by individuals to meet shared economic, social, and cultural needs and aspirations through a jointly owned and democratically controlled entity (ibid). Cooperatives across various regions have seen achievements and developments that can be attributed to several factors. The constantly changing environment and market conditions have allowed some cooperatives to succeed, while others have struggled to remain operational or exist only on paper. In Africa, cooperatives in Kenya are responsible for contributing 40% to country's GDP (O'Neill, 2021). This clearly illustrates that cooperative model, in a suitable environment and with adequate support, can succeed. In Zambia, cooperatives that began in 1914 by European settler farmers as a means of marketing agricultural products to newly opened copper mines in Southern Zaire's Katanga and Northern Zambia's Copperbelt (Munyenyembe, 2025; Nkandu and Habazoka, 2023). With Government's will and assistance, cooperative sector expanded to become third largest employer after Government and mining sectors (Ibid).

Consequently, this led to the movement becoming the second largest contributor to GDP (ZCF, 2015). In 1991, the newly established Government's policy shift regarding cooperatives nearly resulted in the collapse of the cooperative movement.

The challenge to maintain viability in the current business landscape has brought its own set of difficulties. Certain Government initiatives, like the Fertilizer Input Support Programme (FISP), were intended to aid rural farmers in achieving food security but negatively affected the cooperative movement, leading to large cooperatives being split into smaller units as farmers sought to improve their odds of accessing subsidized inputs. Most cooperatives are now based on fertilizer sales, becoming active only during the planting season. The remaining 6% could be considered to be performing well among the 60,000 registered cooperatives (Munyenyembe, 2015; Yaluma, 2018). However, this figure has reportedly increased to around 110,000 cooperatives, with over 23,000 new registrations occurring between September 2023 and December 2023 (Munyenyembe, 2015; Yaluma, 2018; Kabwe, 2021). As the world becomes increasingly globalized, resulting in a highly competitive environment, businesses are continually evolving and engaging in entrepreneurial innovation (Kantur, 2016). Cooperatives must enhance their creativity, innovation, and efficiency by adopting entrepreneurial strategies akin to the private sector. Consequently, organizations that embrace risk-taking, encourage the exploration of new ideas, and prioritize innovation tend to gain considerable popularity (ibid). Previous research has indicated that entrepreneurial orientation (EO) is a critical factor for an organization's success. Nonetheless, the performance of active cooperatives has been viewed as not just underwhelming but also has raised significant concerns among the Government, stakeholders, and funders. Consequently, the absence of entrepreneurial skills hampers the potential opportunities that could be identified and capitalized on (Benos and Kalogeras, 2016). Entrepreneurial orientation (EO), generally characterized as a strategic concept that encompasses a firm's strategic practices, management philosophies, and entrepreneurial behaviors, has been a topic of discussion among various scholars in entrepreneurship for over three decades.

Historical evidence shows that cooperatives have the potential to become leading figures in the business landscape, as evidenced by cooperatives worldwide. OECD countries have recognized the necessity for targeted interventions and collaborations.

The concept of entrepreneurship is increasingly being integrated into business initiatives targeting SMEs in the effort to promote sustainable development within business enterprises and rural economies. It has thus become essential to elevate the focus on entrepreneurial orientation in the development and encouragement of cooperative businesses (Bijman, 2012).

In the fields of entrepreneurship and strategic management research, it has been established that entrepreneurial orientation positively influences firm performance (ibid). It was noted that firms exhibiting high levels of entrepreneurial orientation tend to consistently scan and assess their operational environment to identify new opportunities and enhance their competitive standing (ibid). It is in light of this context that this research has been formulated to explore the impact of entrepreneurial orientation on the performance of agricultural cooperatives in the Southern province of Zambia.

Statement of the Problem

The Solar Powered Milling Plants Project, a central part of Zambia's Presidential Milling Initiative, was designed to strengthen the national economy and improve the livelihoods of rural communities (Yaluma, 2018). Despite significant investments from the government, donors, and stakeholders, agricultural cooperatives in Southern Province continue to face business performance challenges, limiting economic growth and rural development(Mason, Jayne, & Mofya-Mukuka, 2013). This was particularly concerning given agriculture's importance to Zambia's economy, contributing only 2.74% to national GDP (O'Neill, 2021), with cooperatives accounting for about 12% of the agricultural GDP (Yaluma, 2018). This figure remains below the 10% target set by the Maputo Declaration.

The Maputo Declaration (2003) committed African Union member states to allocate at least 10% of their national budgets to agriculture and rural development, while the Malabo Declaration (2014) reaffirmed this commitment and outlined further goals, such as boosting agricultural growth, improving productivity, enhancing food security, and reducing poverty. However, Zambia's current budget allocation for agriculture still falls short of this target. Addressing these issues requires integrating entrepreneurial orientation (EO) with the goals of the Maputo and Malabo Declarations and incorporating business development strategies from strategic management and entrepreneurship fields to improve cooperative business performance. This study seeks to explore the effect of entrepreneurial orientation on the business performance of agricultural cooperatives, examining business performance indicators such as financial outcomes, operational efficiency, and social impact (Yaluma, 2018); (O'Neill, 2021). By assessing business performance data and drawing on relevant research, the study aims to provide a comprehensive analysis of the challenges faced and propose strategies to enhance the effectiveness of cooperatives in Zambia's agricultural sector.

Aim of the Study

To investigate the effect of entrepreneurial orientation on performance of agriculture cooperatives in Southern province of Zambia.

Specific Objectives

1. To identify the relationship of the key determinants of business performance on business performance of solar milling cooperatives in the Southern Province.
2. To determine the relationship of dimensions of entrepreneurial orientation (EO) that contribute to the business performance of solar milling cooperative enterprises in the Southern Province.
3. To establish the relationship between the internal and external business environment on the business performance of solar milling cooperatives in the Southern Province.

Research Questions

1. What was relationship between the identified determinants of business performance and business performance of solar milling cooperatives in the Southern Province?
2. What was the extent of the relationship between the dimensions of entrepreneurial orientation (EO) and the business performance of solar milling cooperative enterprises in the Southern Province?

3. How does the internal and external business environment impact the business performance of solar milling cooperatives in the Southern Province?

Justification for the Study

Agriculture is a vital sector in Zambia's economy, accounting for 2.74% of the national GDP. Cooperatives play a crucial role in supporting smallholder farmers, contributing 12% to agricultural GDP. However, they face challenges in management, productivity, and financial performance. Enhancing cooperative performance is essential for achieving the African Union's Maputo Declaration (2003) and Malabo Declaration (2014) goals, which emphasize accelerating agricultural growth, improving productivity, and enhancing food security. In line with the Malabo Declaration's focus on sustainable agricultural transformation, solar milling plants offer a renewable energy solution. Investigating their performance through entrepreneurial orientation can provide insights into integrating sustainable practices into traditional farming methods, promoting environmental sustainability. Entrepreneurial orientation encompasses innovation, pro-activeness, and risk-taking, essential for cooperatives to improve operational efficiency and competitiveness. The findings inform policymakers on critical aspects requiring support to boost agricultural cooperative performance. This can lead to policies encouraging entrepreneurial activities and sustainable technology adoption, aligning with the Maputo Declaration's commitment to allocating 10% of national budgets to agriculture. Enhancing cooperative performance through entrepreneurial orientation improves farmers' resilience and livelihoods. This includes better market access, pricing, and supply chains. The study further, contributes to academic discourse on entrepreneurial orientation in agriculture, providing empirical evidence and a foundation for further research.

Significance of the Study

The significance for this study was grounded in the important role that cooperatives play in Zambia's agricultural sector, contributing 12% to agricultural GDP. Improving cooperative business performance was crucial for driving economic growth, advancing rural development, and enhancing livelihoods, aligning with the African Union's Maputo Declaration (2003) and Malabo Declaration (2014), which underscore the need for accelerated agricultural growth, increased productivity, and better food security.

Despite considerable government investments, cooperatives in Zambia continue to face business performance challenges, which impede national economic goals. Gaining insights into how entrepreneurial orientation impacts cooperative business performance was critical for policymakers, cooperative managers, and stakeholders. The study's findings may offer practical recommendations for enhancing the viability, efficiency, and social impact of cooperatives, contributing to the achievement of the Sustainable Development Goals (SDGs) and the African Union's Agenda 2063. This research may also highlight strategic areas for resource allocation to maximize value, which was a shared objective for all stakeholders.

Additionally, the findings intends to enrich the existing body of knowledge on solar milling enterprises and inspire further research in this field. Finally, this study fulfills a partial requirement for obtaining a Master of Science degree in Entrepreneurship and Innovation Management from the University of Zambia.

2. Literature Review

Concepts of Entrepreneurial Orientation

Entrepreneurial orientation (EO) has received significant attention in entrepreneurship research, with a growing body of knowledge on the relationship between EO and business performance (Kantur, 2016). An EO firm is defined as one that engages in technological innovation (innovativeness), takes on risky ventures (risk-taking), and proactively pursues opportunities (pro-activeness) (Venkatraman, 1989). Miller (1983) being the first author of entrepreneurial orientation and identified entrepreneurship for three entrepreneurial activities, innovation, proactive action and risk taking, and stated that firms that showed these activities had an entrepreneurial relationship, however, proposes in his definition of what was to become the foundation of the entrepreneurial orientation approach, later adopted by Covin and Slevin (1989): 'An entrepreneurial firm is one that engages in product market innovation, undertakes somewhat risky ventures,

and is first to come up with "proactive" innovations, beating competitors to the punch' (1983, p 771). Consequently, non-entrepreneurial firms are defined in opposite terms: 'A nonentrepreneurial firm is one that innovates very little, is highly risk averse, and imitates the moves of competitors instead of leading the way'. Entrepreneurial management (EM), on the other hand, posits that entrepreneurial firms are driven by opportunities, seize them regardless of available resources, and are willing to rent these resources if necessary (Guulruh & Sinem, 2009). However, Cools and Van den Broeck (2007/2008) postulate that entrepreneurial orientation (EO) refers to the top management's strategy in relation to innovativeness, pro-activeness, and risk taking. Firms develop supporting mechanisms such as organizational structure, culture, and people to achieve these objectives. The dimensions of EM include strategic orientation, commitment to opportunity and resources, control of resources, management structure, reward philosophy, growth orientation, and entrepreneurial culture (Guulruh & Sinem, 2009).

The relationship between EO, EM, and firm performance has been a focal point in previous studies that highlight the positive implications of entrepreneurial processes on firm growth (Bijman, 2012). Miller (2011) notes that majority of entrepreneurial orientation research (EO) is directed to examine the performance of an organisation. However, research on entrepreneurship in developing countries like Zambia has predominantly focused on small firms or individual entrepreneurship (Benos & Kalogeras, 2016). It is important to recognize that large firms face distinct challenges compared to small firms due to their different organizational designs and management styles (Benos & Kalogeras, 2016).

Most researchers have focused on measuring different entrepreneurial dimensions as can be observed in table according to Solikahan and Mohammad (2019). These dimensions particularly innovativeness, risk-taking and pro-activeness have been widely utilised in research to measure and analyse entrepreneurial orientation and its impact on business performance, as they collectively describe an organization's overall entrepreneurial posture. The table further, provides input on dimension measurements frequently analysed and highlighted by different authors or researchers.

In order, to appreciate the EO and its impact on firm performance it was significant to bring in authors from the archives on the richness of this topic and what has been contributed over the years.

Overview of ZCF and Solar Milling Project

The Zambia Cooperative Federation (ZCF) is the umbrella organization for all cooperatives in Zambia, established under the Cooperative Law of 1998 (Zambia Cooperative Law, 1998). The ZCF supports cooperatives through education, training, marketing, and advocacy. The Solar Powered Milling Project, initiated by the government in 2015, aims to provide high-quality flour to rural areas, promote socio-economic development, and create jobs (A El-Salam, 2019). The project uses solar energy to power milling machines, reducing fuel and electricity costs. The solar milling machines, supplied by the ZCF, come in three generations, each with improved features and efficiency. The machines are designed to process maize flour and other dry grains, providing affordable and sustainable food processing solutions for rural communities. The project's objectives include promoting economic activities, creating jobs, and improving food security (A El-Salam, 2019).

Empirical Review

Determinants of Business Performance of Solar Milling Cooperatives

Most studies have found that there are several key factors that can make or break the success of these cooperatives. At the global level, government policies and international market trends play a crucial role in shaping the business environment for solar milling cooperatives. Supportive policies that promote renewable energy and sustainable agriculture can make it easier for cooperatives to access funding and attract customers. Access to affordable financing is crucial for establishment and sustainability of solar milling plants. Limited access to credit can hinder business growth and operations according to Wolfram et al., (2014); Miller et al., (2012). On the other hand, volatile commodity prices and trade barriers can pose significant challenges for these cooperatives. Understanding local and regional market demands for milled products and ensuring market access are vital for business performance. FAO, (2016).

Factors such as access to technology, infrastructure, and skilled labour can have a big impact on the performance of solar milling cooperatives. In some regions, lack of proper equipment or technical know-how can hinder the efficiency of these cooperatives, while in others, poor infrastructure can make it difficult to transport goods to market. The performance of solar milling plants heavily depends on the quality and reliability of the technology used. Maintenance and availability of spare parts are also critical (IRENA, 2015) At the local level, the success of solar milling cooperatives often comes down to the strength of the cooperative itself. Strong leadership, effective management, and a clear vision are all crucial for ensuring that the cooperative can thrive in a competitive market. Effective leadership and transparent governance within cooperatives enhance decision-making and member participation (Birchall, 2003). Additionally, building strong relationships with local farmers and consumers is key to building a loyal customer base. Active community involvement and positive social outcomes, such as job creation and food security, are important for the sustainability of cooperatives (ILO, 2015).

Zakaria and Rahim (2020) discussed various factors such as intellectual capital, reputation, operating profit margin, and social and human capital in relation to governance practices. It also explores individual and situational factors, including members' participation and environmental considerations like climate change. Policy instruments like government incentives are also revealed to be key factors impacting business performance of solar milling cooperatives Chisi, (2024) conducted a study on the accessibility of economical maize meal through the inception of the Solar Powered Milling Plants (SMPs) Project. The study aimed to establish the technical and economic performance of the milling plants installed by the Zambia Cooperative Federation. To achieve this, the study sought to: (1) establish the technical operational characteristics of the installed SMPS; (2) establish the factors that influenced the sitting of the plants; (3) determine the economic benefits of the SMPs; and (4) benchmark the technical operating conditions of the installed SMPs. The study employed a mixed methods approach, where benchmarking observations and semi-structured questionnaires were used as data collection instruments.

The sample size of the study was 168, comprising cooperative leaders, solar milling plant operators, and community members from the 12 sites in Masaiti, Chikankata, Solwezi, and Kapiri Mposhi districts where the milling plants were installed. The results of these studies revealed that that all twelve sites in the Solwezi, Masaiti, Kapiri Mposhi, and Chikankata Districts needed the same amount of power to run, which was between 7.5 kW and 9.0 kW. However, only Site 3 in Solwezi and Sites 4 and 5 in Masaiti Districts strictly followed the standard operation time of 8 hours. The study has also shown that the two main factors that influenced the placement of the solar milling plants were proximity to the main roads of the communities and the availability of land near the Food Reserve Agency (FRA) shades. According to Zambia Cooperative Federation Annual report (2019), the solar milling plants were actually located in high maize production areas and high number of households. With regards to economic benefits, the generated results showed that the installed milling plants brought about employment creation as two operators were employed for each of the 12 sites. However, the revenues generated by the solar milling plants were not economically viable for loan repayment. It was thus recommended that predictive and corrective maintenance, in addition to project management training for cooperatives and operators, be carried out to improve the technical. However, other studies have shown that continuous training in technical, managerial, and business skills is essential for the success of cooperatives (ILO, 2015).

Venter (2014) analysed the influence of entrepreneurial orientation on business success of selected South African SMEs. The result indicated a significant relationship between innovativeness and pro-activeness, while autonomy, risk-taking and competitive aggressiveness were insignificant. Duru, Ehidiamhen and Chijioke (2012) investigated the role of entrepreneurial orientation on the performance of SMEs in FCT Abuja, Nigeria. The study found innovativeness to have a significant effect on SMEs while autonomy, pro-activeness and risk-taking were insignificant. Also, competitive aggressiveness was not demonstrated by SMEs in Abuja.Fairoz, Hirobumi and Tanaka (2010) examined the effect of entrepreneurial orientation and business performance of SMEs of Hanbantota district, Sri Lanka.

The result revealed that risk-taking, innovativeness and pro-activeness were significant on business performance. Previous researches examining the effect of entrepreneurial orientation on firm performance provides mix findings. Most of the studies reviewed measured entrepreneurial orientation using three dimensions (innovativeness, risk-taking, pro-activeness). Therefore, this study examined the effect of entrepreneurial orientation using EO dimensions, business development, information acquisition and utilization, internal and external environment.

Munenyembe (2015), assessed the economic impact of the solar milling plants to the local people in Katete District, Zambia. The specific objectives were to assess the performance of the solar milling plans, the effect of solar milling plants on mealie meal prices on the local market, the effect of solar milling plants on job creation in the district, and to find out challenges that co-operators are facing in managing the solar milling plants in the district for economic development, suggesting measures to be put in place to see to it that the program was sustainable. The research employed a qualitative research design, and extensive literature reviews were conducted in order to have a broader understanding of the research.

The data was collected using the structured questionnaires and interview guide. The main findings of the research were that the hypothesis was rejected because there were no immediate economic benefits of the solar milling plants to the local people of Katete District. The study results revealed that the solar milling plants were underperforming and underutilized in the district. Solar milling plants had no effect on the price of mealie meals in the district. Solar milling plants had a 40% effect on job creation in the district, and the study concluded that there were no immediate economic benefits brought about by solar milling plants in the district at the time of the study. Supportive policies and a conducive regulatory environment facilitate the growth of renewable energy projects and cooperative businesses (REN21, 2020). Efficient supply chain management, from sourcing raw materials to distributing finished products, is crucial (Gereffi & Fernandez-Stark, 2016). Factors that are essential for success are availability of roads, storage facilities, and reliable solar energy infrastructure support the operations of solar milling plants (IEA, 2017).

Innovation and adaptability to market changes are essential for staying competitive and meeting consumer needs according to Schot & Steinmueller, (2018).

Relationship between the Dimensions of Entrepreneurial Orientation and the Performance of Solar Milling Cooperative Enterprises

Most empirical studies on entrepreneurial orientation have utilized the instrument developed by Miller (1983) and extended by Covin and Slevin (1989). Birech, Maroney and Alang'o (2018) examined the relationship between EO and performance of SMEs in Kenya. Innovativeness, pro-activeness and risk-taking were significant on firm performance. Wambugu, Robert and Kenneth (2016) investigated the influence of entrepreneurial orientation on firm performance of Kenya's Agro processing SMEs. The study revealed that pro-activeness, risk-taking and innovativeness have positive and statistically significant influence on firm performance. Prabin (2016) examined entrepreneurial orientation and business performance of handicraft industry. The result revealed that autonomy has significant effect on business performance while innovativeness, risk-taking, pro-activeness and competitive aggressiveness were insignificant. Chinos and Maru (2015) examined the effect of entrepreneurial orientation and firm performance in Kenya. The study showed that innovativeness and pro-activeness have positive effect on firm performance. However, risk-taking negatively affects firm performance.

Yang Lu, Peixin Zuo, José C. Alves & Jinliang Wang, (2023), conduct a systematic review of the relationship between entrepreneurial orientation (EO) and international performance (IP), considering articles published between 2001 and 2022. Intuitively, one would expect that EO would have a positive impact on IP, and previous empirical studies support this notion. However, there is also evidence that EO is not always associated with successful IP. To further understand the complexity of the relationship between EO and IP, we develop three integrative frameworks that synthesize its mechanism. More importantly, two emerging findings from the retrieved papers are worth discussing.

One of the key findings of our review was that there is an indirect relationship between EO and IP, independent of the direct relationship between these two constructs. Additionally, we find that different combinations of EO dimensionality and IP measurement can result in a diverse and complex relationship between entrepreneurial orientation and international performance. Finally, contributions, limitations, and directions for future research are provided.

Previous research has conceptualised EO in two ways: unidimensional and multidimensional. The unidimensional view of EO is "focusing on what is common among entrepreneurial firms" (Covin & Wales, 2019, p. 4). Researchers following this view operationalise EO by aggregating innovativeness, risk-taking, and pro-activeness as one construct. For example, in a systematic review of 51 studies, Rauch et al. (2009) found that the unidimensional EO is significantly related to firm performance. By contrast, the multidimensional view of EO is "focusing on 'how entrepreneurial firms can be different'" (Covin & Wales, 2019). Researchers with this view examine the three EO dimensions separately. For example, Kreiser et al. (2013) found that the three EO dimensions have differential impacts on firm performance. Both unidimensional and multidimensional views are legitimate because they emphasise different phenomena (Covin & Wales, 2019; Gupta & Wales, 2017).

In recent years, increasing research has called for studies to examine EO from a configurational perspective (Wales, 2016; Covin & Wales, 2019). One reason is that entrepreneurial activities are resource-intensive (Lumpkin & Dess, 1996), meaning resource-constrained firms might not be able to pursue all three activities simultaneously. In other words, they may need to strategically configure firms' entrepreneurial activities to avoid over-stretching the limited resources they have. Another reason is that the entrepreneurial activities may act in combinations to impact organisations. For example, innovation outcomes depend on how fast (e.g., pro-activeness) the new products or services are launched into the market (Evanschitzky et al.,2012; Cankurtaran et al., 2013). Indeed, evidence suggests that innovativeness and pro-activeness have shared effects on firm performance (Lomberg et al., 2016). Therefore, in addition to examining the shared effects (unidimensional EO) or the independent effects of innovativeness, risk-taking, and pro-activeness on organisations, it is also critical to consider how configurations of the three dimensions impact firm performance. Previous research has conceptualised EO in two ways: unidimensional and multidimensional. The unidimensional view of EO is "focusing on what is *common* among entrepreneurial firms" (Covin & Wales, 2019, p. 4). Researchers following this view operationalise EO by aggregating innovativeness, risk-taking, and pro-activeness as one construct. For example, in a systematic review of 51 studies, Rauch et al. (2009) found that the unidimensional EO is significantly related to firm performance. By contrast, the multidimensional view of EO is "focusing on 'how entrepreneurial firms can be *different*'" (Covin & Wales, 2019, p. 4). Researchers with this view examine the three EO dimensions separately. For example, Kreiser et al. (2013) found that the three EO dimensions have differential impacts on firm performance. Both unidimensional and multidimensional views are legitimate because they emphasise different phenomena (Covin & Wales, 2019; Gupta & Wales, 2017). In recent years, increasing research has called for studies to examine EO from a configurational perspective (Wales, 2016; Covin & Wales, 2019). One reason is that entrepreneurial activities are resource-intensive (Lumpkin & Dess, 1996), meaning resource-constrained firms might not be able to pursue all three activities simultaneously. In other words, they may need to strategically configure firms' entrepreneurial activities to avoid over-stretching the limited resources they have. Another reason is that the entrepreneurial activities may act in combinations to impact organisations. For example, innovation outcomes depend on how fast (e.g. pro-activeness) the new products or services are launched into the market (Evanschitzky et al., 2012; Cankurtaran et al., 2013). Indeed, evidence suggests that innovativeness and pro-activeness have shared effects on firm performance (Lomberg et al., 2016). Therefore, in addition to examining the shared effects (unidimensional EO) or the independent effects of innovativeness, risk-taking, and pro-activeness on organisations, it is also critical to consider how configurations of the three dimensions impact firm performance.

Although it is well acknowledged that EO can contribute to firm performance (Rauch et al., 2009), emerging research has highlighted that EO might not always translate into better performance.

Specifically, according to the EO-as-experimentation view proposed by Wiklund and Shepherd (2011), EO will likely lead to performance variation, including both success and failure. In other words, EO has a double-edged sword effect resulting in both high performance and low performance. For example, Patel et al. (2015) find that EO can lead to variability in innovation outcomes. Since innovativeness, risk-taking, and pro-activeness are, in essence, exploratory that entails uncertain returns (March 1991), we argue that the configurations of the three dimensions can produce both high and low performance. In the next section, we discuss how each EO dimension might enhance and impede firm performance in turn. *2.2. EO and its double-edged effect on firm performance* We argue that innovativeness, risk-taking, and pro-activeness may enhance as well as impede firm performance because they all entail costs and uncertainties (Kreiser et al., 2013; Dai et al., 2014; Rodrigo-Alarc´on et al., 2018). Innovativeness represents firms' propensity "to engage in and support new ideas, novelty, experimentation, and creative processes that may result in new products, services, or technological processes" (Lumpkin & Dess, 1996, p. 142). On the one hand, innovativeness provides firms with the opportunity to differentiate themselves from competitors (Qian & Li, 2003) and obtain better profits (Gatignon & Xuereb, 1997; Ardito et al., 2015; Linton & Kask, 2017). Indeed, innovativeness allows firms to address changing customer demands and thus achieve superior performance (Howell et al., 2005; Wiklund et al., 2009; Cheng et al., 2013). On the other hand, innovativeness may negatively impact SMEs because they often lack resources, capabilities, and experiences in performing innovation activities (Van de Vrande et al., 2009; Nicholas et al., 2011). As such, pursuing high levels of innovativeness may "compromise the ability of SMEs to meet short-term financial obligations" due to the up-front investments required for developing firm-specific innovation capabilities (Kreiser et al., 2013, p. 276). Furthermore, the innovation process entails uncertainties (Schnaars, 2002; Zhou, 2006), meaning not all innovation activities can yield positive outcomes. Similarly, risk-taking may enhance as well as reduce firm performance. SMEs may need to embrace risk-taking to capitalise on potential new market opportunities (Frishammar & H¨orte, 2007; Dai et al., 2014).

The reason being that "if no risks are taken, no new products will ever be produced and launched" (Frishammar & H¨orte, 2007, p. 769). Hence, risk-taking may contribute to firm performance because it allows firms to remain competitive in the marketplace. However, risk-taking entails a chance of failure (Janney & Dess, 2006; Alvarez, 2007). Indeed, high levels of risk-taking negatively impact firms' return on assets, while the opposite is the case when risk-taking is at a low or moderate level (Begley & Boyd, 1987). While increasing levels of risk-taking may produce better returns, the probability of failure is also higher (Alvarez, 2007). This implies that while successful risk-taking may enhance firm performance, the potential failure and losses from high levels of risk-taking may result in considerable business disruptions or even threaten firm survival. The disruptions will negatively impact the performance of SMEs because they often lack slack resources to absorb potential losses (Rosenbusch et al., 2013).

Impact of Internal Business Environment on the Performance of Solar Milling Cooperatives

Solar milling cooperatives have emerged as a response to the challenges faced by rural communities in accessing affordable maize flour (mealie meal) and reliable milling services. In many developing countries, traditional milling methods are inefficient and expensive, leading to food insecurity and economic hardship for small-scale farmers. The introduction of solar-powered milling technology has revolutionized the way milling services are provided, offering a sustainable and environmentally friendly alternative. Solar milling cooperatives have been established to promote the use of solar energy, improve milling efficiency, and empower rural communities. The success and sustainability of solar cooperatives are heavily influenced by the internal operating environment. Solar milling cooperatives were established to address challenges in accessing affordable maize flour and milling services in rural communities, with solar energy technology revolutionizing milling practices. The internal business environment of solar cooperatives, including factors like management structure, business management, financial management, organizational culture, and stakeholder engagement, greatly impacts their efficiency and sustainability.

Transparent decision-making processes, effective financial management, a culture of collaboration and partnerships with stakeholders are essential for the success of these cooperatives. The future of solar cooperatives looks promising, with increasing interest from various sectors in scaling up solar milling technology, expanding access to services, and enhancing cooperative capacity. The concept that was developed around the solar milling plants under ZCF was to establish Rural Enterprise Hubs (REHs) or Growth centres that supported activities such as clean water sanitation, house lighting, production of irrigated crops, small livestock and poultry production, small business for inputs and business services. A goal which could not immediately be realise due change of scope and ownership of the project as government took over the project and ZCF became a implementing Designed Agent.

Challenges such as limited access to finance, technical expertise, and market linkages need to be addressed to ensure the long-term sustainability of solar cooperatives. Collaboration among stakeholders is vital to maximizing the social, economic, and environmental benefits of solar cooperatives. By addressing internal factors and embracing innovations, solar cooperatives can continue to promote renewable energy solutions and support rural. There are several challenges faced by the cooperative federation which are similar to the ones in social security sectors. All of them have one thing in common that is to do with collections of contributions, loans, pension funds and medical insurance schemes. This challenge is similar to federation challenges on loan recoveries. The second report of the Committee on co-operative development indicated that delayed remittance of loans and payment was one of the challenges faced by institutions mandated by law in Zambia, especially public institutions.

Okundi (2011) conducted descriptive research in Kenya on the SACCO cooperative group and the study comprised of all general membership in Nairobi, registered in the role of co-operatives. The data was collected through the use of Questionnaires which were circulated to the treasurers or managers of the SACCOs sampled. The study concluded that SACCO suffered challenges in meeting loan requests by the members partly due to the long-term investments they engage in.

Members of the SACCOs preferred loans from the bank to the ones from the SACCOs due to the speed within which the loans are disbursed and also due to the fact that amount of loan awarded was not pegged on saving as was the case in SACCOs. The study recommends that SACCOs should change their mode of recovery of loans so that an equal amount is deducted every month until the loan is cleared. This scenario was not different from ZCF, the general membership has come out on several forums that the monthly repayments are way too high in comparison to sales recorded, some even went on to request for breakdown of the K1,700 into two instalments as the business sales does not support such repayments and remain with little for other operations. However, the cooperatives that have been conducting commercial milling and packaging their mealie meal have not had a challenge paying their workers and loan. Cooperatives that have focused on tolling milling only those should experience challenges in pay for their loans. The federation introduce the one brand concept "Co-op Milling" brand which was to be marketed across the country so that cooperatives have access to super markets, chain stores, schools and hospitals under one brand. In a district cooperative could aggregator and supply to any market.

The Influence of the External Business Environment on the Performance of Solar Milling Cooperatives

Biaga, Sibiu and Balcescu (2016) argued that the dynamics and complexity of external environment causes changes in organizations' overall activity. These can lead to disruptions in their work, with multiple implications, both internally and within the areas in which they act. Since the elements that are related to organizations 'external environment does not evolve simultaneously in the same direction and with the same intensity, the effects triggered on these entities are different. The influences between organizations and their external environment are reciprocal: the former influence the environment through their products, services, whereas their outer environment influence organizations. Consequently, to increase the efficiency and competitiveness of organizations, the decisions of managers must take into account the aforementioned interdependence.

Akpoviroro, (2018) examined the impact of external business environment on organizational performance of frozen fish companies in Nigeria. It also reveals literature on business environment, organizational performance and Nigeria business environment. Secondly a questionnaire was developed to collect information from the respondents based on a sample of 3 companies with 120 sample sizes. Data collected were analysed using multiple regression analysis. The study concluded that the external business environment political, economic, and technological and socio cultural etc have impact on organizational performance. Thus, organization should understand the implications of organizational performance of their business activities in order to identify, opportunities and threats to their business and organization.

3. Theoretical Framework

This study's theoretical and conceptual framework provides a foundation for understanding the impact of entrepreneurial orientation on cooperative performance, integrating Resource-Based Theory, Dynamic Capabilities Theory, and Entrepreneurship Theory. The framework is grounded in existing theories and research, including the work of Donald Kuratko and the concept of entrepreneurial orientation introduced by Miller in 1983.

Dynamic Capabilities Theory (DCT)

Dynamic capability is about organizational competitive survival rather resource based view's achievement of sustainable competitive advantage (Teece et al., 1994). Dynamic capability theory explains the capacity of an organization to purposefully create, extend or modify its resource base which refers to the choice of strategy an organization adopts to achieve its goals

Dynamic Capabilities Theory (DCT) complements Resource Base Theory (RBT) that focuses on internal resources and capabilities by emphasizing the importance of adaptability and flexibility in dynamic environments (Ibid). Cooperatives operating in rapidly changing markets must develop dynamic capabilities such as absorptive capacity, innovation, and learning to stay competitive. DCT helps explain how EO enables cooperatives to reconfigure resources and capabilities to respond to environmental shifts.

Entrepreneurship Theory (ET)

Entrepreneurship theory encompasses various perspectives that explain the entrepreneurial process, behaviour, and characteristics of entrepreneurs (Knight, 1921; Gartner, 1989). Key components include opportunity recognition, risk-taking, innovation, pro-activeness, and autonomy. Major theories include Trait Theory, Behavioural Theory, Cognitive Theory, Social Learning Theory, and Resource-Based View (Mitchell et al., 2002) Entrepreneurship theory draws from diverse disciplines, including psychology, sociology, economics, and management, to understand how entrepreneurs create, innovate, and grow businesses.

By examining entrepreneurial cognition, motivation, and action, entrepreneurship theory provides insights into the complex process of venture creation and growth, informing practice, policy, and future research. Entrepreneurship Theory (ET) adds another critical dimension by highlighting the entrepreneurial mindset and behaviour that underpin EO (Drucker, 1985). ET emphasizes the importance of opportunity recognition, risk-taking, and innovation in driving cooperative performance. By examining the entrepreneurial characteristics of cooperative managers and members, researchers can gain insights into how EO influences performance outcomes.

4. Conceptual Framework

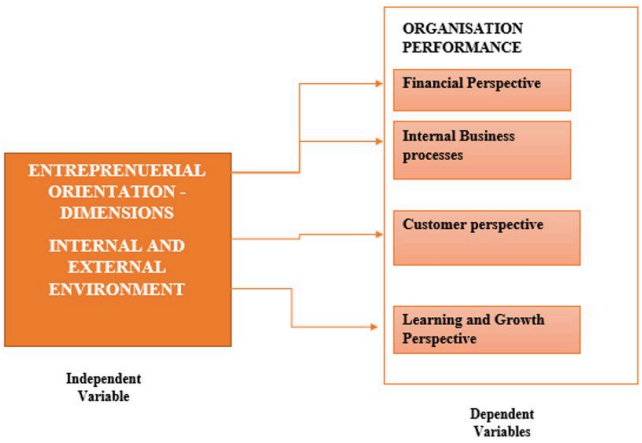

Figure 1: Conceptual Framework of the Research

A conceptual framework is a structured approach to understanding a process or system, consisting of interconnected blocks representing observational, experiential, and analytical aspects.

This study's conceptual framework aims to help solar milling cooperatives in Zambia's Southern Province adopt strategies to increase market share and grow into viable businesses. The framework addresses issues such as cooperative failure, social and economic impact, and lack of strategies. It illustrates the relationship between independent variables (entrepreneurial orientation dimensions) and dependent variables (business performance perspectives), providing a model to answer research questions (Bogdan & Biklen, 2003; Sekaran, 2009).

Research Gaps

Research on the impact of Entrepreneurial Orientation (EO) on agricultural cooperative performance in Sub-Saharan Africa, specifically Zambia, is limited. Existing studies lack theoretical integration, contextual understanding, and empirical evidence on the relationship between EO and cooperative performance.

Gaps also exist in methodology, geography, and conceptual clarity, highlighting the need for longitudinal, mixed-methods studies and context-specific EO frameworks. Addressing these gaps can provide valuable insights into enhancing the performance of agricultural cooperatives, such as solar milling plant cooperatives, in Southern Province, Zambia.

5. Research Methodology

Research Design

This study will adopt the philosophy of pragmatist. Pragmatism offered flexibility in research design and methods, enabling researcher to adapt to the complex and dynamic nature of agriculture cooperatives. Pragmatism values multiple perspectives, enabling the researcher to consider various stakeholders' views, such as farmers, cooperative managers, and policymakers.

Pragmatism accommodates mixed-methods research, allowing researcher to combine quantitative and qualitative data to gain a comprehensive understanding of the research topic. By adopting a pragmatic philosophy, the study was able to provide valuable insights and practical recommendations for enhancing the performance of agriculture cooperatives in Southern Zambia, ultimately contributing to the improvement of the agricultural sector in the region.

Study Approach

The study employed embedded mixed-methods triangulation method combining survey data from 364 respondents' cooperative members with semi-structured interviews, questionnaires and Focus group discussion. Sampling was done using simple random and purposive sampling.

Target Population and Sample Sizes

The target population for this study are members of the agriculture cooperative under ZCF operating from Southern Province. According to the Department of Cooperative under ZCF 2020, Southern province has about 266 agriculture cooperatives who benefited from the solar milling plant initiative with an average of 15 member per cooperative. This implies that that the total target population for this study will be 3,990. It is also important to note that selection of population sample is key. Gschu (2004) underscores the importance of selecting a representative sample through making a sampling frame. From the population frame the required number of respondents was selected in order to make a sample and the ideal technique to be used was stratified random sampling. To establish the sample size the researcher will use Yamane equation. The formula takes into consideration the margin of error, the 95% confidence level, the population and the response distribution (Precision) (Yamane, 1967).

Sample Size

Qualitative Sample Size

Regarding qualitative sample size, the study used a sample size of 15 participants, supported by Creswell (2022), who argued that 15-35 participants are sufficient for qualitative studies involving in-depth questionnaires. The sample size was chosen due to the sensitive nature of the study and limited access to participants, yet large enough to achieve saturation, where no new information was discovered (Thomas, 2015), as indicated by the emergence of repetitive themes and patterns, stable trends in data, and no new insights revealed during data analysis

Quantitative Sample Size

The sample sizes for each population category and for each district (Stratum) Sample size was tabulated using Yamane's equation since Presumptive population size was known.

The determination of the sample size using Yamane sample determination Model was done as follows;

$$n = \frac{N}{1 + N(e)^2}$$

Where

n required sample size

N the total population

e margin of error used was estimated at 5% or 0.05

Where:

N =3990

n =?

e =5%

Calculations below give both the targeted populations and their associated sample sizes based on Yamane Formula. Yamane Formula Model can generate a sample size for any size of the population which could be in form of even or old number though it uses a fixed margin of error which was 5%.

$$\mathrm{n} = \frac{3990}{1+3990(0.05)^2}$$

$$n = \frac{3990}{1 + 9.975}$$

$$n = \frac{3990}{10.975} = 363.55$$

n =364 sample size

Types of Data

Primary Data

For this research, primary data was collected using field work. Key informants were interviewed, and questioners administered. Besides that, the Research did field observation and collected the data in a form of note about situation and case around the object of the research. Photographs were also collected. An interview guide was used to collect data through interviews and focus group. First information was collected from the sampled participants hence improving the validity of the research.

Secondary Data

The secondary data for the study was collected from already existing literature such as books, other research, journals, and some policy documents that supported analysing process. This data was used to support the information of primary data which was got through interviews and direct field observation. The secondary data was obtained through a desk study hence making it very advantageous in that it was inexpensive to collect, quick to access and helped to broaden the understanding of the researcher on the problem and subject matter that was being investigated.

Data Collection Instruments

This study employed both qualitative & quantitative data collection methods. For qualitative data collection, structured interview guide with open-ended questions was used, providing standardized sequence of questions while minimizing respondent influence (Creswell, 1994). Additionally, focus group discussions were conducted. For quantitative data collection, questionnaires with fixed-choice & open-ended formats were used, including Likert scaled self-administered questionnaires. Fixed-choice items provided proposed answers to eliminate overthinking & minimize self-expression opportunities.

Data Analysis

Collected data was compiled, summarized and analysed using Statistical Package for Social Sciences researches (SPSS) version 27. SPSS in this research was used because it was user friendly and easy to compute frequencies and present the computed data in different graphical forms such as frequency tables, histograms, pie charts, and so forth. Qualitative data would be analysed by grouping the responses into common themes, and analysed thematically with respect to the analysis of open-ended question ns.

Ethical Consideration

The researcher obtained ethical approval from University of Zambia Ethical Committee. The research observed main ethical issues including, voluntary nature of participation, obtaining of informed consent; ensuring confidentiality and privacy of participants, institutional ethical issues, which included obtaining authority to conduct research and scientific honesty (Fleming, 2011).

6. Results

Demographic Characteristics of Respondents

This chapter presents findings of study on impact of entrepreneurial orientation on performance of agriculture cooperatives in Southern Province, Zambia. The results are based on analysis of data collected from 364 respondents through a survey and 308 respondents through semi-structured interviews. The chapter outlines demographic characteristics of respondents, levels of entrepreneurial orientation among cooperatives, and relationship between entrepreneurial orientation and cooperative performance. The findings provide insights into role of entrepreneurial orientation in enhancing performance of agriculture cooperatives in Zambia. This section had question that enabled researcher to obtain background information of farmers and key informants who participated in research. The variables looked at include gender, Location and position in their respective cooperatives. Demogra. information of respondents was meant to give strength to research findings.

Gender Distribution

A total of 308 respondents, it was revealed that 70.5% majority of respondents in this research were female and 25.3%, whilst 4.2% chose not to say. This implies that this study was female dominated research. This is true looking at population cooperative membership in communities, so this study in concomitant with actual situation on ground.

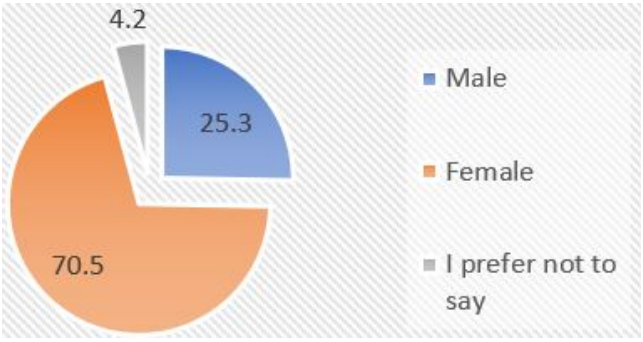

Figure 2: Gender distribution of the respondent

Distribution of Respondents by Location

The study revealed that majority of respondents 36.7% were from kalomo, 20.1% from Kazungula, 8.10% from Gweembe, 16.20% from Namwala, 8.10% from Monze, 10% from Choma, 0.30% from Zimba district.

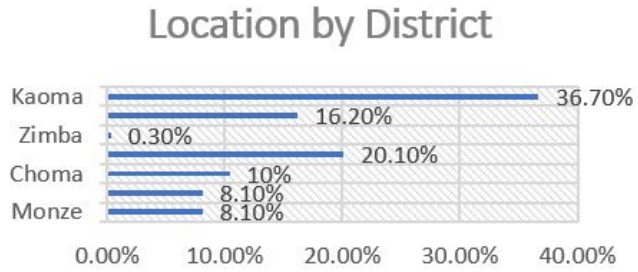

Figure 3: Distribution of the respondents by Location

Position of the Respondents

The researcher was also interested in knowing the position of the respondents in the represented cooperative. The results shows that majority 63.3% were cooperative members just, 16.3% were cooperative treasurers, 10.4% were in the cooperative chairperson bracket and 10.1% were cooperative secretaries.

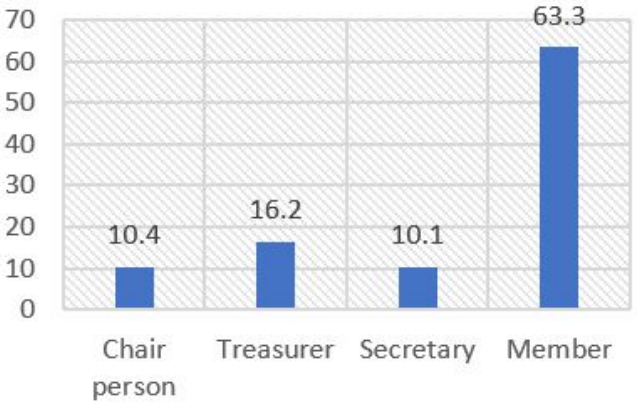

Figure 4: Distribution of the respondents by location

Key Determinants of Business Performance for Solar Milling Cooperatives

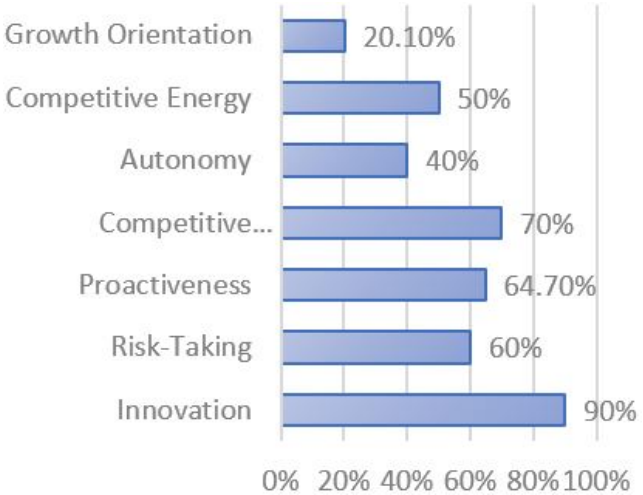

Figure 5: Key determinants of business performance for solar milling cooperatives

The researcher was also interested in knowing the key Determinants of business performance for solar milling cooperatives. Majority of the responses 90% said, innovation, 60% risk-Taking, 64.7% pro-activeness, 70% competitive aggressiveness, 40% autonomy, 50% competitive energy and 20.1% mentioned growth Orientation.

Table 1: Responses on the effects of EO Dimensions on the performance of solar milling cooperative enterprises

		Sales revenues have been rising	The number of customers seeking to grind their maize into flour has been increasing	The cooperative has recorded an increase in market share in milling business	Our cooperative doing Commercial milling	The cooperative has capacity to mobilize its own maize grain	The SMP runs on average a normal period on a business day	Our cooperative consistently meets or exceeds our performance targets.	Our cooperative's performance has improved since adopting solar milling technologies.
N	Valid	308	308	308	308	308	308	308	308
	Missing	0	0	0	0	0	0	0	0
Mean		2.3247	3.8994	4.0649	1.7305	4.1883	4.0877	4.1071	3.9448
Mode		1	4	4	1	4	4	4	4
Std. Deviation		2.52643	0.58727	0.51271	0.74988	0.59607	0.69581	0.67882	0.68502
Sum		1024	1201	1252	533	1290	1259	1265	1215

The study found a significant relationship between Entrepreneurial Orientation (EO) and the performance of solar milling enterprises in Southern Province, Zambia. While respondents disagreed on rising sales revenue (mode=1, mean=2) and commercial milling activities (mode=1, mean=2), they agreed on increasing customer demand (mode=4, mean=4), growing market share (mode=4, mean=4), and enhanced maize grain mobilization capacity (mode=4, mean=4). These findings suggest that EO dimensions, such as innovation and pro-activeness, positively impact solar milling cooperative performance, particularly in terms of market growth and operational capacity. Overall, the results indicate that EO contributes significantly to the success of solar milling enterprises in the region.

Relationship between the Internal Business Environment and the Performance of Solar Milling Cooperatives in the Southern Province

Table 2.1: Correlations Internal business environment and business performance of the cooperative organization

		Business Performance	Internal business environment
Business Performance	Pearson Correlation	1	.482**
	Sig. (2-tailed)		0
	N	252	252
Internal business environment	Pearson Correlation	.482**	1
	Sig. (2-tailed)	0	
	N	308	308
**. Correlation is significant at the 0.01 level (2-tailed).			

There was a significant relationship between There was a significant relationship between internal business environment and business performance of the cooperative organization. Internal business environment; operation costs of SMP business, lack of qualified workers, business skills/acumen of co-op leaders and knowledge, there was limited know-how on undertaking repairs on the SMP and SMP cooperative business performance had P-Value from the SPSS output is below 0.05 which the level of significance as indicated in the table above.

Relationship between the external business environment and the performance of solar milling cooperative enterprises

Table 2.2: Correlations Internal business environment and business performance of the cooperative organization

		Business Performance	Internal business environment
Business Performance	Pearson Correlation	1	.482
	Sig. (2-tailed)		0
	N	252	252
Internal business environment	Pearson Correlation	.482	1
	Sig. (2-tailed)	0	
	N	308	308
. Correlation is significant at the 0.05 level (2-tailed).			

There was a significant relationship between external business environment and business performance of the cooperative organization. External business environment; Government policies, market accessibility,

raw materials and time of operation and SMP cooperative business performance had P-Value from the SPSS output is below 0.05 which the level of significance as indicated in the table below. The coefficient of correlation of -0.042 suggests that there a weak negative relationship between I between external business environment and business performance. This further, suggests that, External business environment has a significant influence on business performance of the cooperative organization. Since the P-Value (0.042) from the SPSS output was below 0.05 which the level of significance as indicated in the table above.

Table 3: Relationship between the dimensions of entrepreneurial orientation (EO) and the performance of solar milling cooperative enterprises

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Interval	Confidence for B
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	1.223	0.323		3.784	0.001	0.588	1.857
Gender	0.057	0.078	0.031	0.33	0.046	-0.096	0.21
Education	0.22	0.058	0.037	0.0681	0.001	0.0483	0.532
Internal Factors	0.67	0.082	0.043	0.723	0.001	0.078	0.56
EO Dimensions (Autonomy, risk taking, innovation, growth orientation, competitiveness)	0.211	0.158	0.055	1.34	0.018	-0.098	0.52
External Factors	-0.373	0.079	-0.209	-4.737	0.001	-0.528	-0.219

The study results have revealed that that gender, Education, Internal Factors, External factors, EO Dimensions (Autonomy, risk taking, innovation, growth orientation, completeness) have a significant relationship with the performance of solar milling cooperative enterprises.

The results were significant at ($p< 0.05$). This implies that gender, Education, Internal Factors, External factors, EO Dimensions (Autonomy, risk taking, innovation, growth orientation, competitiveness) are directly associated with the performance of solar milling cooperative enterprises. Correlation analysis revealed that: EO positively correlated with cooperative performance ($r = 0.65$, $p < 0.01$), on the other hand regression analysis: EO dimensions (autonomy, innovativeness, risk-taking, pro-activeness) significantly predicted cooperative performance ($R^2 = 0.53$, $F(4, 115) = 24.11$, $p < 0.01$).

Qualitative Responses

The insights from key informant participants provided a deeper understanding regarding the effect of entrepreneurial orientation on the business performance of agriculture cooperatives in Zambia's Southern Province. Their diverse perspectives shed light on how these themes interact to shape the overall performance and sustainability of cooperatives. The responses were grouped into three broad categories for clarity and analysis.

Entrepreneurial Orientation Themes

This section explores how participants perceive the key dimensions of entrepreneurial orientation innovation, risk-taking, pro-activeness, competitiveness, and adaptability in driving cooperative success. The participants' firsthand experiences highlight both the opportunities and challenges inherent in fostering entrepreneurial spirit within cooperatives. Participants consistently highlighted the transformative impact of innovation on cooperative performance.

Innovation

Participants, the Committee Member (Innovation Leader), *noted that innovation drives the cooperative's success and keeps it competitive, citing the launch of mobile milling services as an example of innovation in action*.

Participants 11, the Treasurer, *noted that innovation was vital for the cooperative's survival, highlighting the importance of regularly refining milling techniques to meet customer demands efficiently*. The Vice Chair, *noted that innovation was at the core of everything the cooperative does, crediting solar-powered machinery for reducing operational costs while enhancing efficiency*. It was also noted that innovation was critical to addressing environmental constraints, affirming that the adoption of advanced technologies ensures long-term sustainability.

Risk-Taking

One of the participants, the Chairperson, noted that risk-taking was necessary for growth, emphasizing the cooperative's bold investment in solar milling technology despite its upfront costs.

One of the participants, the committee member, *noted that risk-taking was critical, warning that hesitation can lead to missed opportunities that competitors may quickly exploit*. One of the participants, the Technical Consultant, *noted that embracing solar technology was key to sustainable competitiveness, advocating for investments in this area*.

Pro-Activeness

One of the participants, the Chairperson, *noted that being proactive has allowed the cooperative to stay ahead of competitors, involving anticipating customer needs and expanding services accordingly.*

Similarly other participants noted that, *aligning milling operations with seasonal crop cycles ensures operational continuity, highlighting the importance of pro-activeness and additionally it was also suggested that* pro-activeness has secured the cooperative's competitive edge, citing expansion into untapped markets as an example.

Competitiveness

Participants 3, the Chairperson, noted that the, *cooperative's competitiveness was moderate, urging improvements in marketing strategies to enhance competitiveness*. Participants 2, the Treasurer, *noted that competitiveness was limited by financial constraints, emphasizing the need for increased financial resources, it was also noted that competitiveness was crucial for growth and relevance, pushing for aggressive marketing strategies to enhance competitiveness.*

Adaptability

Adaptability was identified as a key trait in navigating challenges and identifying opportunities for diversification.

Participant 6: Alluded that, "Our cooperative's greatest strength lies in adaptability," citing their diversification into sorghum and millet milling during maize shortages. However, others noted that the supply inconsistencies pose barriers to adaptability.

Cooperative Performance Themes

Participants provided insights into the cooperative's financial health, operational efficiency, customer satisfaction, and market share. These factors collectively reflect how the internal environment influences performance.

Participants reflected on the cooperative's financial outcomes, operational efficiency, customer satisfaction, and market share. This section delves into their views on how these performance metrics are shaped by both internal practices and external influences.

Financial Performance

Financial performance was seen as both a measure of growth and a reflection of operational resilience.

Chairperson from one of the cooperatives in southern province observed that while the cooperative has managed to maintain steady financial performance, rising costs of raw materials are creating significant challenges for its overall stability. These pressures highlight the need for creative financial strategies to sustain operations.

Participant 2, the **Vice Chair** celebrated the cooperative's robust financial growth, attributing the success to well-planned investments in technology. These investments have not only fueled business expansion but also demonstrated the cooperative's commitment to forward-thinking strategies.

Participant 4; one of the committee member from the cooperative

also remarked on the exceptional strides in operational efficiency. They explained that modernization efforts have streamlined processes, minimized waste, and brought the cooperative closer to achieving peak performance.

Treasurer pointed out that despite the progress in improving efficiency, technical expertise gaps continue to pose challenges. Addressing these gaps remains crucial to ensuring the cooperative's operations reach their full potential.

Secretary emphasized the importance of inclusivity and innovation in driving customer satisfaction. They noted that the cooperative's *ability to consistently deliver high-quality products has earned it strong loyalty and positive feedback from customers*.

One of the **Technical Consultant from ZCF** highlighted the role of advanced technologies and innovative services in shaping the cooperative's market strategy. While the market share has not yet expanded, these efforts have positioned the cooperative to capitalize on future growth opportunities.

Challenges and Opportunities Themes

Challenges

This section outlines the hurdles faced by solar milling cooperatives and the potential opportunities that could help them overcome these challenges. Participants highlighted pressing issues like raw material shortages and financial constraints while identifying areas for growth such as diversification and inclusivity.

Participant 1 (Chair Person) cited "*rising operational costs and shortages of raw materials" as the cooperative's biggest hurdles.*

Participant 3 (Committee member) pointed to restrictive government policies as another major constraint.

According to the Chairperson, two of the major issues confronting cooperatives are rising operational costs and raw material shortages. These challenges can severely impact the cooperatives' ability to operate efficiently and effectively, ultimately affecting their bottom line. Furthermore, the Policymaker pointed out that restrictive government policies and limited access to funding are significant barriers that cooperatives must navigate. These external factors can hinder cooperatives' growth and development, making it essential for policymakers to create a more conducive environment. All in all, Rising operational costs and limited resources were consistently raised as significant barriers.

Opportunities

Despite the challenges, participants identified several opportunities that cooperatives can leverage to drive future success;

Participant 1 (Manager) noted that; "*Diversifying into sorghum and millet milling" has strengthened operational resilience and opened new markets*.

Participant 5 (Gender Advocate) advocated for, "*empowering women through targeted training programs" to drive inclusivity and foster innovation.*

The Chairperson highlighted diversification into sorghum and millet milling as a strong opportunity for resilience and growth. By expanding their product offerings, cooperatives can reduce their dependence on a single crop, making them more resilient to market fluctuations. Additionally, the Secretary advocated for empowering women through targeted training programs, emphasizing that "inclusivity fosters innovation." This approach can not only promote gender equality but also tap into the creative potential of women, leading to innovative solutions and business growth.

7. Discussion

This section discusses the findings based on research questions regarding the effect of entrepreneurial orientation on the business performance of agriculture cooperatives in Zambia's Southern Province. The study employed a mixed-methods approach, combining survey data from 364 respondents with semi-structured questionnaires and interview guides. The analysis involved 308 respondents, with 70.5% female and 25.3% male, indicating a predominantly female-oriented cooperative membership. The age distribution showed most respondents were between 35-45 years old, with few under 25 or above 55 years old.

This result reflects what was on the ground in that most members who join cooperative are members of the community with less opportunities for other jobs due to education capacity challenges (FINSOPE, 2019). The study identified key determinants of business performance, including innovation, risk-taking, pro-activeness, competitive aggressiveness, autonomy, and growth orientation.

These dimensions collectively reflect the entrepreneurial orientation (EO) framework, which has been consistently identified as a driver of business success in cooperative enterprises (Mason et al., 2015; Lumpkin and Dess, 1996). The study's findings contribute to Entrepreneurship Theory (ET) and Dynamic Capabilities Theory (DCT) by highlighting the significance of EO dimensions and dynamic capabilities in enhancing cooperative performance.

The dimensions of EO, including innovation, pro-activeness, competitive aggressiveness, risk-taking, and autonomy, have varying impacts on business performance.

The study found that these dimensions are critical drivers of success, with respondents highlighting increasing customer engagement, expanding market share, and enhanced capacity to mobilize raw materials as key performance indicators influenced by EO dimensions (Felício et al., 2012; Mason et al., 2015). The interplay between internal and external business environments profoundly affects cooperative performance, with internal factors such as operational costs and leadership skills exhibiting a strong positive correlation with business performance (P-value < 0.01, coefficient: 0.482), and external factors such as government policies and market access posing challenges (P-value < 0.05, coefficient: -0.042). The study's findings have practical implications for cooperative managers, policymakers, and stakeholders. By addressing both internal and external environmental factors and fostering a culture of entrepreneurial orientation, solar milling cooperatives can improve their competitiveness, adaptability, and overall sustainability (Anderson and Eshima, 2013; Covin and Slevin, 1989; Wiklund and Shepherd, 2005). Practical strategies may include investing in employee training, enhancing market access, and developing innovative approaches to overcome operational and environmental constraints. The study's limitations include not investigating the potential mediating role of organisational learning, primarily examining the effect of entrepreneurial orientation on business performance within the agricultural sector, and using a cross-sectional design.

8. Conclusion

This study investigated the effects of Entrepreneurial Orientation (EO) on the business performance of solar milling cooperatives in Zambia's Southern Province. The study concluded that EO dimensions, such as innovation, pro-activeness, and risk-taking, significantly enhance cooperative performance. Additionally, internal factors like operational costs and external factors like government policies and market access influence performance. The study also highlighted the importance of gender, education, and experience in shaping EO and cooperative performance. These results are consistent with existing literature on the positive effects of EO on organizational performance.

To improve performance, cooperatives should cultivate a culture of innovation, pro-activeness, and risk-taking, while addressing internal and external challenges to foster EO and enhance cooperative performance. The study also identified key determinants of business performance, including operational costs, leadership skills, and market access. The research contributes to academic discourse by integrating Dynamic Capabilities Theory and Entrepreneurship Theory into the EO framework. Practical implications include recommendations for cooperative management, policymakers, and entrepreneurs to foster innovation, address external barriers, and provide training in entrepreneurial skills

Recommendations

Based on the findings of this study, the following practical recommendations are proposed to enhance the performance of solar milling cooperatives in Southern Province, Zambia:

- Encourage cooperative managers and members to actively pursue innovative ideas, such as new milling techniques or value-added products (e.g., milling fortified maize meal).
- Cooperatives need to develop strategic plans to anticipate and respond to market trends. For example, exploring opportunities for partnerships with local businesses or expanding services to reach underserved markets.
- Organize capacity-building programs to enhance the skills of cooperative members in leadership, technical repair knowledge, and business management. This will improve operational efficiency and reduce costs associated with machinery breakdowns.
- Develop strong leadership programs to equip cooperative committees with skills in decision-making, problem-solving, and financial management.
- Cooperatives should actively engage with policymakers to advocate for policies that promote market accessibility, subsidized solar equipment, and favorable taxation for agricultural cooperatives.
- Establish supply networks with local farmers to ensure steady availability of raw materials. Agreements with suppliers for consistent maize supply can enhance productivity.

Author Contributions: Conceptualization, methodology writing review and editing and analysis (GM) The author has decided to published this version of the review article, Editing the article (Dr. H.Daka).

Funding: Funding for this research was not provided. The authors have no other relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript apart from those disclosed. No writing assistance was utilized in the production of this manuscript.

Institutional Review Board Statement: This study was approved by the University of Zambia Humanities and Social Sciences Ethics Committee.

Informed Consent Statement: Not applicable.

Data Availability Statement: The datasets used during the current study are available from the corresponding author on rational request.

Acknowledgements: I, am grateful **Dr. H. Daka** for his unreserved support and supervision both during the preparation of the proposal and the write up of this dissertation. I remain sincere, grateful and indebted to My Wife, my mother and children sisters and brothers not forgetting all colleagues, whose words of encouragement, affection and prayers served me as a source of strength and inspiration throughout my academic journey.

Last but not least, I thank my Lord God Almighty for the rare opportunity given to me to accomplish my dream of acquiring the Degree of **Master of Science in Entrepreneurship and Innovation Management** of University of Zambia.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Benos, T., & Kalogeras, N. (2016, April 5). Harnessing a 'Currency Matrix' for performance measurement in cooperatives: A multi-phased study. *MDPI, 14*(2), 1-5.

2. Bijman, J. (2012). *Support for farmers.* OECD: Wageningen University, The Netherlands.

3. Covin, J., & Miller, D. (2014). International entrepreneurship: A competitive advantage for global firms. *Journal of International Business Studies, 45*(8), 1-21.

4. Covin, J., & Slevin, D. (1991). A conceptual model of entrepreneurship as firm behavior. *Entrepreneurship theory and practice, 16*(1), 7-25.

5. Cropp, R. &. (1989). Structure and scope of agricultural cooperatives. *Cooperatives in Agriculture*, 35-67.

6. Guulruh, G., & Sinem , A. (2009, September 4). Entrepreneurial management, entrepreneurial orientation and Turkish small firm growth. *Management Research*, 32.

7. Kantur, D. (2016). Strategic entrepreneurship: Mediating the entrepreneurial orientation-performance link. *Management Decision, 54*(1), 24-43.

8. Lumpkin, G. a. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review, 21*(1), 135 - 172.

9. Lumpkin, G., & Dess, G. (2001). Linking two dimensions of entrepreneurial orientation to firm performance: The moderating role of environment and industry life cycle. *Journal of Business Venturing, 16*(5), 429-451.

10. Miller, D. (1983). The correlates of entrepreneurship in three types of firm. *Management Science, 29* (7), 770 - 791.

11. Ministry of Agriculture and Livestock. (2016). *Farmer Input Support Programme (FISP) Implementation Manual.* Lusaka: Government Printers (GRZ).

12. Mungule, M. C. (2016). *Validating a measurement scale for entrepreneurial actions for sustainable corporate entrepreneurship using confirmatory factor analysis.* Gaborone: Research Gate.

13. O'Neill, A. (2021). *Share of economic sectors in the GDP in Zambia 2019.* New York: Statista.

14. Royer, J. S. (2014, May 5). The theory of agricultural cooperatives. *Agricultural Economics*, 1-7.

15. Venkatraman, N. a. (1989). Measurement of business performance in strategy research: a comparison of approaches. *The Academy of Management Review, 11*(4), 801 - 814.

16. Wiklund, J., & Shepherd, D. (2005). Entrepreneurial orientation and small business performance: A meta-analysis. *Entrepreneurship Theory and Practice, 29*(4), 313-332.

17. Yaluma. (2018). *Status of solar powered milling plants project.* Lusaka: Minister of Commerce, Trade and Industry.

18. Zambia Cooperative Federation (ZCF). (2018, August 7). Zambia cooperative to install 2,000 solar milling plants. *Food business Africa*, 1-5.