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CASE STUDY ANALYSE THE SUSTAINABILITY PERFORMANCE OF THE PULSES VALUE CHAIN OF ALL PULSES PROCESSING FIRMS VIA THE BALANCED SCORECARD METHOD: EVIDENCE SELECTED FROM THE THREE STATES OF INDIA.

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Abstract
The case study analyses the sustainability performance of the pulses value chain of all pulses processing firms from selected locations of Uttar Pradesh, Rajasthan, and Delhi /NCR regions, to identify whether pulses firms are sustainable in their different operational functions and also analyze the pulses firms are adopting the sustainability measures techniques for increasing the firms' performance. The study generates information related to sustainability factors that shows the significance level of risk may not impact the performance of the pulses value chain of pulses firms. The study analyses the declining status of Indian pulses processing firms facing a critical situation when adopting sustainability factors. The study implements the balanced scorecard method to measure the sustainability factors from different perspectives that provide the growth and development of firms.

Keywords: Sustainability, perspectives.

Uniqueness: The case study adopted the balanced scorecard method to assess the sustainability performance of all Pulse's firms.

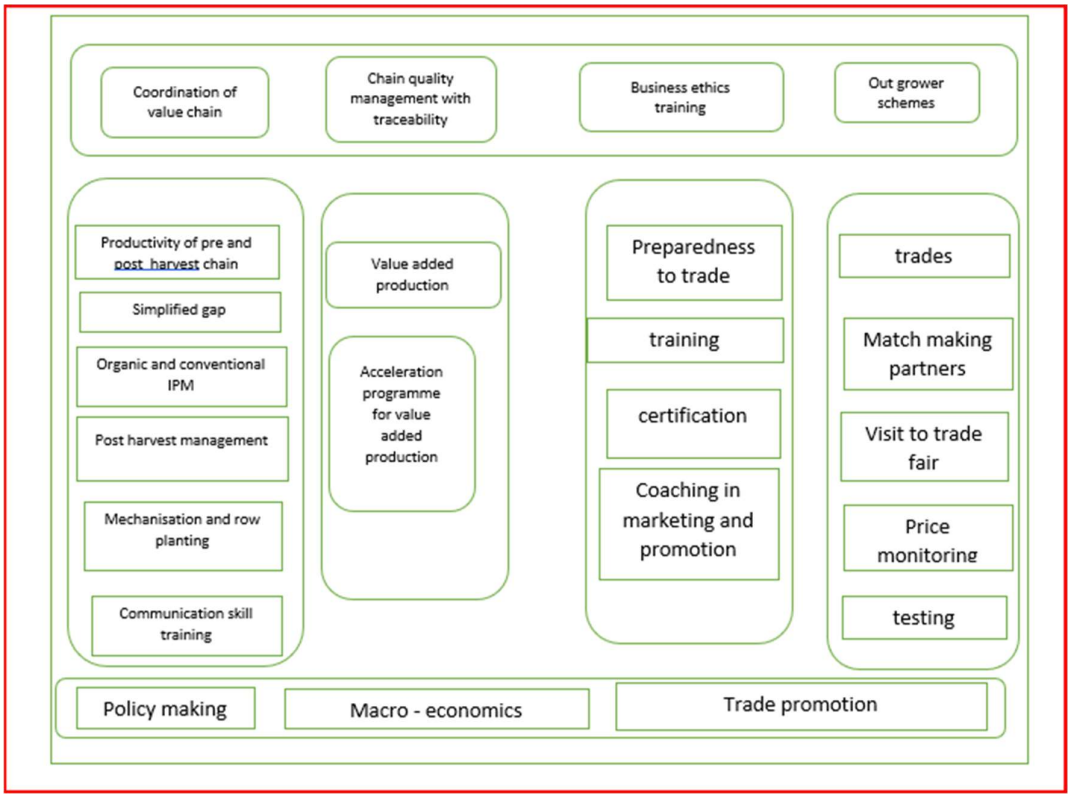
Limitation/ uniqueness: The case study on evidence-based survey data was applied to generate the empirical method based on quantitative techniques.

Introduction

Pulses are an essential agricultural food crop with protein nutrients to generate a healthy diet with food security. The pulses serve as feed crops for large populations through farming systems. It is generally grown in rainfed, marginal land and can grow in complex production environments. In India, the pulses produced in different soil condition cause biotic constraint which affects pulses production through pest diseases, and make the environmental stress that generates variation and slow down the pulses production capacity also developed a considerable yield gap as compared to potential pulses production (Rajendra Daria, 2021). Pulses are important food crops globally. It is recognized as high protein fiber contents are responsible for generating a high yield with significant financial gain through a large volume of pulses export. Pulses are substantial protein sources in the diet to form an integral part of the food diet. Pulses help to control chronic diseases and are used in medicine to prevent heart diseases. India is the wealthiest producer, exporter, and consumer of pulses, with about 25% of global production and 35% of the international areas covered for pulses production. The pulses production in India is comparatively half the productivity level of the USA and Canada. The pulses are rich in dietary fibers that provide nutrients to the human body (Ridaurar, 2015). The new innovative technology has reduced the significant challenges of pulses

farming and provides crop rotation practices for pulses cultivation. It emphasizes expanding pulses farming areas and generates short-duration varieties of pulses. It developed multiple pest-resistance varieties to reduce pulses production's biotic and non-biotic constraints and allowed using micro-nutrients such as zinc and sulfur (Reddy,2009). The demand and supply gap of pulses occurs due to a lack of quality pulse production that creates pressure on pulses prices. Therefore the farmers adopted various crop pulses production management and the participatory rural method to identify and set the priority issues of pulses production. According to that method, the pulses production is grown in large volumes and made fertile parcel of land. It leads to adequate adaptation of pulses production technology that reduces the risk and low level of irrigation factors (I.P, S Ahlawat, 2016). A pulses value chain consists of business activities from producing specific raw material inputs for developing the complete product, following the pulses production process and transforming it into processed food, and performing the final sale of a finished processed product to consumers. (GTZ Value Links, 2008).

1. Figure illustrates the Pulses value chain with different functions and activities.



source: Value chain analysis of pulses and oilseeds from Ethiopia, (2018)

Pulses value chain analysis developed the conceptual framework of pulses that reduces the cost and provides quality enhancement at different stages of the value chain and made implication of cost and margin on farmers' income. The pulses value chain developed the coordination of random sampling techniques used for selecting districts and markets, performed the pulses market survey, and entirely fulfilled the requirement of stakeholders. (Meera Kumari, 2018). The pulse value chain consists of many actors performing activities and significant functions related to procurement, marketing, and production of processed food, bringing the agricultural products from the field, after processing and transforming them into the final consumption of

value-added pulses product. The pulses value chain developed the vertical linking or established network between various actors of business involved in processing, packaging, storage, and made transport and allowed distribution. A successful pulse value chain generates each stakeholder's profitability at each chain. The pulses value chain produced the pulses, with value-added features of quality upgradation, that performed multiple functions and activities related to buying, selling, and storing pulses at each value chain stage. The pulse value addition should be performed at both ends; agriculture was profitable to industries and performed the monetary flow from the rural to urban areas (Pradyumna Raj Pandey, 2019). The case study discussed the sustainability performance factors of the pulse value chain of all pulse processing firms with the Balanced Scorecard Method (SCORE). The case studies provide the sustainability measures and techniques to improve the pulses product ivity that enhanced pulses firms. The case study is based on the empirical-based data collection from the selected location of Uttar Pradesh, Rajasthan, and Delhi/ NCR regions of 26 firms. The case studies are segregated into different sections. The first section discussed the balanced scorecard method and literature review. The second section performed the data analysis with the empirical method of quantitative techniques to determine the score factors with ANOVA tables to analyze the different elements, and the third section discussed the limitation, acknowledgment, and conclusion.

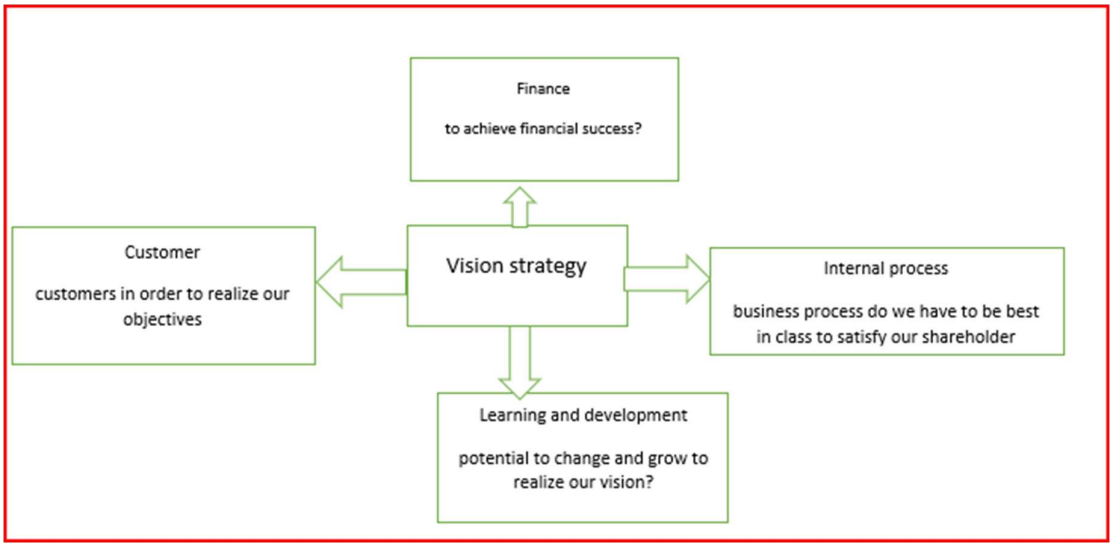
Section 1

1. Balanced score method

The balanced scorecard method was evolved by Kalpna and Norton in 1992 and introduced in Harvard Business as a review article of techniques for measuring business performance to become an effective tool for developing a framework, which is used and recommended extensively. The balanced scorecard is applied in business to measure business performance. The balanced scorecard method has been used for multi-activity in the industry to analyze the performance measurement of all firms related to all tangible and intangible assets made role in firms' value creation (Robert S, Kaplan,2009). The balanced scorecard generates information about all functional areas, develops strategic decisions, and improves firms' performance externally and internally. The flat scorecard concept describes the management tool for communicating and implementing strategy (Robert S, Kaplan, 2009) and applying the balanced scorecard (BSC) in the business sector regarding the adaptation of quality performance that made significant differences and developed similarities between sub-functional areas of business (Demetrius, 2010). The balanced scorecard method has various applications for formulating organizational strategy and measuring business performance. The balanced scorecard consists of four learning and growth prospects that help employees develop learning skills, generate growth perspectives, and improve the organization's process to build customer relations. The other customer perspectives create value for customers and set the internal process to meet our customers and shareholders' expectations. Moreover, financial perspectives help improve firms' financial status to achieve profit and gain (nectarines, 2015). Balanced Scorecard developed the vision and made competitive strategies of firms that translate a business mission and strategy into a long-term goal and vision to perform the measurement. The balanced scorecard achieved the following objectives 1) to develop the aim and objectives and made clarifying the vision and strategy of firms, 2) and establish communication among different functional units to develop the linkage

with strategic objectives, 3) to develop the set of planning, and achieves the targets, to establish the strategic initiatives and 4) made enhancement of strategic decision making with feedback. The sustainability measures establish the relationship between strategy and cooperative action to develop the internal part of firms and select goals and standards to monitor the performance of firms and achieve the financial goals.

1. The given figure illustrates the balanced scorecard method and its perspectives.



Source: The methodology of the Balanced Scorecard (Kaplan & Norton, 1997)

The figure describes the balanced scorecard method consisting of four main aspects learning and growth, business processes, customers, and finance. BSC allows the companies to fill the information in a single report and provide the information related to service and quality. The figure describes each component's functional area related to growth and development and generates opportunities for firms.

II. Literature review

The literature review has discussed the impact of the balanced scorecard method on the organizational performance of firms (**Dag Oivind, 2015).** scorecard adoption in firms made the transformation of strategy into action and allowed them to perform organizational changes and implement quality programs to achieve goals and objectives. (Margarita IŠORAITĖ, 2008), The balanced scorecard achieved the organization's strategy, measures, the performance of firms and developed the initiatives for filling the firm's plan. (Isaias De Jesus Alvares, 2023), The balanced scorecard method performed the quantitative, qualitative, or theoretical approaches that have been applied to achieve the firms' goals and objectives and improve the work performance, also adopting the Balanced Scorecard (BSC) method in educational sectors. Nattarinee Kopeeka (2015), The Balanced score method made the continuous development of firms' performance. It generated the advantage and disadvantages of the approach related to communication of integration and developed the indicator to measure the internal implementation of firms **(E. Grigoroudis**, 2020). The Balanced Scorecard (BSC) methodology provides an accurate tool for timely information throughout an organization. The method is based on different perspectives of modern business organizations to generate effective corporate performance and develop a successful corporate strategy. (Robert S. Kaplan, 2009),

The balanced scorecard method is applied in various research projects to evaluate their performance and measure firms whose intangible assets add value. (Sven C. Voepel, 2006), The Balanced Scorecard made radical changes to the underlying assumptions by moving to the management system's more systemic framework. (Maris Martinsons,1999), A balanced scorecard system based on an integrative management system to develop a competitive strategy to achieve the firm's long-term goal and vision also align the different functions (Kalpan, R. s. Wisner,2009). The balanced scorecard (BSC) assisted the employers. It focused on four dimensions to understand the nature of cross-functional relationships, which lead to improvement, problem-solving, and decision-making to develop and grow firms. (Kalpan - Norton 1992, P.P. 71-79) balanced scorecard emerged as a decision tool, the strategic management tool, that supported corporate performance through implementing the financial accounting data with goal-related measures such as firm perspectives such as customer perspectives, the internal business processes, and made learning and growth development (Donald Chand, 2005). The balanced scorecard method made an appropriate tool for evaluating the ERP system. This literature review generates different implications of a balanced scorecard based on a framework structure for assessing the strategic contribution of the ERP system (Hasan,2017). The balanced scorecard is the regaining of the practices based on relevance in different industries, primarily focused on empirical research based on evidence based on data. (Sindumathi, 2022), pulses productions have been produced and cultivated to serve the essential part of the diet, which consists of protein nutrient content that emphasizes the utilization of pulses in food.

Section-II

III. Research Methodology

The research method consists of an empirical study adopting the practical approach conducted in three states of India, Uttar Pradesh, Rajasthan, and Delhi/NCR region of (25) pulse processing firms. The research method analyzes the sustainability performance of pulses firms' value chains. It determines the frequency, value, and significance level of all risk factors with ANOVA techniques also adopted the balancing the scorecard method with their sustainability factors.

The BSC was initially formulated and presented as a multi-dimensional performance measurement system (Kaplan & Norton, 1992). Its primary purpose was to provide managers with more and better Information for strategic decision-making. The original version of the BSC focused primarily on integrating financial and non-financial performance measures. K.N. called this a dashboard of different performance measures grouped in four perspectives.

a. Objectives: To assess the sustainability performance factors of the pulse value chain of all pulse processing firms with the Balanced Scorecard Method (SCORE)

IV. Result and Discussion

The data was collected from 25 pulses processing firms in Uttar Pradesh, Rajasthan, and India's Delhi / NCR regions. The research analyzed the selected pulse processing firms and adopted the sustainability practices and balanced scored card method to find the level of significance of risk and frequency of risk factors and measures the sustainability performance index of

sustainability factors. The ANOVA tables show that the different aspects of sustainability generate the frequency value and determine the level of significance of risk to promote the high range of pulse-based commodities and generate information that all pulse firms are adopted the sustainability paradigm. The table is prepared using a questionnaire with a pie chart showing the firm's sustainable strategies and business practices.

1.1. Table. Illustrates % of the on-time deliveries of pulse value chain performance of all pulse processing firms.

% on-time deliveries

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low	8	32.0	32.0	32.0
	Medium	7	28.0	28.0	60.0
	High	4	16.0	16.0	76.0
	Very High	6	24.0	24.0	100.0
	Total	25	100.0	100.0	

The above table shows that 8 out of 25 firms' deliveries on time are very low, seven firms' deliveries on time are medium, four firms are high, and six firms are very high 25.

1.2. The table illustrates % the very late deliveries of pulse value chain performance of all pulse processing firms.

% of very late deliveries

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High	12	48.0	48.0	48.0
	Medium	13	52.0	52.0	100.0
	Total	25	100.0	100.0	

The above table shows that 12 out of 25 firms have a high number of deliveries, and 13 firms have a medium number of late deliveries.

1.3. The table illustrates % the on-time shipments of pulse value chain performance management of all pulse processing firms.

% on-time shipments

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Medium	10	40.0	40.0	40.0
	High	7	28.0	28.0	68.0
	Very High	8	32.0	32.0	100.0
	Total	25	100.0	100.0	

The above table shows that 10 out of 25 firms had medium shipments on time, seven firms highly loaded on time, and eight had very high shipments on time.

2. Response /time

1.4. Table. Illustrates % the proportion of orders that can be filled immediately (Fill rates %) of pulse value chain performance management of all pulse processing firms.

% (proportion) of orders that can be filled immediately (fill rates %)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Medium	11	44.0	44.0	44.0
	High	7	28.0	28.0	72.0
	Very High	7	28.0	28.0	100.0
	Total	25	100.0	100.0	

The above table shows that 11 firms out of 25 firms of medium orders immediately, 7 of high orders can be served, and seven firms of very high demand can be filled immediately.

1.5. Table. Illustrates the Cycle time (time required to begin one complete process) of pulse value chain performance management of all pulse processing firms.

Cycle time (time required to begin one complete process)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Long	10	40.0	40.0	40.0
	Medium	8	32.0	32.0	72.0
	Short	7	28.0	28.0	100.0
	Total	25	100.0	100.0	

The above table shows that ten firms out of 25 firms of the long time required to begin one complete process, eight firms have the medium necessary time to start one entire process, and seven firms have a short time needed to form one whole cycle.

V. Hypothesis

Table 11.10 The given table illustrates measuring the sustainability performance of the pulse value chain through mean, standard deviation, frequency, group means, and level of significance and adoption of the ANOVA technique to find the level of importance of various factors for the pulse value chain.

H01: Sustainability measures have no significant impact on the pulse value chain of pulses firms.

H02: Sustainability measures significantly impact the pulse value chain of pulses firms.

Anova- One way

The F-test procedure was applied to test the significant difference in the mean values of pulses firms between supply chain performances. The null hypothesis was tested at a 0.0 5% significance level.

Table 1.1 Analysis of F-test (Anova)

1.6 Table illustrates the ANOVA techniques of sustainability measure factors of the pulse value chain. It describes the Sum of the square, D.F., mean Square, Frequency, and the significance level of all sustainability factors.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
DELIVERY	Between Groups	.881	2	.440	1.722	.202
	Within Groups	5.626	22	.256		
	Total	6.507	24			
Responsiveness	Between Groups	.796	2	.398	2.878	.078
	Within Groups	3.044	22	.138		
	Total	3.840	24			
Cost	Between Groups	.065	2	.032	.264	.770
	Within Groups	2.695	22	.123		
	Total	2.760	24			
Resource	Between Groups	.071	2	.035	.084	.920
	Within Groups	9.245	22	.420		
	Total	9.316	24			
Flexibility	Between Groups	.063	2	.031	.121	.887
	Within Groups	5.727	22	.260		
	Total	5.790	24			
Quality	Between Groups	.380	2	.190	.878	.430
	Within Groups	4.765	22	.217		
	Total	5.146	24			
Innovative	Between Groups	.507	2	.253	.793	.465
	Within Groups	7.033	22	.320		
	Total	7.540	24			

*. The mean difference is significant at the 0.05 level.

VI. Interpretation from Table 1.1

The sustainability factors, such as delivery, generate the frequency F -value at 1.722 was significant at a level of .202 at the standard level of Significance 0.05, which may imply the delivery factor may not impact the pulse value chain and the pulses firms since the H01:There is no significant impact of sustainability measures on the pulse value chain. Similarly, the sustainability factors are Responsiveness generated the F value at 2.878 was not practical at the level of 0.78 at the standard level of significance 0.05 level, which may imply the responsive factor may not impact the pulse value chain and pulses firms since H01: There is

no significant impact of sustainability measures on the pulse value chain and pulses forms. Similarly, the Cost factor generated the F value at .264 of all costs of all processing firms was not significant at .770 at the level of significance at 0.05, which may imply the cost factor which may not impact the pulse value chain since H01 means There is no significant impact on sustainability measures on the pulse value chain. Resources factors generate F value at 0.084 was necessary at the level was .920 at 0.05, the level of significance, which may imply resources may not impact the pulse value chain of the pulses firms, H01: there is no significant impact of sustainability measures on the pulse value chain. Flexibility factors generate the frequency value of F value at .121 was not effective at the level was .887 at the standard level of significance is 0.05, which implies that Flexibility may not impact the pulse value chain and the pulses firms, H01: there is no significant impact of sustainability measures on the pulse value chain and their pulses firms. Quality factors generate the F value at .878 of all quality was not necessary was .430 at the standard level of substantial is 0.05 level of significance, which may imply the quality may not impact the Pulse value chain and pulses firms, H01: there is no significant impact of sustainability measures on the pulse value chain. Innovative factors generate the frequency F value at .793 was significant at the level of .465 at the standard significance level of 0.05, which may imply that the innovation may not impact the pulse value chain, H01. Sustainability measures have no significant impact on the pulse value chain of all pulses firms.

Section-III

VII. Limitation of studies

The case study adopted the balanced score method to measure the performance of the pulses value chain of all pulses processing firms, and based on four perspectives learning, growth, financial, customer, and internal perspectives, the balanced scorecard method made significant factors in providing sustainability measures and techniques to all pulses processing firms. The major limitation of pulses processing is related to the sustainability paradigm least adopted in pulses firms due to lack of funds, lack of resources, less fragmentation of the pulse market, and lack of supply chain distribution network, which made a direct impact on the financial status of firms and suffered from high loss, also hamper the value addition practices of pulses firms. The other major challenge of adopting a balanced card method is to measure the sustainability performance of firms. The survey found that the maximum number of pulses firms follow the traditional way of pulse processing, with old equipment and machine that reduces the efficiency of pulse processing and causes a high rate of machine breakdown that suffer the production process of pulses firms. Indian pulses firms are highly suffering from biotic and non-biotic factors that made negatively impact the work performance of firms, that causes poor pulses production, machine breakage, and lack of innovation and technology, which generates the decline of pulses processing firms in selected locations due to the non-availability of the pulses market, high fluctuation in pulses prices and made the absence of a supply chain distribution system that causes maximum pulses firms are in decline phases. The government is least concerned about sustainability practices in pulses firms, which is one of the major causes of the high loss and decline of pulses processing firms. The unfavorable climate is becoming a

challenge to all pulses firms. Therefore, pulses firms must adopt suitable measures to procure pulses and develop to access and control the usage of resources and provide the limited availability of pesticides to prevent biotic and abiotic diseases, which causes the low production of pulse legumes.

VIII. Conclusion

The result generates information related to the ANOVA method implemented to calculate the frequency of risk factors and significance level of all risks that may not impact the pulses value chain and their pulses firms. The expected outcomes generate the result that shows the sustainability factors and the measure sustainability performance that does not affect the pulses firms, also determine how many firms adopted the balanced score method and sustainability factors. The maximum number of firms still need to embrace sustainability factors, which shows that all pulses firms have urgent requirements to adopt sustainability measures and technology. The traditional pulses processing practices in Indian pulses firms cause a high loss of economic gains. Therefore pulses firms must adopt risk mitigation strategies to avoid loss and failure of all risk factors. The sustainability paradigm of a balanced scorecard increases the pulse firm's life and controls the usage of all natural resources. The data analysis shows that the sustainability factors in terms of the significance level are higher, which shows that the scorecard factors may not impact India's pulses value chain and pulses firms. The government should introduce an innovative pulses program to improve the condition of all pulses processing firms and adopt suitable measurement techniques. The data analysis generates the null hypothesis that the mean should be defined at the individual level, and the risk mitigation strategy is the collective performance of removing all risks. Therefore, total pulses firms are in decline stages that require government support, innovative pulses processing techniques, and relevant sustainability factors such as measures and processes to generate improved pulses processing and increase the pulses production capacity, improving the yield per hectare. The case study develops the adoption of sustainability practices with a balanced scorecard method, which creates long-term strategies to achieve future growth and prospect of firms and increases the pulses' production capacity.

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