The Paradox of Organic and Sustainable Certifications in Nepalese Orthodox Tea: Do Producers Truly Benefit?

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Abstract. Organic and sustainable certifications have become critical for tea producers seeking access to premium international markets. However, their economic implications in Nepal's orthodox tea industry continue to be a subject of debate. Organic and sustainable certifications such as United States Department of Agriculture (USDA) Organic and Rainforest Alliance (RA) are key market access tools but their economic viability is uncertain due to high certification and compliance costs. This paper explores whether Nepalese orthodox tea producers truly gain from the certifications or if the financial burden outweighs the advantages. This study examines the economic impact of certification through a set of economic indicators, including production costs, costs of certification, prices, profit margins, and benefit-cost ratios. A census survey of 69 tea companies in Ilam, Nepal was conducted, employing structured interviews. Using a combination of descriptive and inferential statistics, including one-way ANOVA, a comparison was made among 3 groups, organic, RA and uncertified producers. The findings indicate that while certification provides higher per-unit prices, net financial benefits are low due to high certification costs. Benefit-cost ratio differences between certified and non-certified producers suggest that certification may not necessarily result in higher profitability. The study concludes that unless certification costs are reduced or external financing is provided, small and medium-scale producers will be unable to sustain certification. These findings contribute to the ongoing discourse on the economics of certification in the tea sector.

Keywords: Cost-benefit Analysis, Economic Impact, Nepal tea, Organic certification, Sustainable Certification

1 Introduction

The tea industry contributes to the Nepalese economy by generating a rural employment and fetching export revenues. Orthodox tea, in particular, has gained international popularity because of its unique taste and organic farming method (Wasti et. al, 2020). However, the sector has several challenges such as price volatility, high cost of production, and increased demand for quality assurance. Certifications such as organic and

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other certifications based on sustainable standards has become crucial to access the international market to fetch premium prices. However, it contributes significantly towards the financial and administrative burdens for producers.

In recent years, the role of organic and sustainable certifications in global agricultural trade has been widely debated. Existing literature on certification impacts in agriculture presents mixed findings. Some studies suggest that Fair Trade and organic certification leads to higher prices and better market access (Blackman & Rivera, 2011), while others argue that the benefits are balanced against high certification fees (Sexton, 2013). In Nepalese tea, less research has been conducted, and the net economic benefit of certification remain unclear. Earlier research on smallholder tea growers puts emphasis on how certification stimulates sustainability (Mishra & Kattel, 2021), although economic viability relies on production quantity as well as the forces in the market.

One significant and somewhat overlooked issue relates to the paradox of certification in Nepal's orthodox tea industry. While certified producers often receive higher prices per unit, they also face higher production costs resulting from strict organic practices, certification charges, and bureaucratic hurdles. This paradox also asks if the premium prices actually cover the additional costs or if they inadvertently marginalize small-scale farmers who lack the financial capital to sustain certification schemes. Furthermore, the global tea market is highly competitive, and certifications—despite being a market-entry requirement—might not always guarantee fair financial returns, leaving producers in a precarious economic position.

Against these reservations, this study seeks to empirically assess whether organic and sustainable certifications provide tangible economic returns or else represent another barrier in an already saturated global tea market. Through analysis of key economic indicators—i.e., price, sales revenue, production costs, certification costs, profit margins, and benefit-cost (BC) ratios—this study provides evidence-based findings on the real effects of certification for Nepalese orthodox tea producers. By addressing the economic viability of certification, the study contributes valuable insights for producers, policymakers, and development stakeholders working to promote sustainable tea trade.

2 Materials and Methods

2.1 Study Area and Sampling

The study was conducted in Ilam district of Nepal, selected purposively, as it accounts for approximately 97.87% of the total orthodox tea production in the country (Ministry of Agriculture and Livestock Development, 2024). The research conducted an intensive survey of all 69 orthodox tea-producing enterprises based in Ilam. This census method eradicates sampling bias and offers a true representation of the economic effects of certification on Nepalese orthodox tea production.

2.2 Assessed Certification Schemes

Two certification programs were purposively selected for assessment in this study—the United States Department of Agriculture (USDA) Organic Certification and Rainforest Alliance (RA) Certification, as they are commonly followed certification schemes in Nepalese tea industry. While USDA Organic is the standard for organic production and is widely known in global organic markets (Guilabert and Wood, 2012), RA Certification represents sustainable standards focusing on environmental conservation, ethical labor, and ecologically balanced agriculture practices (Maina et al., 2012).

These schemes were purposively selected because they are widely adopted by Nepalese orthodox tea producers. Moreover, the USDA Organic certification is one of the most sought organic standards by foreign buyers (Forbes and Balasubramanian, 2019), and RA certification is also becoming a prerequisite for accessing sustainability-focused European and North American markets (Gather and Wollni, 2022). To distinguish between the economic effects of these two certification schemes, certified producers were categorized into Organic-certified and RA-certified groups during data analysis.

2.3 Data Collection

Primary data were collected via structured interviews with the managers of the orthodox tea producing industries operated in the study area - both certified and uncertified. The prepared questionnaire focused on quantitative data, such as production level, pricing, production costs – including labor, inputs, and processing – certification charges and other associated costs. Moreover, qualitative data regarding the respondents' perceptions of the challenges and benefits of certification were also collected.

2.4 Data Analysis

Data collected were examined with the application of both descriptive and inferential statistical techniques. Descriptive statistics such as the mean, standard deviation, and confidence intervals were employed to present summary economic indicators across three categories: Organic certified, RA certified and Uncertified.

In order to ascertain the statistical significance of variances in economic performance among the certification groups, one-way ANOVA was conducted. The economic indicators tested for comparison were production levels, cost of production, cost of certification, price per unit, return on sales, gross and net profit, net margin, and the Benefit-Cost ratio.

Cost of Production. Following formula was applied in the calculation of cost of certification:

$$Cost\ of\ Production = Total\ Variable\ Cost + Total\ Fixed\ Cost \quad (1)$$

Whereas:

Total variable costs are the costs associated with green leaves, labour, energy, packaging materials, transportations and other costs
Total fixed costs are the costs associated with salary, communication, rent, maintenance, bank interest and charges, insurance, depreciation, audit, marketing and other costs

Benefit-Cost ratio. Following formula was applied in the calculation of Benefit-Cost ratio:

$$Benefit\ Cost\ ratio = Total\ Benefits / Total\ Returns \quad (2)$$

Whereas:
Total Benefits = Total revenue from sales of tea
Total Returns = Cost of production including certification costs

3 Results and Discussion

3.1 Organic and Sustainable Certification Practices in Agriculture Sector

In agriculture, certification practices seek to guarantee that farming techniques meet particular criteria pertaining to sustainability, environmental protection, and social responsibility (Qiao et al., 2015). Particularly in tea producing countries, organic and sustainable certifications serve as a tool for market differentiation, protect the environment, and promote socioeconomic development (Munasinghe et al., 2021). Popular certifications in tea include: i) Organic (e.g., USDA, EU Organic, and JAS) – focused on eliminating synthetic inputs (IFOAM-Organics International, 2019); ii) Fairtrade International – guaranteeing fair wages and ethical labor practices (World Fair Trade Organization, 2023); and iii) Rainforest Alliance – fostering biodiversity preservation (Rainforest Alliance, 2020).

Similarly, there are other certification schemes like Ethical Tea Partnership, Trust Tea, Halal, and so on which addresses food safety, environmental conservation, worker welfare, and other regional and sectarian issues. These certifications serve to establish consumer confidence by guaranteeing product quality and ethical behavior (Qiao et al., 2015). Moreover, the primary purpose of the certification schemes is to enable producers to meet growing consumer demand for sustainably produced goods, access premium markets, and command better pricing (Méndez et al., 2010). These certifications are prominent in tea-producing nations like India, Sri Lanka, Kenya, Vietnam and Nepal due to the global demand for ethical and high-quality tea products (Bermúdez et al., 2024).

3.2 Current Status of Certification in Nepalese Orthodox Tea

Adoption of organic and sustainable certification in Nepalese orthodox tea industry is still limited. Out of 69 tea producers surveyed in Ilam, 16 industries were organic certified, and 10 industries were RA certified. The remaining 43 industries were not under any certification.

Although fewer producers are certified, the amount of production volume tells a different story as illustrated in Fig 1. The organic-certified producers collectively produced 1,197,100 kg of tea, whereas the RA-certified producers produced a much larger quantity at 1,808,500 kg and the uncertified producers, who constituted the largest number, produced 4,356,726kg tea.

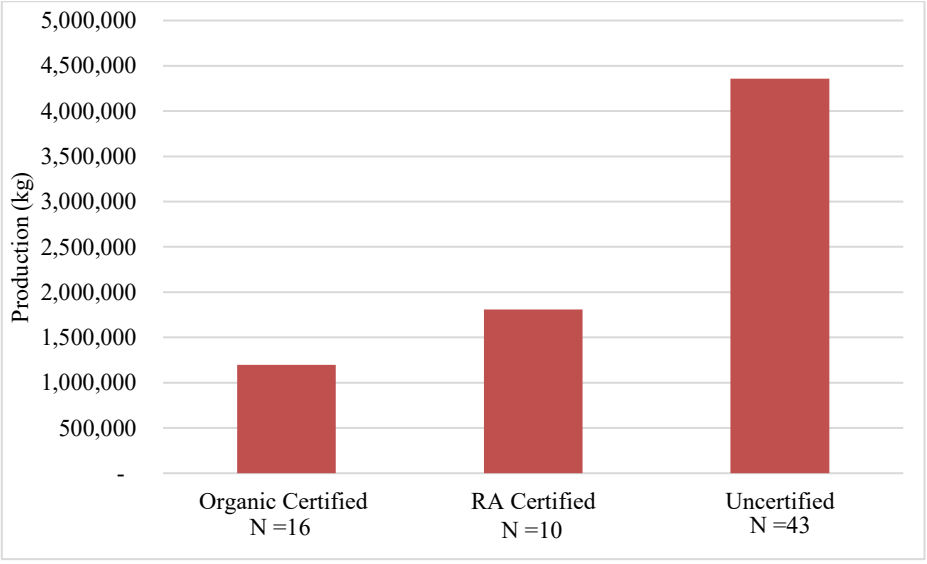

Fig 1. Status of Certification in Nepalese Orthodox Tea

The findings show that although the certification programs are implemented to open market access and fetch premium prices, they are not uniformly adopted across the industry. The adoption of certification depends on various factors such as production level, financial capacity, and access to export markets. The impact of these differences in the adoption of certification shall be examined closely in the benefit-cost analysis of certified and uncertified tea producers.

3.3 Benefits of Certification

Certification provides Nepalese orthodox tea producers with tangible market advantages, above all in terms of access to premium international markets. As shown in Fig 2, 80.8% of certified factories sought to get certified primarily to reach foreign markets, and 69.2% cited premium price opportunities as a primary reason. In addition,

53.8% of the respondents wanted to obtain certification in order to meet buyer requirement, which reflects the growing importance of sustainability and quality assurance in export trade.

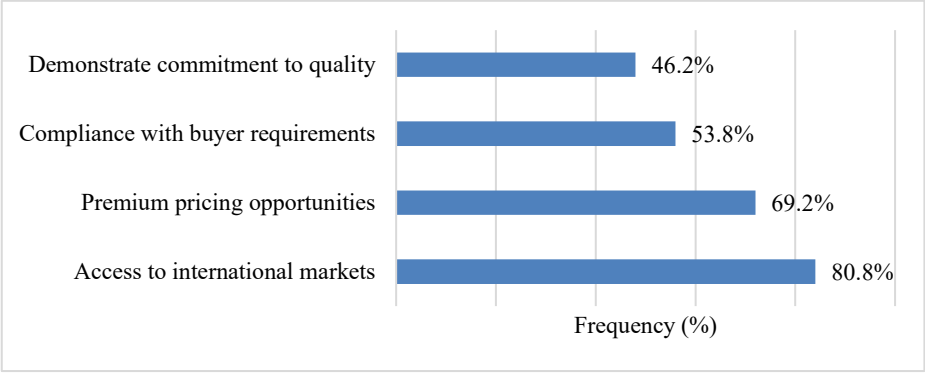

Fig 2. Perceived benefit of certification

3.4 Challenges of Certification

Despite its advantages, certification is still a costly and complex process for Nepalese tea producers. Fig 3 shows that 80.8% of the certified producers mentioned the high cost of certification and its renewal as the biggest challenge. Additionally, 50% of them experienced complexity in complying due to frequent audits and strict documentation. The cost is also elevated by the lack of external funding, as perceived by 53.8% of the respondents.

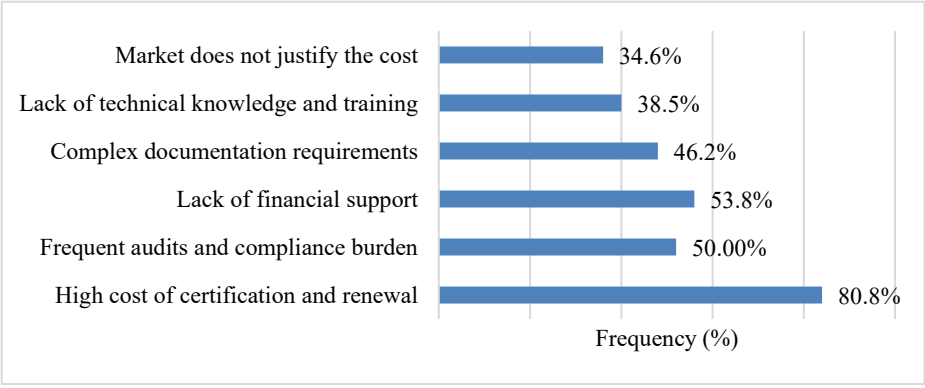

Fig 3. Perceived challenges of certification

Moreover, Fig 4 demonstrates the sources of financing contributing to the cost of certification, which indicates that certification costs were predominantly covered by factory's own revenue (45.71%) with minimal support from donor agencies (20%) or the government (14.29%).

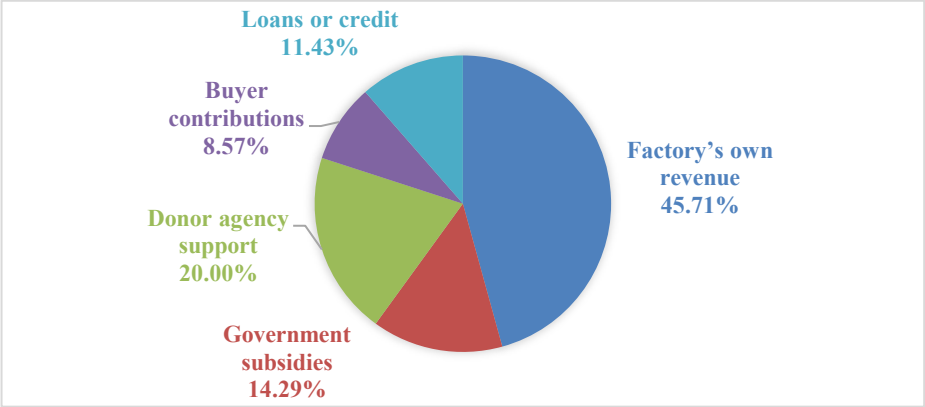

Fig 4. Financing sources for certification cost

Furthermore, the survey shows that economic benefits of certification do not always justify its costs. Despite certified tea generally commanding a better price, 46% of the certified producers reported that this price premium was not stable and varied according to markets. Further, 31% also reported instances where certified tea was sold at similar or even lower prices than non-certified tea, contradicting the expectation that certification consistently ensures higher revenue.

This unreliability along with high compliance cost has led some factories to abandon certification. In fact, the survey data shows that 30.8% of the earlier certified factories withdrew because of unaffordable costs and lack of sufficient price premium to justify the certification costs. All these factors contribute to the sustainability of sustaining certification over the long term as a concern, particularly for small-scale producers.

3.5 Cost of Certification

The cost of obtaining organic and sustainable certification varies significantly across the certification schemes as presented in Table 1. Overall certification expense per producer was higher for organically certified producers ($11,034.7) compared to RA-certified producers ($7,815.2). A major contributor to this disparity is the field inspection cost, which is done by the international inspector, costing $6,226.6 for organic but significantly less at $2,783.2 for RA. Similarly, processing and application fees were higher for RA certification ($1,560.4) compared to organic certification ($1,242.6).

Table 1. Cost of certification of Organic and RA (in USD)

Particulars	Organic certified (N=16)	RA Certified (N=10)
Application and processing charges	1,242.6	1,560.4
Field inspection cost	6,226.6	2,783.2
ICS Implementation cost	1,682.7	1,967.9
Training	519.7	378.5

Materials support	461.9	242.2
Stationary	519.7	21.4
Other costs	381.5	656.0
Total cost of certification	11,034.7	7,815.2
Production of made tea (kg)	74,819	180,850
Cost of certification (USD per kg)	0.15	0.04

Source: Field Survey (2025)

When estimated on a cost per kilogram of tea produced basis, the cost was far higher for organic certification at 15 cents per kg, whereas for RA certification, it was only 4 cents kg. This wide disparity indicates that organic certification has a greater cost impact on producers, making it a less attractive alternative, especially for small- and medium-scale tea businesses. Compliance costs, which are high, particularly those related to field inspections and the implementation of an Internal Control System, can be a limiting factor to producers who seek organic certification.

3.6 Cost of Production

The production cost varies significantly among certified and uncertified tea producers, demonstrating the economic costs of certification. The total cost of production, inclusive of the certification cost, was $305,428.26 for organic-certified producers, $541,620.89 for RA-certified producers, and $247,451.75 for uncertified producers as presented in Table 1. While RA certification was relatively cheaper than organic certification, it also had an added expense of $8,248.03 in total costs. The cost of production per kilogram was highest for organic-certified producers at $4.08/kg, followed by RA-certified producers ($2.99/kg) and uncertified producers ($2.44/kg). Certification costs imposed a substantial additional burden, especially on organic-certified producers.

Table 1. Cost of production (in USD)

	Organic Certified (N=16)	**RA Certified (N=10)**	**Uncertified (N=43)**
Production (kg)	74,819	180,850	101,319
Cost of Certification	$11,034.67	$8,248.03	-
Cost of Production	$294,393.59	$533,372.86	$247,451.75
Cost of Production including certification cost	$305,428.26	$541,620.89	$247,451.75
Cost of Certification (per kg)	$0.15	$0.05	-
Cost of Production including certification (per kg)	$4.08	$2.99	$2.44

Source: Field Survey (2025)

3.7 Sales Revenue and Price Differences

Organic-certified producers reported an average sales revenue of $421,278 while RA-certified producers earned far greater revenues of $726,138. Uncertified producers earned the lowest mean revenue of $309,402 though their revenue varied widely as presented in Table 2. The price per kilogram of tea was highest for Organic-certified tea ($6.01/kg), considerably exceeding RA-certified ($4.05/kg) and Uncertified tea ($3.64/kg). The greater revenue achieved by RA-certified producers can be due to their greater production levels and advantages in market extent, whereas Organic-certified producers can have premium prices but production limitations which does not necessarily translate into higher profits.

Table 2. Sales revenue and price differences (in USD)

	Organic Certified (N=16)	RA Certified (N=10)	Uncertified (N=43)
Production (kg)	74,819	180,850	101,319
Return on Sales	$421,278	$726,138	$309,402
Price per kg	$6.01	$4.05	$3.64

Source: Field Survey (2025)

3.8 Profitability Analysis

Although Organic-certified tea received the highest price per kg ($6.01), net profit per kg presents a contrasting picture, as presented in Table 3. Organic-certified and RA certified producers earned $1.55 and $1.02 per kg respectively, Uncertified tea producers earned $0.61 per kg. The profit margin, calculated as net profit as a percentage of sales revenue, shows a similar pattern: 27.50% for Organic-certified, 25.41% for RA-certified, and 20.02% for Uncertified tea. This means that Organic certification gives a slightly higher return in terms of sales, despite its higher production costs.

Table 3. Profitability and Benefit-Cost Analysis

	Organic Certified (N=16)	RA Certified (N=10)	Uncertified (N=43)
Production (kg)	74,819	180,850	101,319
Price per kg	$6.01	$4.05	$3.64
Return on Sales	$421,277.64	$726,138.46	$309,401.80
Gross Profit	$119,064.71	$192,756.80	$65,555.56
Net Profit	$115,849.38	$184,517.57	$61,950.05
Net Profit per kg	$1.55	$1.02	$0.61
Profit Margin (%)	27.50	25.41	20.02
BC ratio	1.38	1.34	1.25

Source: Field Survey (2025)

Moreover, the BC ratio was estimated to be 1.38 for Organic-certified producers, 1.34 for RA-certified producers, and 1.25 for Uncertified producers. This result assures that all groups are indeed profitable (BC > 1); however, the minimal differences in BC ratios indicate that certification will not yield a significant economic benefit compared to non-certification. The high costs of certification seem to neutralize the gains from premium prices. Thus, while certification eases market entry and enables price premiums, the direct financial gains are small, raising questions about the justification of the costs of certification.

3.9 Statistical Analysis of Cost and Profitability Differences

In order to compare the economic impacts of certification further, a one-way ANOVA was run to compare differences among key financial indicators of Organic-certified, RA-certified, and Uncertified Nepalese tea producers which is presented in Table 4. Details are presented in Annex 1 and Annex 2.

Table 4. ANOVA results for key indicators across Organic, RA and Uncertified tea producers

Variable	df	Mean Square	F-value	Sig.
Production	2	36,244,912,841.043	1.215	0.303
Cost of Certification	2	828,035,587.751	150.373	0.000***
Cost of Production	2	340,154,000,812.520	2.098	0.131
Price	2	33.104	67.777	0.000***
Sales Revenue	2	711,300,197,902.585	2.660	0.077
Gross Profit	2	70,987,336,171.274	4.954	0.010**
Net Profit	2	66,760,787,760.613	5.045	0.009**
Profit Margin	2	181.594	3.359	0.041*
BC Ratio	2	0.027	1.323	0.273

Note: *, ** and *** indicate significance at 5%, 1%, and 0.1% levels respectively.

Cost of Production and Certification. The findings show that no difference exists in the overall level of production across the three groups ($F = 1.215$, $p = 0.303$). This implies that the certification status does not directly influence the general level of production, and that certified and non-certified producers produce almost at same levels. There was, however, a notable difference in the certification cost between the groups ($F = 150.373$, $p < 0.001$), which validates that certification is a considerable cost imposition on producers, with organic certification being the most expensive.

Price and Sales Revenue. When looking at the price per kg, the difference was statistically significant ($F=67.777$, $p<0.001$), with the most expensive being organic-certified tea. This proves that certification does indeed grant the premium prices in international markets. This supports the premise that certification enables premium pricing in

the global market. However, there was no significant difference among groups with respect to sales revenue ($F = 2.660$, $p = 0.077$). This indicates that the certified producers may have access to premium markets but the overall sales and revenues aren't significantly different.

Profit Margin and Profitability. Nonetheless, although there were substantial differences between groups for both gross profit ($F = 4.954$, $p = 0.010$) and net profit ($F = 5.045$, $p = 0.009$), profit margins ($F = 3.359$, $p = 0.041$) were only of a marginal level of statistical significance. In other words, although certified producers can command more revenue, the expensive costs of certification and production trade off the overall net financial gains.

Interestingly, the BC ratio also showed no differences ($F = 1.323$, $p = 0.273$), suggesting that changes in cost and price do not necessarily lead to a better overall rate of return on investment because of certification. The result supports the fact that certification might not be as financially advantageous as perceived and that producers need to carefully assess the costs in relation to expected benefits before committing to certification programs.

3.10 The Certification Paradox

The findings of this study point to a paradox in Nepal's certified orthodox tea industry: although certifications open up premium markets, operational and structural issues trade off their financial returns. This reveals three key conflicts that needs to be addressed:

Market Access vs. Trade Barriers. While organic and sustainability certifications are intended to expand market access, they create additional barriers to trade. Producers that are certified gain entry into high-value international markets where organic and sustainably produced tea is sought after. However, these markets have rigorous import controls, traceability requirements, and ongoing compliance costs that render it difficult for small and medium-scale producers to compete effectively. Therefore, although certification theoretically opens markets, in practice, it often reinforces existing trade barriers rather than removing them.

Market Premiums vs. Cost Burden. One of the most important motivations for certification is the potential for premium pricing. Certified Nepalese orthodox tea commands higher prices in the international markets compared to non-certified tea. However, the economic benefits are offset by the high cost of certification. For the majority of producers, the price premiums are too small to offset the costs, and the net benefit is minimal. Small producers cannot meet the requirements of certification without external financial or technical support. This raises questions about whether certification is a viable long-term investment or merely another cost with limited financial returns.

Global Demand vs. Local Constraints. The global tea market increasingly demands certified organic and sustainably produced tea, amid consumer pressure for ethically produced goods. Nepalese orthodox tea producers are not in a situation to capitalize such demand, however, since they are held back by structural constraints. Limited access to affordable certification services, unstable production levels due to climatic factors, and weak value-chain infrastructure constrain its competitiveness. Without stronger institutional support and efficiency-enhancing investments, Nepalese tea producers remain constrained by rising global demand and persistent local bottlenecks.

4 Conclusions

To sum up, the study reveals that while organic and sustainable certifications offer distinct advantages with respect to accessing premium markets and pricing, they also present economic trade-offs for producers because of the exorbitant cost associated with certification and compliance requirements. The major financial burden of organic certification makes it less attractive to small and medium-scale producers. Statistical analysis confirms that certification has a significant effect on prices. However, it does not make much contribution to increased sales revenue or profitability.

Furthermore, the minimal variations in benefit-cost ratios between certified and non-certified producers show that certification does not really provide value for money. Some producers are withdrawing from the certification because of the high costs and compliance burden, raising their sustainability issues. This suggests that while certification may facilitate marketing, its financial viability depends upon structural reforms and external support. Making certification more economically feasible for Nepalese tea producers will require addressing the cost barriers, improving the existing supply chain structures, and increasing production efficiency.

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Author contributions

G Luitel - planning of studies, data collection, writing of the initial draft and revision
H K Panta - Conceptualization of research and interpretation of results
K C Dahal - Securing of funds
T P Bhusal - Feedback revision of draft
KP Timsina - Statistical analysis of data
All authors reviewed the results and approved the final version of the manuscript.

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ANNEX 1

Descriptives for Key Economic Indicators Across Organic Certified, RA Certified and Uncertified

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Production	Organic	16	74818.75	78487.147	19621.787	32995.90	116641.60	10000	312000
	RA	10	180850.00	95879.569	30319.782	112261.89	249438.11	95000	385000
	Uncertified	43	101319.21	206701.327	31521.657	37705.93	164932.49	460	1190000
	Total	69	106700.38	173294.113	20862.160	65070.59	148330.17	460	1190000
Cost of certification	Organic	16	11034.6673	4659.46719	1164.86680	8551.8125	13517.5221	3111.83	20149.14
	RA	10	8248.0308	2048.61693	647.82955	6782.5385	9713.5230	4612.08	10715.22
	Uncertified	43	.0000	.00000	.00000	.0000	.0000	.00	.00
	Total	69	3754.1302	5449.63865	656.05940	2444.9841	5063.2764	.00	20149.14
Cost of production	Organic	16	302212.9322	301505.86558	75376.46640	141551.7972	462874.0673	55387.75	1.24E+6
	RA	10	533381.6569	268476.75408	84899.80417	341324.9568	725438.3570	272259.71	1.17E+6
	Uncertified	43	243846.2395	454827.29202	69360.51178	103871.0598	383821.4193	1604.23	2.49E+6
	Total	69	299342.1998	409107.04531	49250.70065	201063.9568	397620.4428	1604.23	2.49E+6
Price per kg	Organic	16	6.0108	.88271	.22068	5.5404	6.4812	5.05	8.56
	RA	10	4.0474	.30814	.09744	3.8270	4.2679	3.46	4.34
	Uncertified	43	3.6364	.68477	.10443	3.4256	3.8471	2.40	5.75
	Total	69	4.2465	1.20321	.14485	3.9575	4.5356	2.40	8.56
Return on Sales	Organic	16	421277.6442	412761.02046	103190.25511	201332.8219	641222.4666	72153.85	1.68E+6
	RA	10	726138.4615	385551.42474	121922.06573	450331.5872	1001945.3358	372307.69	1.66E+6
	Uncertified	43	309401.8032	572350.22196	87282.59058	133258.4042	485545.2022	2030.77	3.15E+6
	Total	69	395740.6444	529630.62909	63760.03510	268509.4753	522971.8135	2030.77	3.15E+6
Gross profit	Organic	16	119064.7120	112178.21862	28044.55466	59289.1587	178840.2653	16766.09	445187.40
	RA	10	192756.8046	120032.49285	37957.60706	106890.7319	278622.8773	85808.90	482007.49
	Uncertified	43	65555.5637	122211.57996	18637.09122	27944.3909	103166.7365	426.54	658692.31
	Total	69	96398.4446	126473.80042	15225.65636	66016.1204	126780.7688	426.54	658692.31
Net profit	Organic	16	115849.3822	109391.94090	27347.98523	57558.5315	174140.2329	16446.86	434041.25
	RA	10	184517.5738	115603.15964	36556.92892	101820.0552	267215.0924	79731.98	463392.10
	Uncertified	43	61950.0535	116859.50300	17820.90714	25986.0069	97914.1001	404.08	625000.00
	Total	69	92211.8573	121682.77017	14648.88409	62980.4642	121443.2504	404.08	625000.00
Profit margin	Organic	16	27.4903	3.14143	.78536	25.8164	29.1643	21.64	32.83
	RA	10	24.8237	3.99311	1.26273	21.9672	27.6802	15.15	27.98
	Uncertified	43	22.0246	8.83312	1.34704	19.3062	24.7430	4.58	44.52
	Total	69	23.6977	7.60392	.91540	21.8710	25.5243	4.58	44.52
BC ratio	Organic	16	1.3964	.06174	.01543	1.3635	1.4293	1.29	1.50
	RA	10	1.3536	.06739	.02131	1.3054	1.4019	1.19	1.41
	Uncertified	43	1.3280	.17406	.02654	1.2744	1.3816	1.06	1.83
	Total	69	1.3476	.14478	.01743	1.3128	1.3824	1.06	1.83

ANNEX 2

ANOVA Results for Key Economic Indicators Across Organic Certified, RA Certified and Uncertified

		Sum of Squares	df	Mean Square	F	Sig.
Production	Between Groups	72489825682.087	2	36244912841.043	1.215	.303
	Within Groups	1969607935464.116	66	29842544476.729		
	Total	2042097761146.203	68			
Cost of certification	Between Groups	1656071175.503	2	828035587.751	150.373	.000
	Within Groups	363430998.607	66	5506530.282		
	Total	2019502174.110	68			
Cost of production	Between Groups	680308001625.041	2	340154000812.520	2.098	.131
	Within Groups	10700755065954.768	66	162132652514.466		
	Total	11381063067579.809	68			
Price	Between Groups	66.208	2	33.104	67.777	.000
	Within Groups	32.236	66	.488		
	Total	98.445	68			
Return on Sales	Between Groups	1422600395805.171	2	711300197902.585	2.660	.077
	Within Groups	176519846265 13.188	66	267454312522.927		
	Total	19074585022318.360	68			
Gross profit	Between Groups	141974672342.548	2	70987336171.274	4.954	.010
	Within Groups	945727636686.627	66	14329206616.464		
	Total	1087702309029.175	68			
Net profit	Between Groups	133521575521.225	2	66760787760.613	5.045	.009
	Within Groups	873333790253.273	66	13232330155.353		
	Total	1006855365774.498	68			
Profit margin	Between Groups	363.188	2	181.594	3.359	.041
	Within Groups	3568.540	66	54.069		
	Total	3931.728	68			
BC ratio	Between Groups	.055	2	.027	1.323	.273
	Within Groups	1.370	66	.021		
	Total	1.425	68