

## RESEARCH ARTICLE

## NEPALESE TEA SECTOR: PRODUCTION, EXPORT, AND KEY ISSUES

Samip Raj Poudel\*, Surya Mani Dhungana

Agriculture and Forestry University, Rampur, Chitwan

\*Corresponding author email: [samiprajpoudel7@gmail.com](mailto:samiprajpoudel7@gmail.com)

This is an open access article distributed under the Creative Commons Attribution License CC BY 4.0, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

## ARTICLE DETAILS

## Article History:

Received 23 June 2024

Revised 15 July 2024

Accepted 19 August 2024

Available online 22 August 2024

## ABSTRACT

Tea, originating from northeast India and Southwest China, holds global appeal for its health benefits and cultural importance. Nepal's tea industry has been around since 1863 and boasts diverse varieties of tea, like Assam, Chinese, and Cambodian types, that grow in specific climatic conditions. Findings showed that the trend of production and export has been decreasing for a few years with production falling nearly by 20% in 2022/23. CTC tea was found to dominate the market segment. Similarly, Nepal faced a nearly 43% increase from 2010 to 2018 and a 17% decrease from 2018 to 2023 with periodic fluctuations in exports and imports in recent years. Despite its good quality, Nepal faces challenges in production, labour shortages, and climate change impacts affecting yield and quality. This study looks at Nepal's position in the global market and analyses production trends and export-import dynamics. Challenges persist in meeting the global standards, and regulatory hurdles, branding, and promoting Nepali tea. Nepal must address the production constraints, tackle climate change, enhance quality control measures, and streamline policies in production and export to unlock its full potential. It is recommended that Nepal capitalize on its tea heritage and emerge as a prominent player in the global tea industry, contributing to economic growth and livelihood enhancement by fostering a conducive environment and strengthening institutional support, fostering public-private partnerships, and utilizing technological advancement to revitalize the tea sector.

## KEYWORDS

Tea, Import, Export, Production trends, Climate Change

## 1. INTRODUCTION

Tea (*Camellia sinensis*) is a widely consumed beverage in the world and is believed to have originated from northeast India, Southwest China, and north Myanmar (Mukherjee et al., 2018). Flavonoids present in tea leaves help to reduce many cardiovascular diseases like coronary heart disease, hypertension, and Atherosclerosis; and even reduce the chance of many cancers like lung cancer, stomach cancer, and breast cancer (Shrestha et al., 2010; Suzuki et al., 2016). The COVID-19, pandemic placed tea as an immune system booster with strong antioxidant, antiviral, and anti-inflammatory properties (Khabour and Hassanein, 2022). Among the agricultural products, Nepali tea, has a significant presence in domestic consumption and export trade, because of its outstanding quality. The history of tea farming in Nepal extends up to 1863 AD when the then Prime Minister brought tea seeds from China as a gift. After that many tea states were established in the Eastern Nepal region. Since the establishment of the National Tea Development Corporation on October 9, 1966, the public and private sector Tea estates' production of Tea in Nepal increased which has been capable of substituting imports to a satisfactory extent (NTCDB, 2019).

Tea grows well in subtropical to tropical climates with ample rainfall and humidity, typically grown in highlands with good drainage. The ideal conditions for tea farming include a relative humidity above 70% during the growing season, with high humidity, fog, and dew promoting bud and leaf growth and maintaining an average annual temperature of 18–21 °C is crucial for tea's successful development and maturation (Wang et al., 2022). In Nepal, two varieties of tea are grown: *Camellia sinensis* var *assamica* (Assam type), *Camellia sinensis* var *sinensis* (China type), and

*Camellia sinensis* var *lasiocalyx* (Cambodian type) (Shrestha, 2015). Currently, three types of tea are produced, namely; Herbal, CTC (Crush, tear, and curl), and Orthodox. Herbal tea, comprising leaves, bark, roots, and other plant parts, is prepared from single plants or blends. CTC tea is primarily grown in the Terai region, while Orthodox tea is cultivated in hilly areas like Ilam, Panchathar, Dhankuta, and Terathum. Orthodox tea is exclusively derived from tea shrub leaves, buds, and delicate stems, often grown in hilly areas under natural conditions for organic market certification (Baral, 2019; Luitel, 2022; Mishra et al., 2020). The quality of tea, like the quantity, varies between the Hill and Terai regions. There are methods to assess tea quality. In the hills, tea made from two leaves and a bud is considered good quality. However, in the Terai, tea made from three leaves and a bud is deemed high quality.

Globally, the tea industry is continuously growing with improvements in variety, cultivation, and processing technology. Globally, black tea production has grown by 2.1 percent and green tea production by 4.9 percent annually over the past decade particularly due to associated health benefits (FAO, 2024). With annual global tea output surpassing USD 17 billion and USD 9.5 billion in commerce, tea is a substantial source of export revenue for emerging and low-income economies (Bermudez et al., 2024). Tea production grew steadily with a compound annual growth rate of 3.32% from 2008 to 2020 and is estimated to rise at the rate of 5.7% from 2021 to 2026 (Bermudez et al., 2024; Caro, 2020). In South Asian countries it is an important industry for employment and a source of income for smallholder farmers. China still is the largest producer of tea production with nearly 50% of world tea which is followed by India with a 20.5% market share. Out of more than 35 recognized top tea producers, four countries, namely; India, Sri-Lanka, Bangladesh, and Nepal are among

## Quick Response Code



## Access this article online

Website:  
[www.fabm.org.my](http://www.fabm.org.my)

DOI:  
10.26480/fabm.01.2024.47.53

the top 20 countries indicating that the South-Asia region has great potential in the international tea industry (FAO, 2009). In Sri Lanka, tea production fell by 15.6% in 2021 due to fertilizer bans and economic challenges. High fuel costs and labor expenses further hindered logistics and factory functions in 2022 (FAO, 2024).

Nepal became the 23rd largest tea exporter in the world in 2022 with \$32.5 million worth of tea exports while it imported \$910k worth of tea in the same year. In that particular year, tea ranked as the ninth most exported goods from Nepal. India (\$29.4M), Russia (\$663k), Germany (\$539k), the United States (\$333k), and Japan (\$296k) are the top destinations for tea exports from Nepal. In terms of tea exports from Nepal, the three largest markets during 2021 and 2022 were Pakistan (\$71k), China (\$144k), and India (\$9.17M) (*The Observatory of Economic Complexity, n.d.*).

The tea plant is an evergreen shrub that grows in particular climates. It is highly susceptible to unpredictable weather fluctuations, which could pose a serious risk to the quantity and quality of tea produced (Kumarihami and Song, 2018). Moreover, areas that are particularly susceptible to harsh weather have been used to cultivate tea. The changing patterns are affecting operations in tea cultivation like pruning, plucking, and chemical application impacting the timing of flush and harvest per season and ultimately reducing yield (Baurah and Handique, 2021; Subedi, 2020). This paper aims to present the prospects of tea farming in Nepal while addressing the production, export, and impact of climate change on tea farming.

## 2. METHODOLOGY

The study was performed to present the production and export status of tea in the local and global context and to address the looming effect of climate change on tea production in Nepal. The production and marketing function data were collected from the reports and statistical data from the National Tea and Coffee Development Board (NTCDB), Trade and Export Promotions Centre (TEPC), and Ministry of Industry, Commerce and Supplies (MoICS). Relevant laws, regulations, plans, policies, and literature

from national and international journals, and presentation reports were reviewed to study the present status and suggest policy implications for the improvement of this sub-sector. The collected data were examined through Microsoft Excel.

Linear trend line analysis was carried out to estimate the average annual change in tea production in the context of Nepal.

Mathematical expression for linear trend line:

$$Y = a + bt$$

Where "Y" is the production of the tea at the time (t), "b" is an average annual growth (kg), "t" is a time factor in years, and "a" is an intercept.

Percentage change was estimated with the following expression:

$$\text{Percentage (\%)} \text{ change} = \frac{X_2 - X_1}{X_1} * 100$$

## 3. RESULT AND DISCUSSION

### 3.1 Status of tea production in Nepal

Nepal's eastern and middle corridor between the Himalayas and the Terai scene is gifted with suitable qualities of soil, climate, and geography for the cultivation of natural tea. Tea bushes prefer warm and humid climates with long daylight hours with sufficient precipitation and with a warm and humid climate (Shrestha, 2015). According to NTCDB, farmers of only 14 districts of Nepal are engaged in the commercial production of Tea of which 98.8% were involved in individual-level farming and 1.2% were involved in institutional-level farming (NTCDB, 2017). Currently, there are 163 tea estates, with an area of 8785 sq. km. and 15198 smallholder farmers cultivating in an 11,452 ha area over 30 districts of Nepal (NTCDB, 2024). Nepal's major districts for orthodox tea production are mainly from the eastern part of the country, namely: Jhapa, Ilam, Panchthar, Dhankuta, and Terhathum. However, recently it has expanded to central and western districts like Kaski, Lamjung, Nuwakot, Bhojpur, Gulmi, Udaypur, Sindhuli, Ramechhap, Sidhupalchowk, and Dolakha.

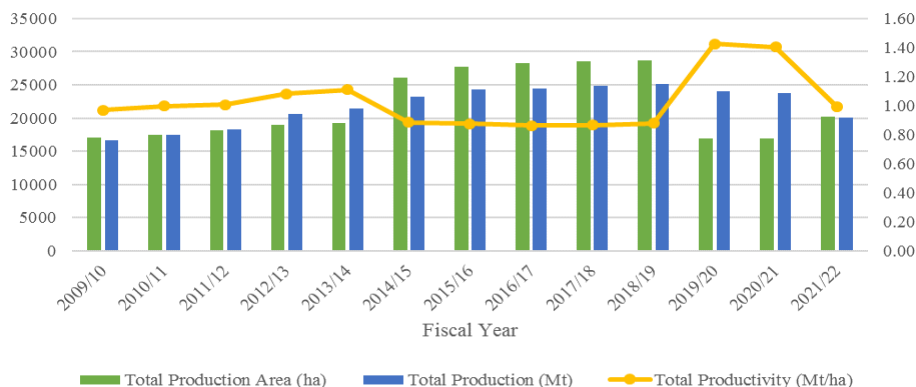


Figure 1: Plantation area, production, and productivity trend of tea in Nepal (NTCDB, 2024)

In Fiscal Year 2021/22, the total production area was 20,237 ha while the production was 20103.77 Mt. of tea. Figure 1 shows the trend of production of tea in Nepal. It was found that the highest production area and production was recorded in FY 2018/19. In FY 2019/20 the productivity of tea was the highest at 1.43 Mt/ha and it was later decreased to 0.99 Mt/ha in FY 2021/22.

Moreover, it was found most of the farmers grow CTC tea mainly in estates, while small farmers grow mainly orthodox tea (NTCDB, 2024; Kalauni et al., 2020). The share of smallholder farmers in the total production is similar over the years and accounts for nearly 25 % which is similar to reports of (Dewan, 2023; Poudel, 2010). The trend of producing green tea is a minority as 3% of farmers produce green tea which was also reported by (Shrestha, 2008).

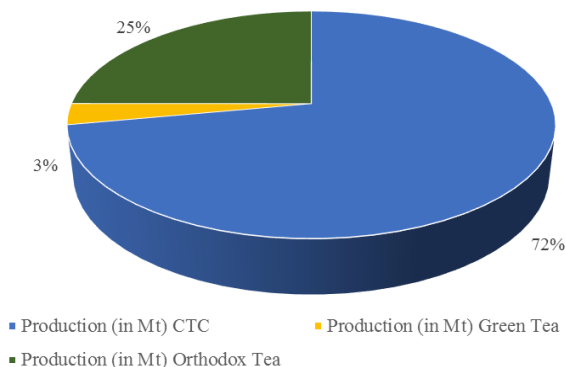


Figure 2: Production share of different types of tea in FY 2021/22 (NTCDB, 2024)

### 3.2 Export and Import status of tea

The global tea industry is continuously increasing in terms of production, consumption, and international trade. The global tea market was roughly 6.3 million metric tonnes in 2020 and it is anticipated to grow to 7.4 million metric tonnes by 2025 (Debnath et al., 2021). The growth of the tea market is driven by the trend of healthy lifestyles, which is being followed by more and more consumers and is also positively supported by the global rise of coffee shop chains (Sukhava, 2022).

The world tea market is segmented by product type into black tea, green tea, and others (long tea, white tea, dark tea, etc.). The difference is "fermentation", which refers to the oxidative and enzymatic alterations in the tea leaves during processing. Green tea is almost unfermented, oolong tea is incompletely fermented, and black tea is completely fermented.

Black tea, the most popular type of tea, which produces an amber-colored, flavored liquid, accounts for 90% of international trade (Pathibhani et al., 2018).

Nepal Trade Integration Strategy (NTIS), identifies tea as one of the 32 promising export products and services of Nepal but acknowledges that despite the high international demand, and soaring production, the growth of exports is very low (NTIS, 2023). While the production of tea has risen nearly by 50% from 2009 to 2018, it has decreased by nearly 20% till 2023 from 2018. Similarly, the export of tea faced a nearly 43% increase from 2010 to 2018 and a 17% decrease from 2018 to 2023. The export of tea has decreased significantly by 13.9 % in the first seven months of FY 2023/24 related to the same period for FY 2022/23 while the export of other promising products like ginger and lentils is increasing (MOICS, 2024).

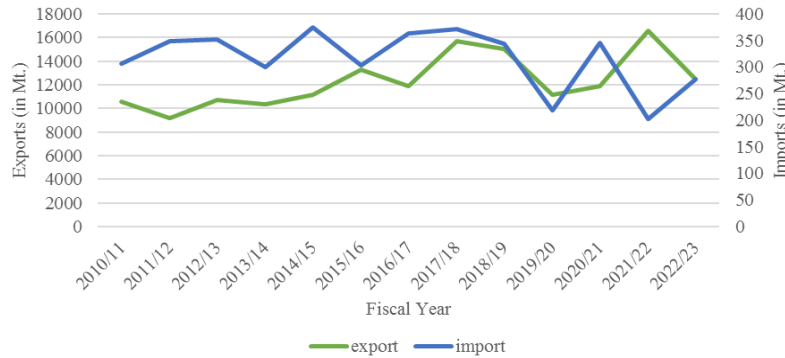


Figure 3: Import and Export Status of Tea (MoF, 2023; NTIP, 2024)

According to ITC, Nepal exports tea to more than 35 countries. Nepal exported 12494 metric tonnes of tea in FY 2022/23 worth almost 30 million dollars (ITC, 2017). Green tea has a growing market share and

there is a good prospect for Nepal in the global green tea market (ITC, 2017). The main export markets for Nepalese green tea are Germany, Japan, France, India, the Czech Republic, the United States, and Australia.

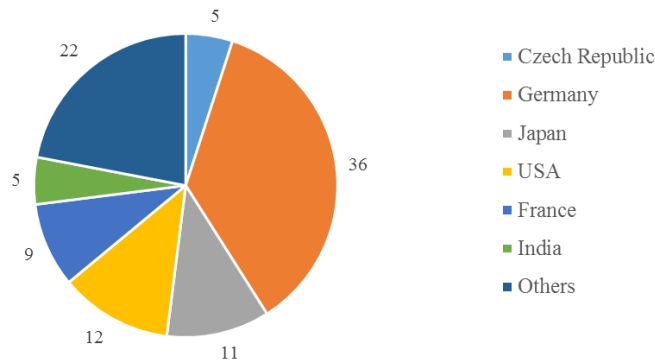


Figure 4: Export Location of Nepalese Green Tea, 2022 (NTIP, 2024)

Traditionally, India has been the major market for CTC tea with about 90% of the market share (ITC, 2017; Sharma et al., 2017). Also, they captured 96% of the total market in 2022 while a minority of tea is exported to Germany, the Netherlands, Russia, and other countries.

The exports of black tea to India have almost been stagnant and facing challenges in recent times. Nepali tea is facing Indian resistance due to

alleged blending issues. Indian farmers lobby for import bans, prompting proposed stringent regulations and anti-dumping measures. Despite this, much Nepali tea is still being sold to Indian merchants who rebrand it as Darjeeling which prompted Nepal to register its orthodox tea in 2019, 157 years after the start of the tea plantation (Dhakal, 2024; Prasain, 2022).

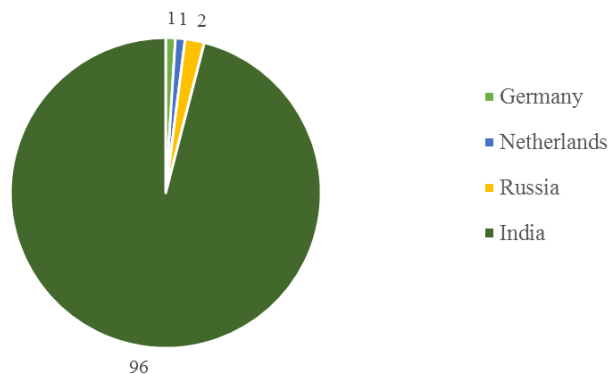
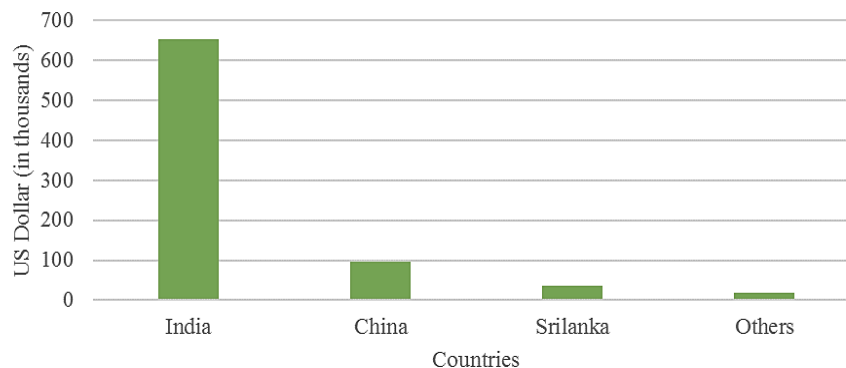


Figure 5: Export Location of Nepalese Black Tea, 2022 (NTIP, 2024)

Despite having better tea quality, younger tea bushes, and low application of chemical fertilizer/pesticide, Nepal's tea faces stiff competition from Darjeeling. A study in 2018 stated that the majority of farmers believe that membership in WTO affects negatively in Nepalese tea market and stresses the need for the auction market to maintain the price level, retain quality, and improve transparency in price structure (Sapkota, 2018). A

study showed that Nepal has a high and positive Normalized Revealed Comparative Advantage in the Tea Industry with a score of 334.62 and provides competition to other established countries like India, Sri Lanka, Bangladesh, Kenya, and Indonesia in the long run (Chaudhry and Negi, (2017).



**Figure 6:** Import Status of Tea, 2022 (NTIP, 2024)

Before 2001/02 Nepal was a net tea-importing country but it has become a net-exporting country (ITC, 2017). Currently, the trade surplus is almost US \$ 30 million. Nepal also imports from India, China, and Sri Lanka. Nepal imported nearly 653.23-thousand-dollar worth of tea from India which accounts for nearly 81% percentage of total imports. China ranks second with a 12% share with about 96-thousand-dollar worth of imports. The trend of imports decreased in FY 2021/22 which coincided with an increase in domestic production while it again rose in 2022/23.

### 3.3 Key issues related to the tea sector of Nepal

#### 3.3.1 Production issue

The productivity of Nepal's tea is 800-1500 kg/ha which is quite low to the potential of 5000 kg/ha (Wastia et al., 2018). Tea farming is a labour-intensive business and costs about 45-60% of total production costs (Parmar et al., 2023; Shyamalie et al., 2020). A study conducted in Ilam ranked the shortage of labor as the major production constraint for both certified and non-certified growers which affects the timely harvest of tea leading to reduced prices (Mishra et al., 2020; Katuwal, 2020). Men migrate mostly to foreign countries for a stable source of income leading up to 90% of workers being locally trained women (Poudel, 2010). This increased involvement of women has positively impacted the involvement of women in household decision-making (Rai, 2022).

Production costs in tea farms are affected by volume and poor topography. Tiwari et al., (2017) stated that large farms are better managed with efficient labor and input mobilization. A study in 2018 stated that farms are underutilizing labor and a dollar increase in labor can generate \$11.53 in return (Baral, 2018). Certified tea growers fetch lower income than non-certified tea growers due to economies of scale of organic production and low premium of organic farmers (Adhikari et al., 2017).

Few research, pointed out that farmers have limited knowledge of proper plantation and harvesting activities with the availability of low-quality inputs (USAID, 2011; Gautam and Poudel, 2022).

#### 3.3.2 Climate change

Researchers highlighted that the Nepalese tea industry is also affected by climate change (Chalise et al., 2017). The tea sector also faces significant effects of climate change like reduced water content in tea crops, sun scorch damage, and increased incidence of extreme weather that decreases leaf quality and causes crop damage and failure (ITC, 2014). Adverse climatic condition is a threat to crop production with notable falls in yield and quality of tea with an increase in financial losses particularly to small farmholders (Biggs et al., 2018).

As an outcome of climate change, there has been a large change in outlook by large related to insects and pests in the tea sector. In addition to secondary pest outbreaks, tea pests currently incur more damage to the crop through increased reproductive potential, feeding rate, distribution pattern, shorter developmental stage, and consequently greater number of annual generations (Roy et al., 2020). Common looper, leaf roller, red slug caterpillar, stem borer, root borer, and aphids are the common insect

pests of tea and are responsible for degradation of quality and up to 43% yield loss (Shrestha and Thapa 2015). Similarly, fungal disease results in up to 85% yield loss while viral disease can reduce yield by up to even 100% (Pandey et al., 2021).

A study conducted in 2021 reflected that Nepali tea farmers are highly aware of climate change but strategies like crop diversification and soil conservation are adopted not to their potential (Muench et al., 2021). Farmers with credit access, frequent training, and cooperative membership were found to be better adapted to climate change in Jhapa and Ilam. Regular farmer-to-farmer innovative training programs to enhance farmer interaction, access to credit facilities with proper government backing, and regular dialogue between stakeholders can be effective strategies for mitigating the impact of climate change (Khanal et al., 2018; Muench et al., 2021). The importance of fostering social sustainability along with economic and environmental sustainability in influencing the adoption of organic farming and climate change strategies (Deka et al., 2021).

#### 3.3.3 Regulatory issues

Nepal's tea is superior or equal to the majority of teas that are part of a category with exceptional quality. However, because of their strong brand image, which was ingrained in the consumer's mind, it seemed that it was next to impossible to compete with them. Nepal claims a rich narrative, exotic production roots, and manufacturing competence, enabling it to vie in the specialty market. As Nepali teas often find their way into Darjeeling teas sold in the U.S., they are adequate to be directly sold in the US market (Walker, 2011). However, it faces a lack of financial resources in proper brand building.

Researcher stated that the unfavorable national tea policy and indifference of the government to farmers have caused many small farmers to move to other crops (Rajbansi, 2023). The government has cut the irrigation facilities provided to the tea sector and made the charge for electricity mandatory which as a result increased the cost of production. Moreover, farmers face difficulties in getting subsidies and its difficult procedure (Dhakal, 2023). Nepalese farmers face difficulty in export citing pesticide residue and quarantine checks which have increased delays and losses in transit (Karki, 2002; Sapkota, 2018). Though Nepal received its trademark in orthodox and CTC tea, many farmers have reported difficulty in obtaining the logo (Kalauni et al., 2020; NTCDB, 2024).

Nepali tea struggles to meet the regulations for Maximum Residue Level so there have been some questions about the quality of Nepal's tea, which can be associated with the lack of chemical labs in Nepal (ITC, 2017).

Healthy relations, a stable working environment, and implementation of sustainable agriculture production policies are imperative to driving in the right direction and developing a sustainable tea industry (Shrestha, 2014).

#### 3.3.4 Institutional support

Nepali tea value chain and associated livelihood are affected by NGOs, corporations, cooperatives, and government policy and institutions. The

National Tea and Coffee Development Board (NTCDB) is the sole supervisory body for the Tea-Subsector in Nepal which is responsible for policy implementation, monitoring, implementation of collective trademarks, promotion, etc. (Mishra et al., 2020). Tea growers also receive support from agro-vet, tea nurseries, banks for finance, and processing industries for technical support on organic support and labor at a local level (Adhikari et al., 2017).

Three types of institutions in tea farming in Nepal, namely; chain governance institutions which control the flow of products, information, and finance, labor institutions which design the way that farmers access workers for their farm and financial institutions which affect farmers' access to capital (Mohan, 2015). The paper suggested that upgrading one institution can trigger multiple cycles of institutional change promoting growth and long-term benefits.

A stronger governance capability along the chain will enable the problems facing the tea industry to be resolved through more policy coherence amongst government, non-governmental organizations, and private sector players (Mohan, 2013). Cooperatives develop the capacity of small holder farmers through aggregation, quality checks, and limited training while private sectors can pitch in through processing, transport, and marketing of the tea industry as a whole (ILO, 2019). USAID suggested strengthening NTCDB, developing a database, establishing training and market information centres, and improving research on tea to strengthen the overall sector (USAID, 2011).

Table 1: Strength, weakness, opportunities and threats of Nepalese tea sector	
Strength	Weakness
High quality and uniqueness Sloppy and undulating land suitable for tea production Favourable climate and soil condition Experienced and cheap labour International certification	Low productivity (0.99 Mt/ha) comparative to India (around 70%) Limited infrastructure growth and processing facilities Dominant small-scale production Low technological adoption Increasing pest and disease problems
Opportunities	Threats
Rising global demand Greater scope for expansion of plantation area Diversification on range of tea Tea Tourism Cheaper than Indian tea	Climate change Shortage of labour Limited financing service availability Absence of long term export policies Strong competition from neighbouring countries like India, China, Sri Lanka Global market fluctuations

Source: (Dhakal, 2013; Kattel et al., 2011; NEAT 2011; Tea Board India, 2024)

#### 4. WAY FORWARD

As challenges mount, new opportunities emerge. Nepal can take advantage of its huge production potential due to its favorable landscape, climate, and environment by cultivating barren lands and bare hills suitable for tea plantations. Nepal should also concentrate on introducing the most recent technological developments in the sector. We ought to commercialize the orthodox tea value chains utilizing healthy market contests with proper coordination of stakeholders including government, private, and public sectors. The government should support bringing forward farmer-friendly policy and support on input supply, technical assistance, and certification. The private sector effectively inspires new ideas, products, and plans of action to work on the value of standard tea.

Nepal has been unable to diversify its tea market. It should utilize the duty-free access provided by the Chinese government, China could be a lucrative destination for Nepalese tea. Adjusting products to different market segments and using narrative marketing with themed tourism initiatives, as Nepal Tea Collective has demonstrated, can significantly expand the customer base in international markets.

Tea tourism can be another way to promote Nepali tea and also an opportunity for small-scale farmers to diversify their income sources as farmers through eco-houses, tea estate trekking, and tea culture tourism.

#### 5. CONCLUSION

Nepal has infinite prospects with the growing demand for orthodox tea, green tea, and specialty tea in the international market. The Nepalese tea sector is a profitable commodity but is facing a slump in terms of production and export. The trend of production and export has been decreasing for a few years. Nepal experienced the highest production in FY 2018/19 and the production has fallen nearly by 20% in 2022/23. CTC tea still dominates the production of orthodox and green tea. Similarly, Nepal exports tea to over 35 different countries all over the world but the export of tea faced a nearly 43% increase from 2010 to 2018 and a 17% decrease from 2018 to 2023 with periodic fluctuations in the export and import in recent years. Farmers face production problems like shortage of labor and limited technical knowledge while also experiencing the detrimental effect of climate change through increased incidence of disease and pests. Regulatory struggles such as difficulty in meeting pesticide residue levels due to lack of proper lab facilities and lack of proper branding of Nepali tea in the abroad market have limited the growth of Nepali tea. Strong institutional support with policy coherence, technical facilitation by the government proper backing of cooperatives in the small farm holder levels, and technical and financial backing of the private sector can generate a conducive environment and act as a booster to the stagnant tea industry.

#### REFERENCES

- Adhikari, K. B., Regmi, P. P., Gautam, D. M., Thapa, R. B., and Joshi, G. R., 2017. Value chain analysis of orthodox tea: Evidence from Ilam district of Nepal. *Journal of Agriculture and Forestry University*, 1(1), Pp. 61-68.
- Baral, R. B., 2019. Nepal Orthodox Tea: Analysis of industry, production, and market potential (Doctoral dissertation).
- Baruah, P., and Handique, G., 2021. Perception of climate change and adaptation strategies in tea plantations of Assam, India. *Environmental Monitoring and Assessment*, 193(4), Pp. 165.
- Bermúdez, S., Voora, V., Larrea, C., and Luna, E., 2024. Tea prices and sustainability.
- Biggs, E. M., Gupta, N., Saikia, S. D., and Duncan, J. M., 2018. The tea landscape of Assam: Multi-stakeholder insights into sustainable livelihoods under a changing climate. *Environmental Science and Policy*, 82, Pp. 9-18. <https://doi.org/10.1016/j.envsci.2018.01.003>
- Caro, L. P., 2020. Wages and working conditions in the banana sector: The case of Costa Rica, Ethiopia, India, Indonesia, and Viet Nam. ILO Background note.
- Chalise, S., Naranpanawa, A., Bandara, J. S., and Sarker, T., 2017. A general equilibrium assessment of climate change-induced loss of agricultural productivity in Nepal. *Economic Modelling*, 62, Pp. 43-50. <https://doi.org/10.1016/j.econmod.2017.01.014>
- Chaudhry, S., and Negi, Y. S., 2017. Export Competitiveness of Tea Industry: An Analysis of Major Tea Producing Countries. *Journal of Arts, Science and Commerce*, 8(4), Pp. 24-30.
- Debnath, B., Haldar, D., and Purkait, M. K., 2021. Potential and sustainable utilization of tea waste: A review on present status and future trends. *Journal of Environmental Chemical Engineering*, 9(5), Pp. 106179. <https://doi.org/10.1016/j.jece.2021.106179>
- Deka, N., Goswami, K., and Anurupam, K., 2021. What will drive the small tea growers towards environment-friendly cultivation? Implications from the tea sector in Assam, India. *Climate and Development*, Pp. 1-16. doi:10.1080/17565529.2021.1930988
- Dewan, S., 2023. Livelihood status of tea estate labour: A study of Ilam Tea Estate, Ilam, Nepal (Doctoral dissertation, Department of Rural Development).
- Dhakal, S., 2024, April 29. From Taste to trade: Exploring the dynamics of Nepal's tea export sector. *Nepal Economic Forum*. <https://nepaleconomicforum.org/from-taste-to-trade-exploring-the-dynamics-of-nepals-tea-export-sector/>

- Dhakal, S., 2023. Economic Analysis of Tea Farming In Jhapa District, Nepal. *Food and Agribusiness Management (FABM)* 4(2), Pp. 71-76 DOI: <http://doi.org/10.26480/fabm.02.2023.71.76>
- FAO., 2009. The state of food and agriculture. FAOSTAT statistical database. Rome. Retrieved April 30, 2013. (available at [faostat.fao.org](http://faostat.fao.org)).
- Food and Agriculture Organisation, 2024. 25th Intergovernmental Group on Tea – Current global market situation and medium-term outlook. (2024). <https://openknowledge.fao.org/server/api/core/bitstreams/f912481a-3666-46e7-965e-30b227a19994/content>
- ILO, 2019. Assessment, A. R. M. Eight Ways to Grow Nepal's Agricultural Sector. International Labour Organisation, Switzerland. 978-92-2-133722-5 (web pdf)
- ITC, 2014. Mitigating climate change in the tea sector. International Trade Centre (ITC), Geneva. Doc. No. SC-14-245.E
- ITC, 2017. Nepal national sector export strategy tea (2017-2021). Government of Nepal
- Kalauni, D., Joshi, B., and Joshi, A., 2020. Production, marketing, and future prospects of Nepali orthodox tea. *Cogent Food and Agriculture*, 6(1), 1757227. <https://doi.org/10.1080/23311932.2020.1757227>
- Karki, T.B., 2002, Sanitary and Phytosanitary (SPS) Measures in SAARC countries, Discussion Paper, v+43. SAWTEE, Kathmandu and CUTS, Jaipur
- Katuwal, N., 2020. Factors Influencing Small Farmers' Participation In The Extension Of Tea Farming: A Case Of Ilam, Nepal. *Epra. International Journal of Agriculture and Rural Economic Research (ARER)*, 8(6), Pp. 33-41. DOI: <https://doi.org/10.36713/epra6009>
- Keshav Kattel, K. K., Vasantha, R., Reddy, M. J. M., and Prashanth, P., 2011. A SWOT analysis on tea cultivation in eastern region of Nepal.
- Khabor, O. F., and Hassanein, S. F., 2021. Use of vitamin/zinc supplements, medicinal plants, and immune boosting drinks during COVID-19 pandemic: A pilot study from Benha city, Egypt. *Heliyon*, 7(3). <https://doi.org/10.1016/j.heliyon.2021.e06538>
- Khanal, U., Wilson, C., Hoang, V. N., and Lee, B., 2018. Farmers' adaptation to climate change, its determinants and impacts on rice yield in Nepal. *Ecological economics*, 144, Pp. 139-147. <https://doi.org/10.1016/j.ecolecon.2017.08.006>
- Kumarihami, H. P. C., and Song, K. J. (2018). Review on challenges and opportunities in global tea industry. *한국차학회지 제*, 24(3). <https://doi.org/10.29225/jkts.2018.24.3.79>
- Luitel, Gaurab, 2022. Diversifying trade, consumption of tea. 10.13140/RG.2.2.31209.98400.
- Mishra, P., Kattel, R. R., Dhakal, S. C., and Bhandari, P. L. 2020. Orthodox Tea: Value Chain Analysis From The Perspective Of Certification In Ilam District Of Nepal. *Food & Agribusiness Management (FABM)*, 1(2), Pp. 63-67. DOI: <http://doi.org/10.26480/fabm.02.2020.63.67>
- MoF. 2023. Nepal Foreign Trade Statistics Fiscal Year 2022/23 (2079/80). Department of Customs, Ministry of Finance, Government of Nepal
- Mohan, S., 2013. Institutions and livelihoods in Nepal's tea value chain: a policy paper. DOI:10.13140/RG.2.1.4592.0241
- Mohan, S., 2016. Institutional Change in Value Chains: Evidence from Tea in Nepal. *World Development*, 78, Pp. 52–65. DOI: 10.1016/j.worlddev.2015.10.004
- Mukherjee, A., Sharma, M., Latkar, S., and Maurya, P., 2018. A study on aflatoxin content in black tea available in domestic market in India. *J. Chem. Chem. Sci*, 8, Pp. 562-568.
- Nepal, USAID, 2011. Value Chain/Market Analysis of the Orthodox Tea Sub-Sector in Nepal. Nepal Economic Agriculture, and Trade Activity. Contract No. EEM-1-00-07-00008, AID-367-TO-11-00001, United States Agency for International Development, General Development Office Kathmandu, Nepal.
- NTCDB, 2017. Survey on commercial tea cultivation 2075. CBS
- NTCDB, 2019. National tea and coffee development board: Government of Nepal. NTCDB. Retrieved May 1, 2019, from <http://www.teacoffee.gov.np/>
- NTIP, 2024. Nepal Trade Information Portal. Ministry of Industry, Commerce and Supplies (Retrieved on May 3, 2024)
- NTIS, 2023 Nepal Trade Integration Strategy, 2023 Government of Nepal, Ministry of Industry, Commerce and Supplies, Singhadurbar, Kathmandu
- Pandey, A.K., Sinniah, G.D., Babu, A., Tanti, A., 2021. How the Global Tea Industry Copes With Fungal Diseases–Challenges and Opportunities. *Plant Disease*, 105 (7), Pp. 1868-1879. DOI: <https://doi.org/10.1094/PDIS-09-20-1945-FE>
- Parmar, N., Maurya, M. K., and Mishra, A., 2023. Estimate Resources used, Cost Return Structure and Various Cost concept of Tea in Kangra District, Himachal Pradesh. *Biological Forum – An International Journal*
- Poudel, K., 2010. Orthodox tea production and its contribution in Nepal. *The Third Pole: Journal of Geography Education*, Pp. 34-42.
- Prasain, K., 2022, August 10. For Nepal's troubled tea industry, India's import barriers could be a death knell. *The Wire*. <https://thewire.in/trade/india-nepal-tea-import-barrier>
- Rai, S., 2022. Role of Tea Cultivation on Women's Livelihood: A Case Study of Ilam Municipality, Sumbek, Ilam (Doctoral dissertation, Department of Sociology).
- Rajbansi, A., 2023. Nepal's tea industry going through tough times <https://kathmandupost.com/money/2023/04/20/nepal-s-tea-industry-going-through-tough-times>. *The Kathmandu Post*.
- Roy, S., Barooah, A. K., Ahmed, K. Z., Baruah, R. D., Prasad, A. K., and Mukhopadhyay, A., 2020. Impact of climate change on tea pest status in northeast India and effective plans for mitigation. *Acta Ecologica Sinica*, 40(6), Pp. 432-442. <https://doi.org/10.1016/j.chnaes.2019.08.003>
- Sapkota, K. B., 2018. Implication of WTO on Nepalese agriculture: Competitiveness of Tea (Doctoral dissertation). <http://archive.nnl.gov.np/handle/123456789/115>
- Sharma, R., Kumar, A., and Joshi, P. K. (2017). Nepal-India agricultural trade: trends, issues and prospects. *Agricultural Economics Research Review*, 30(2), 245-263.
- Shrestha, B. 2014. A Supply Chain Approach to Study Efficiency And Sustainability In The Nepalese Tea Industry. (2013). [Turku University of Applied Sciences]. <https://core.ac.uk/reader/381152407>
- Shrestha, G., and Thapa, R. B., 2015. Tea pests and pesticide problems and integrated management. *Journal of Agriculture and Environment*, 16, Pp. 188-200.
- Shrestha, M. B., Thapa, M. J., Bhandari, R. C., Rana, K. K., and Fikkal, I., 2008. Quality Parameters Assessment of Orthodox and Green Tea Production in Nepal. *Agricultural Resea Agricultural Research for Poverty Rch for Poverty Alleviation And Livelihood Enhancement*, 27, Pp. 257.
- Shrestha, R., Thapa, R., Amatya, N., Prajapati, P., and Bokhhim, H. Study on Total Polyphenol Content, Antioxidant Activity, Colour Profile of Different Green Teas on Different Solvent Extracts. *Food Research Bulletin*, 84.
- Shrestha, S., 2015. Tea Cultivation Manual. NTCDB.
- Shyamalie, H. W., Karunarathne, B. M. N. C., Pilapitiya, H. M. C. G., Lakshani, P. T. P., Chathuranga, T. H. I., and Nadeeshani, K. W. N., 2020. An Analysis of the impacts of Labour Scarcity on Land Productivity in Sri Lankan Tea Plantations. *Tropical Agricultural Research* (2020) 31(4), Pp. 54-64 DOI: <http://doi.org/10.4038/tar.v31i4.8421>

- Subedi, A. 2020. Climate change and COVID land Nepal's tea production in hot water. Reuters.
- Sukhava, A., 2022. The trends and specific of the world tea market.
- Suzuki, T., Miyoshi, N., Hayakawa, S., Imai, S., Isemura, M., and Nakamura, Y. (2016). Health benefits of tea consumption. Beverage Impacts on Health and Nutrition: Second Edition, Pp. 49-67.
- Tea Board India, 2024. 69th Annual Report of Tea Board India, 2022-23. (2021). In [teaboard.gov.in](https://www.teaboard.gov.in/pdf/Annual_Report_2022_23_English_Lite_pdf8749.pdf). [https://www.teaboard.gov.in/pdf/Annual\\_Report\\_2022\\_23\\_English\\_Lite\\_pdf8749.pdf](https://www.teaboard.gov.in/pdf/Annual_Report_2022_23_English_Lite_pdf8749.pdf)
- The Observatory of Economic Complexity. (n.d.). The Observatory of Economic Complexity. <https://oec.world/en/profile/bilateral-product/tea/reporter/npl>. Retrieved May 1, 2024
- Tiwari, A., Adhikari, K.B. and Dhungana, S.M. 2017. Economics of Orthodox Tea Production. A Case of Ilam, Nepal. *Journal of Agriculture and Environment*, 18:1-5
- Walker, D. 2011. (rep.). Nepal Economic Agriculture, and Trade Activity—Nepali Tea Assessment. Kathmandu, Nepal: United States Agency for International Development.
- Wang, C., Han, J., Pu, Y., and Wang, X., 2022. Tea (*Camellia sinensis*): A review of nutritional composition, potential applications, and Omics Research. *Applied Sciences*, 12(12), 5874.
- Wastia, D., Dhakalb, S. C., Kattelb, R. R., and Dhunganab, S., 2018. A Resource Use Efficiency of Orthodox Tea In Ilam District Of Nepal. *Reviews In Food And Agriculture (RFNA)* 2020, 1(1) Pp. 01-05 DOI: <http://doi.org/10.26480/rfna.01.2020.01.05>

