TREND ANALYSIS ON PRODUCTION, IMPORT, AND EXPORT OF VEGETABLE SUB-SECTOR IN NEPAL

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ABSTRACT

Vegetable sub-sector is the third most prioritized sub-sector of agriculture in Nepal. This sub-sector is characterized by heavy fluctuation in production. Despite being an agricultural country, Nepal is facing a huge trade deficit in the agriculture sector. A trend analysis was carried out to explore the change in cultivation area, production, yield, import, and export of the vegetables over the 10 years from 2009/10 to 2018/19. Data were collected mostly from secondary sources including different governmental publications and governmental portals which were analyzed using Microsoft Excel. It was observed that, although vegetable cultivation and overall production had increased during the period, the productivity was growing at slower pace, and hence the national demand for vegetables was not fulfilled by domestic production. This enhanced the import of vegetable commodities and further broadened the import-export gap. The study showed that Nepalese vegetable farming was mostly of subsistence type with a need for commercialization to decrease import and enhance export.

Keywords: *vegetable, demand, production, trade*

INTRODUCTION

Agriculture has long been serving as the backbone of the Nepalese economy contributing about 26.50 percent to the national Gross Domestic Product (GDP) (AITC, 2020). Within the agriculture sector, horticulture contributes 16.75%, within which vegetables contribute 9.71% , and fruits and spices contribute 7.04% to the national agricultural GDP (MoF, 2015).

Nepalese Agriculture is mostly rainfed with almost 67% of cultivation depending on rainfall (Shrestha et al., 2013). According to (MoAD (2016), only about 21% of the total land area was cultivated in 2016, out of which only 45% was irrigated. Similarly, more than four-fifth of rainfall (>80%) falls during the monsoon i.e. between June to September in Nepal (Malla, 2009). The unreliability of rainfall makes Nepalese agriculture vulnerable to climatic hazards, and vegetable growers have to face serious consequences in case of erratic rainfall as the vegetable cropping season is relatively short. The inconsistent climatic conditions have led to a fluctuating trend in cultivation and production of vegetable sub-sector in Nepal (Pandey et al., 2017).

Due to its diverse climatic and ecological variability, Nepal is considered to have comparative advantage of growing seasonal as well as off-seasonal vegetables. Because of this, vegetable is the third most prioritized sub-sector in the agriculture sector by agriculture development strategy (ADS).

Vegetables are integral parts of a balanced diet that supply the majority of vitamins, protein and micronutrients (Schreinemachers et al., 2018). Nepalese people have increased the consumption of vegetables in recent years but still mainly depend on rice for regular diets (ADB, 2018). According to dieticians and nutritionists, the average per capita daily requirement of vegetables in Nepal is 300 gm. (USAID Nepal, 2011) but intake is very poor as compared to standard requirements, with a deficit of 60 percent in reference to produced vegetable (Gautam & Bhattarai, 2006).

Due to population growth, economic change, and increased purchasing power from income growth and migrant remittances, Nepal's demand for vegetables is growing at a higher pace which is not met by the increasing production (CASA Nepal Country Team, 2020). Despite the country's high demand of vegetables as well as the huge potential for vegetable production, the vegetable farms are affected by the unavailability of quality inputs in time, lower level of post-harvest facilities, and diversion of agricultural loans to the non-productive sector resulting in a slower pace in increment of vegetable yield (Simkhada, 2019). This has been well reflected in the yield of this sector (13.41 ton per hectare) which is found to be far below compared to the yields of China, India, and the world (23.4, 17.3, and 19.6 ton per hectare respectively) (Thapa & Dhimal, 2017). Therefore, the country has to import vegetables in larger amounts with lower export. In the fiscal year 2018/19, the import-export ratio of the vegetable sub-sector was 20.010 (MoF, 2020).

The export situation doesn't look promising for vegetables, considering the potential (SAWTEE, 2017). Similarly, the majority of the export commodity falls into raw materials in case of Nepal which has a larger volume but low value, and imports processed products having lower volume but high value. The rising and continuing gap between imports and exports has resulted in an unprecedented imbalance in Nepal's trade deficit. Exports have nearly halted over the years, and imports have gone through the roof (Ghimire, 2016).

This analysis is undertaken to identify the issues regarding the potential of vegetable export and import which can be useful for briefing out necessary policy recommendations for several governmental and non-governmental bodies including NGOs and INGOs. Both import and export sides were analyzed with a particular focus on the export potential of vegetables.

MATERIALS AND METHODS

Time series agricultural data for vegetable cultivation area, production, and yield in Nepal was collected from the databook 'Statistical Information on Nepalese Agriculture' published by the Ministry of Agriculture and Livestock Development (MoALD) for 10 years period from 2009/10 to 2018/19, and vegetables import and export for same period was extracted from Trade and Export Promotion Centre (TEPC), Ministry of Commerce and Supply. These ten years' data were taken as the import experienced a high rise and price was also highly fluctuated. Similarly, the nation has focused more on increasing exports to reduce trade deficit since 2009 after the implementation of Trade Policy 2009.

The data here includes vegetables such as root crops, green leafy vegetables, pulses, and also potato and mushrooms in both fresh, dried, and other chilled forms which are listed under product code 07 by TEPC.

The linear trend analysis model was used to analyze time-series data of the area, production, and productivity of vegetables and import and export quantity and value of vegetables in Nepal. The statistical analysis was carried out through the Microsoft Excel program.

The annual average yield of vegetables was calculated to find which years had below and above-average yield, as defined by (Pandey et al., 2017):

$$\text{Annual average yield} = \frac{\left(\textit{Total yield of } 2009/10 + \textit{Total yield of } 2010/11 + ... + \textit{Total yield of } 2018/19\right)}{\textit{Number of years}}$$

RESULTS AND DISCUSSION

Vegetable production trend in Nepal

The cultivation area, production, and yield of vegetables were in increasing orders on analyzing data from the past ten years i.e. from 2009/10 to 20018/19 (Figure 1 and 2 respectively). The cultivation area has increased by 26.41 percent during this period while production jumped by 42% and productivity by just 12.48%. The cultivation area was continuously increasing except in the fiscal year 2016/17 which had a swift decrease in production.

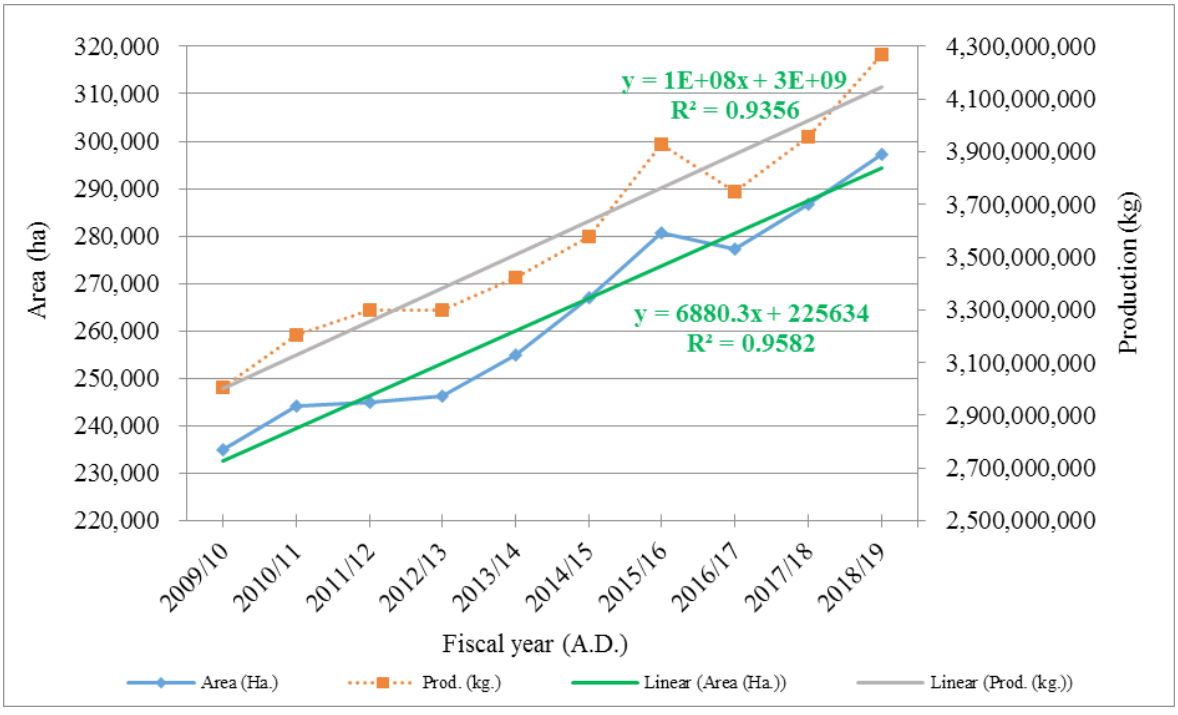


Figure 1. Area and production of vegetables in Nepal (2009/10-2018/19)

The productivity of vegetables also followed the increasing trend at varying rates except for the years 2012/13, 2014/15, and 2016/17 where it decreased than the previous years. The average area, production, and yield of vegetables for the ten years period were 263,476 ha, 3,571,733,980 kg, and 13527 kgha^{-1} respectively. The yield was above average in fiscal years 2015/16, 2017/18, and 2018/19 only, and the remaining years had below-average yield. The R square value for the trend line of area and production was found to be 0.9685 and 0.9502 signifying a close association of the trend line to the data.

Vegetable farming is tempting as it assures cash profits, often from small acreages, within a short period (CASA Nepal, 2020). The benefit-cost ratio (B:C ratio) of vegetables (1:3) is higher than that of cereals (1:1.5) (Bhandari et al., 2015). Similarly, the commercialization rate of vegetables is also higher (30-50 %) than cereals and fruits (SAWTEE, 2017). So, more farmers have been engaged in vegetable farming thereby increasing the total cultivation area.

The commercialization of the vegetable sub-sector along with increased knowledge about farming techniques and practices and better infrastructure development are in line with increasing production in Nepal. Moreover, the favorable climatic conditions, seed and

fertilizer supply, and mechanization of vegetable farming are also the governing factors for the increased vegetable production trend in Nepal (Pandey et al., 2017). However, a report by ADB (2018) suggests that the majority of increased production is contributed by growth in the area rather than by productivity (in the case of tomato and potato production increment from 2011-2016, 65% and 82% of total growth was due to increase in cultivation area and rest, 35% and 18% by yield for respective crops).

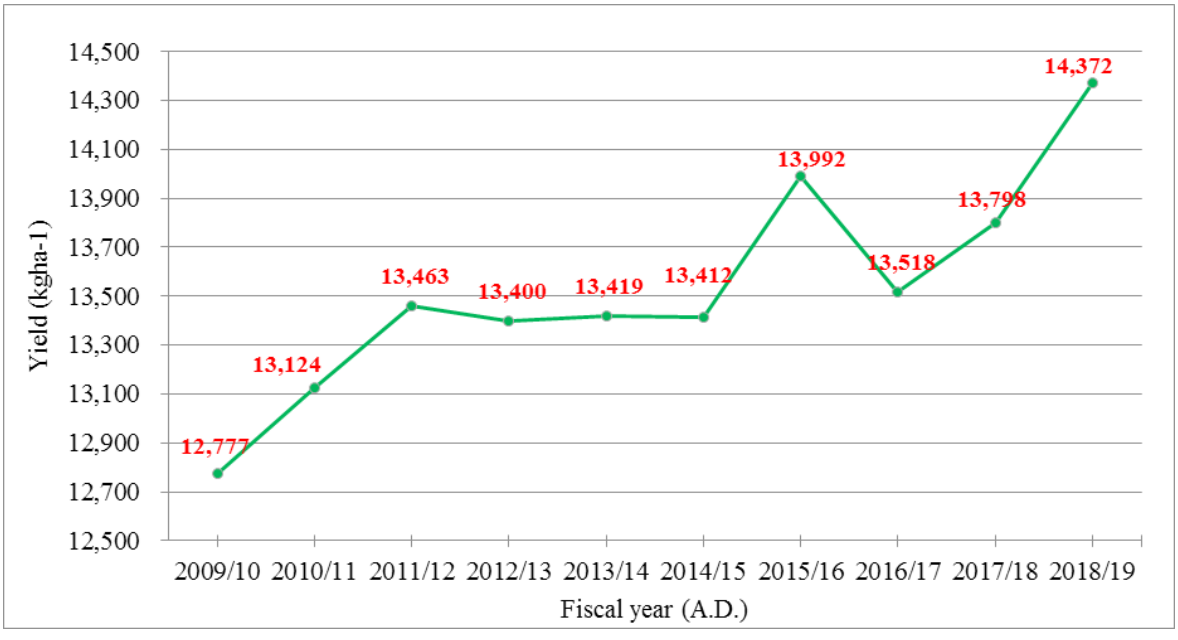


Figure 2. Productivity of vegetables in Nepal (2009/10 - 2018/19)

The yield factors are constrained mostly by external factors like the incidence of diseases and pests, climatic hazards, a decline in land ownership, and the depletion of soil fertility due to heavy chemical usage (Rai et al., 2019). Similarly, the input factors such as inferior quality of the seeds and untimely availability of fertilizers are also responsible for lower production. This has caused a fluctuating trend in productivity of the vegetable sub-sector in Nepal.

Vegetable import trend in Nepal

On analyzing vegetable import data from the fiscal year 2009/10 to 2018/19, the average quantity of imports was 510,455,519 kg with an average value of NRS 14,185,462,054. The import quantity has been increasing in each successive year (Figure 3). The most recent four years i. e. from 2015/16 to 2018/19, have import quantity more than the average import quantity. Moreover, the value of import has also been increasing with the increasing rate for every year except in 2017/18 which has the decreased value of import than the previous year. The import value was below average in the beginning years up to 2013/14. from 2009/10. But after 2013/14, the import value was higher than the average value till 2018/19. Despite having an increasing quantity of vegetable imports every year, the import value was lower in 2017/18 than that of the previous year. The total import quantity has increased by 278.87 % and the value has skyrocketed by 602.94% on arriving at 2018/19 from 2009/10.

The vegetable market is the most fluctuating and price-sensitive market in the context of Nepal as the supply is season bound and goods are perishable along with consumer's preference to get cheaper options. The government of Nepal had signed Trade and Transits Treaty with India in 1996 that prioritized tariff-free trade between the countries (GoN, 2010). This has resulted in increased import of vegetables from India since Nepalese vegetables are costlier than Indian vegetables, as Indian vegetables benefit from subsidization and also end up with higher yields and better power grid, thereby cutting the cost (ADB, 2018).

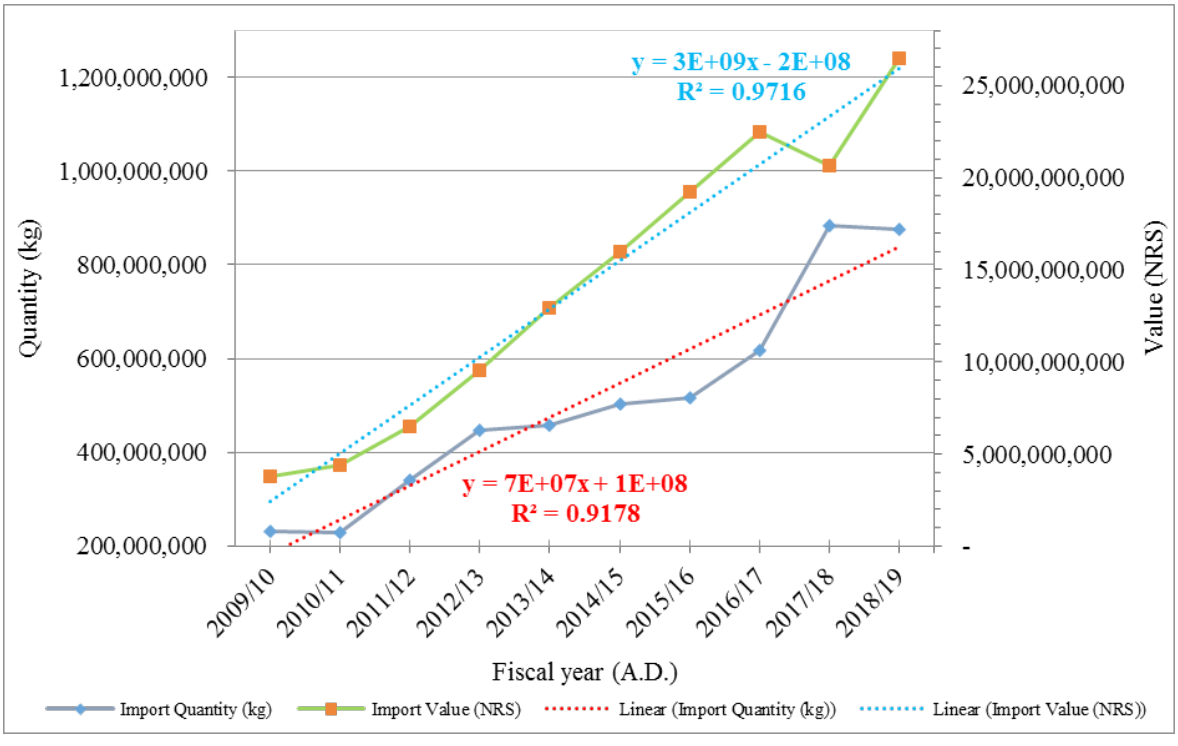


Figure 3. Import quantity and value of vegetable sub-sector in Nepal (2009/10 - 2018/19)

Due to poor industrial and economic growth and surrounded by two bigger nations with high economic growth rates, the local enterprises have struggled to capitalize on the opportunities created by the growing demand for vegetables (Ghimire, 2016). Similarly, the government is unable to implement several plans effectively which are bought to achieve self-sufficiency in the vegetable sub-sector (Subedi, 2017).

Vegetable export trend in Nepal

In the fiscal year 2018/19, there was a decrease in the quantity of export of the vegetable sub-sector by 51.47% with a subsequent fall in value by 71.25% as compared to that of 2009/10. On analyzing data of the past 10 years there was a decrease in the quantity of exported vegetables except for years 2014/15, 2017/18, and 2018/19, which has increased exported vegetable quantity than respective previous years. Similarly, the export value has risen in 2012/13, 2015/16, and 2018/19 than successive previous years and besides these years, each year had decreasing export value (Figure 4).

The average quantity and value of vegetable export during this period was 28,458,124 kg and NRS 2,207,765,057 respectively. The exported quantity was higher than average for

years 2009/10, 2010/11, 2011/12, 2012/13, and 2014/15 but in the case of export value, only 2009/10, 2010/11, 2011/12, and 2012/13 had a higher value than average value.

The inability of the nation to diverse the finished and/or raw commodities or products resulting in less competitive exportable products at the international level had led to a moderate decline in export for the years 2009/10 to 2013/14 (Ghimire, 2016). Similarly, the earthquake of 2015 was also the major factor for decreased export in the successive following years ("Export is Must," 2017). However, the implementation of projects like PMAMP has enhanced the production and export sector with the establishment of storage houses and processing units in recent years. In past three years (2016/17 to 2018/19), 336 post-harvest centers, 2 rustic stores, 2 processing industries were established by the aforementioned project (Poudel, 2019). This ultimately has increased the export trend in recent years.

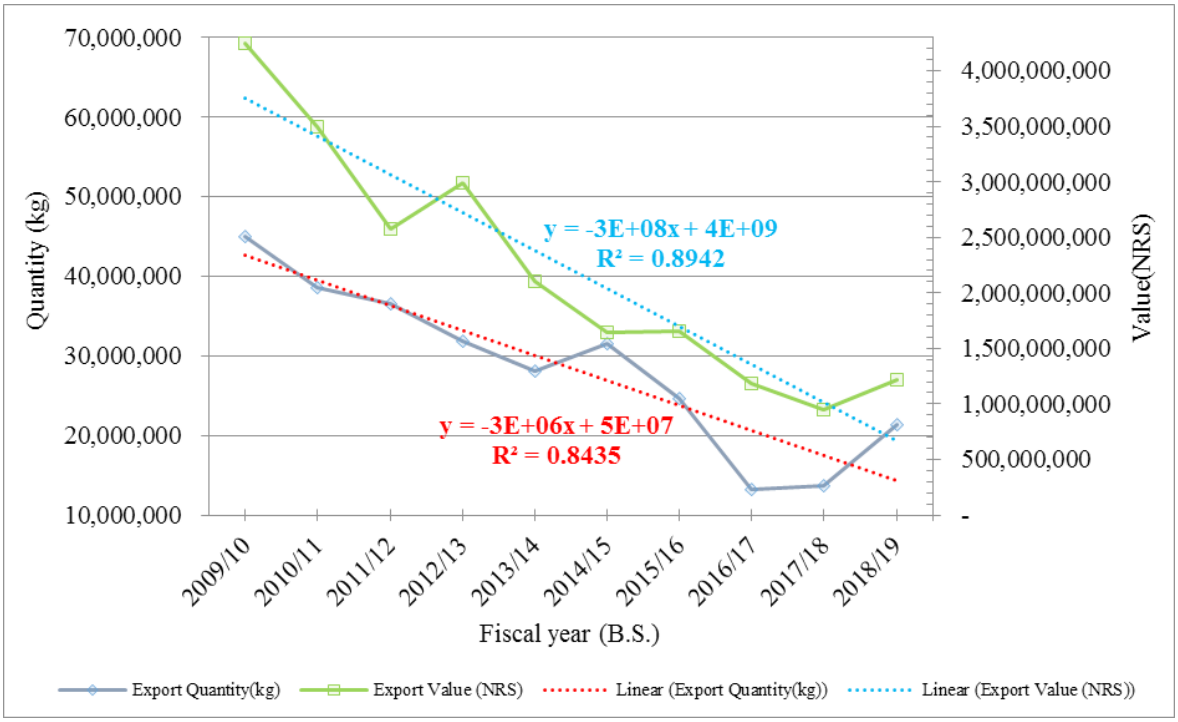


Figure 4. Export quantity and value of vegetable sub-sector in Nepal (2009/10 - 2018/19)

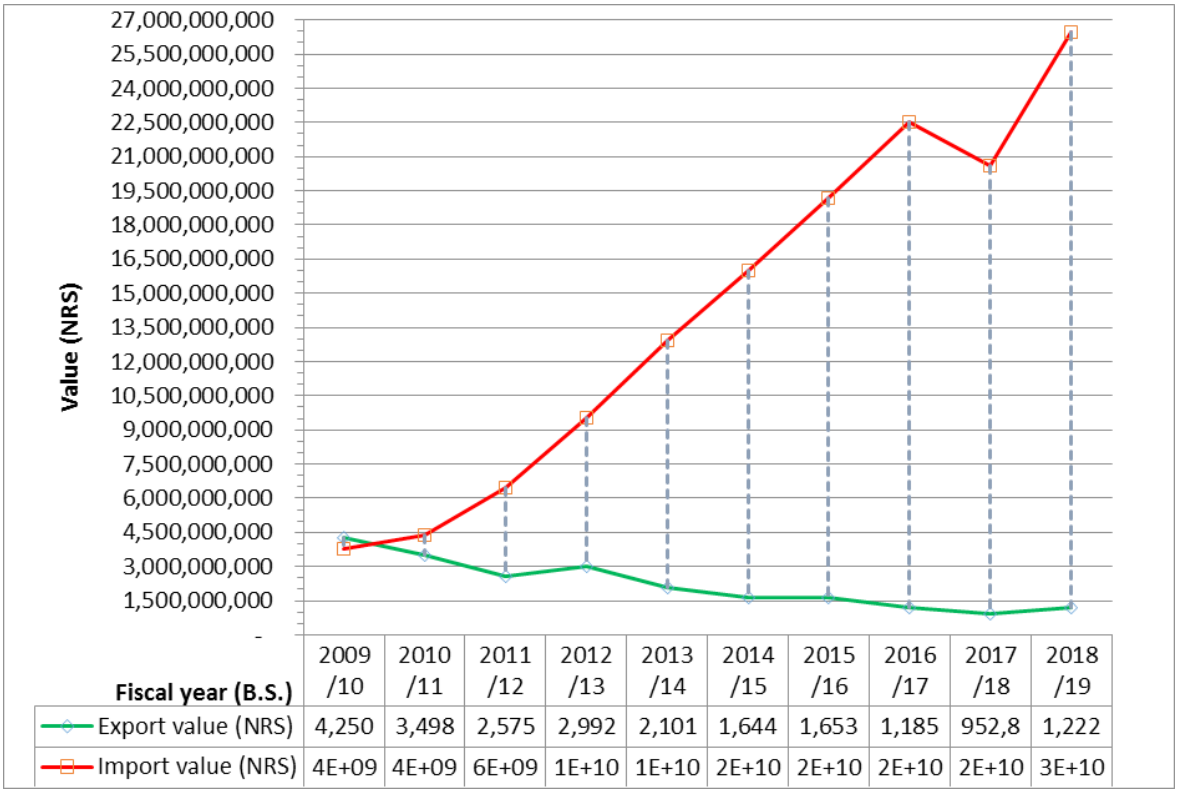
Nepal lacks proper laboratory and modern tools and techniques for checking quality standards which often results in rare acceptance of plant quarantine certificates released by Nepalese authorities by international authorities including India (Ojha & Thapa, 2015). So, Nepali products face impediments in entering the neighboring markets and therefore, the export performance remains weak due to supply-side constraints and low productivity (Sharma, 2019).

The lower rate of commercialization of vegetable farms and industrialization has resulted in lower adoption of modern new technologies (SAWTEE, 2017). This has caused a higher cost of production and hence the Nepalese products become more expensive as compared to other nation's products resulting in shrinkage in the export potential of the vegetable sub-sector of the nation.

The report published by SAWTEE (2017) has suggested the open border with India has caused informal trade between the borders which is almost equal in amount to the formal trade. These informal trade data are without any quarantine, recording, and customs clearance process which often results in fluctuation in national-level import and export data.

Vegetable trade balance trend in Nepal

Since 2009/10, the export value was decreasing moderately but import value was increasing dramatically on coming up to 2018/19 (Figure 5). The average export and import value for ten years (2009/10 to 2018/19) were NRS 2,207,765,057 and NRS 14,185,462,053 respectively. This has resulted in a heavy trade deficit in recent years. In the year 2009/10, the import value was less than the export value but since then the export value had never been able to cover the import value in the vegetable sub-sector. The import-export ratio has increased from 0.89 in 2009/10 to 21.67 in 2018/19 with an average ratio of 6.43.



Fiscal year (B.S.)	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
Export value (NRS)	4,250	3,498	2,575	2,992	2,101	1,644	1,653	1,185	952,8	1,222
Import value (NRS)	4E+09	4E+09	6E+09	1E+10	1E+10	2E+10	2E+10	2E+10	2E+10	3E+10

Figure 5. Import and export value of vegetable sub-sector in Nepal (2009/10 - 2018/19)

Vegetables have significant potential value on the market not only in Nepal but also across the Indian frontier and are recognized as a major agricultural product that offers a comparative advantage for exports (HVAP, 2011). But Nepalese trade is still dominated by the import of vegetables with very few exports resulting in a heavy trade deficit.

The increasing demand for vegetables is far ahead of domestic production which is almost contributed by smallholder farmers (ILO, 2019). One of the major reasons for lagging domestic supply is seasonal production and heavy post-harvest loss of 15-30 % in vegetables (Bhattarai & Gautam, 2012). The demand for a commodity falls during the peak production

time of the respective commodity when there is a surplus supply. The surplus amount is unable to be preserved as there is no proper storage facility and the product is lost in huge amounts. But, later on it needs to be imported as its demand again increases during the lean period. This results in a significant increase in import value making the trade deficit wider.

Similarly, Nepal mostly exports raw goods as it lacks industries for proper processing which has a larger volume but less value (Acharya, 2019). But in case of import, it is just the opposite with the import of processed foods having high value and low volume. In 2019/20, Nepal exported onion of 8080 kg having value NRS 355,000 and imported dried onion of 16,809,580 kg with the monetary value of NRS 770,226,000 (TEPC). This ultimately increases the import-export gap.

CONCLUSION

This study suggests that the Nepalese vegetable farming is still of subsistence type and the productivity is not increased at the same rate as production and cultivation area increased. With the low productivity of vegetables, the produced products are insufficient to meet domestic demand thereby increasing demand in the Nepalese market. Moreover, the Nepalese products face barriers in entering the neighboring markets. Therefore, the export performance remains weak in case of the vegetable sub-sector and results in a heavy trade deficit. Nepal has a comparative advantage in the production of both seasonal and off-seasonal vegetables. So, the government should focus more on vegetable production. Similarly, farmers should be encouraged for commercialization with the implementation of new modern technologies and government should invest in infrastructure development including storage houses, grading and packaging to meet the international standard for increasing export of vegetables. Moreover, cost effective packages should be implemented to reduce the cost of production.

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