

Identifying Trade Deficit Reduction Strategies for Fresh Vegetables in Nepal

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Abstract

Fresh vegetables are the most significant sector among Nepalese's agricultural pursuits, in terms of providing an honorable livelihood to millions of Nepalese farmers, ensuring household food security. Moreover, as certain crops offer high economic returns per hectare of land, the fresh vegetable sector has the potential to improve the economic conditions of producers, particularly small-scale producers. However, the growing dependency on other countries for agricultural products, as painted by the statistics of import of fresh vegetables, shows a different picture. As such, Nepal is importing fresh vegetables worth billions of rupees to meet the demand of the people. The present study is an attempt to identify the potential strategies to reduce the import of fresh vegetables and to find out problems in supply chain management. The main finding of the study indicates a lack of production of vegetables to meet the demand, lack of high-value seeds, and absence of collection centers and warehouses. The finding also clarifies that import of two products- potato and onion is significantly high and imported vegetables are cheaper than the domestic productions which caused a high trade deficit in fresh vegetables. To address these constraints in fresh vegetables, the government should focus on increasing production with the promotion of off-seasonal vegetables and planting high-value seeds. The government needs to formulate favorable policies in favor of all actors involved in the vegetable subsector at the central level while they can provide required support and services, monitor, supervise, and follow up the vegetable production program at the field level.

Keywords: Fresh vegetables, Import of vegetables, Trade deficit, Potential strategies

1. Introduction

In recent years, there is an unexpected surge in the import of agricultural products although the majority of the population in Nepal has been engaged in agriculture. The cause of acute trade deficit in Nepal is due to a significant rise in imports of rice and vegetables (Joshi et al., 2018). The country produces around four million metric tons of fresh vegetables annually and imports around three million metric tons (TEPC, 2021). The gap between domestic production and demand for vegetables has been significantly large and widening every year. Nepalese agricultural growth is embarrassed by low productivity, poor infrastructures, weak institutions, scarcity of cold storage, shortage of land labour, and inadequate growing techniques for commercialization. In general, the prevailing weak agricultural growth is not sufficient to boost overall per capita income enabling economic transformation in the country (Amgain, 2019). Fresh vegetables have high export potential as they have a competitive advantage due to the diverse geographical landscape in Nepal (Joshi & Piya, 2021).

Commercial vegetable farming is an essential part of livelihood as it presumably supports food provision, income generation, and employment (Bhatta & Doppler, 2010). There is an opportunity and constraint in the fresh vegetable sector like other agricultural sectors. Vegetable farming can help farmers generate cash

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even from a small area of land in a short time and help farmers to improve their livelihood (Gurung et al., 2016). However, most farmers are hesitant to invest more in fresh vegetables due to unstable pricing. This is caused by the seasonal peaks and troughs of harvesting seasons together with weak coordination along the supply chain as the markets become over- and under-supplied throughout the year. As a result, prices can be as much as 9 times higher at one point versus another depending on the season and the supply.

The foremost constraints on the supply side are low productivity, poor market access, high post-harvest losses, estimated at 25 percent at the producer level. The major problems on the market side are the lack of storage facilities in market centers and cooperatives, weak farmer organizations, limited access to finance, and the limited ability of small and medium enterprises to innovate and diversify (CASA, 2020). More investment is required to develop modern supply chains and logistics services to handle high-value commodities such as cold chains, reefer vans, and warehouses. The unorganized supply chain is characterized by inefficiencies in logistics and storage, resulting in food losses at the post-harvest stage. Farmers have limited information on demand, leading to frequent oversupply or shortages, which impact prices and exacerbate crop wastage. Post-harvest management is also poor, as the layers of small intermediaries in the supply chain invest very little in quality storage, packaging, and transportation infrastructure. Detection of problems associated with the commercialization of fresh vegetables would help solve the present trade deficit in Nepal.

In the light of the above mentioned information, the research aims to identify the causes of the high trade deficit in fresh vegetables and find out the problems in domestic production and supply management and explore the ways for import substitution.

2. Literature Review

The growing and continued mismatch between imports and exports have resulted an alarming level of the trade deficit in Nepal. Over the years, export has almost stagnated, and import skyrocketed. Nepal's import is now 11 times higher than export. Available statistics show that the total export, which used to be 9.4 percent of the Gross Domestic Product (GDP) a decade ago, has squeezed to 5.2 percent, whereas import has surged to almost 40 percent of GDP, in the fiscal year 2004/05 it was 35 percent (Ghimire, 2016). From 2015 to 2020, the import of agricultural products in Nepal rose by 65 percent. This alarming surge in imports is the result of foreign market dependence and regional geopolitics, politics of modernization of the economy, ineffective government policy, and political instability forcing off-farm income (Adhikari, Shrestha, & Paudel, 2021).

Nepal has a high potential for market growth in fresh vegetables (SWATEE, 2017). For the development of fresh vegetable farming, it is necessary to identify the opportunity and constraints of fresh vegetable farming. Constraints indicate the hindering issues related to vegetable farming and suggest the designing and implementation of appropriate interventions that address the constraints (Ruel and Levin, 2002). The agriculture sector in Nepal still employs around 66 percent of the population and its contribution to GDP has steadily declined, from 49 percent in 1990 to 27 percent in 2017. During this period, poverty rates in Nepal have also declined from 42 percent in the mid-1990s to 25 percent in 2010/11 (ILO, 2019).

Marketing management systems have been a major problem for vegetable farmers (Pokhrel, 2010; Thapa & Dhimal, 2017). However, the 2015 Agricultural Development Policy of the Nepalese government

prioritized agriculture roads, collection centers, and market infrastructure to spur economic growth, improve livelihood, and enhance food security (Thapa & Dhimal, 2017). The government should also place more emphasis on monitoring and evaluating the vegetable market to protect farmers from prospective parasitic middlemen in the vegetable markets. Furthermore, government subsidies on marketing should be provided to encourage farmers to continue their agricultural practices (Bhatta & Doppler, 2010). Around 78 percent of households cultivate on less than one hectare of land, with higher proportions (53 percent) cultivating on land ranging in size from 0.2 to 0.5 hectares. Some 27.4 percent cultivate on 0.5 to 1 hectare (CASA, 2020).

Previous studies lack to identify the unexpected rise in imports of fresh vegetables in Nepal. This research would be a great asset for policy makers to reduce the trade deficit in fresh vegetables in Nepal.

3. Methodology

3.1 Data Source

The official data published by Central Bureau of Statistics (CBS), Ministry of Industry, Commerce and Supplies (MoICS), Ministry of Agriculture and Livestock Department (MoALD), Trade and Export Promotion Centre (TEPC), and other official documents have been used for assessment.

3.2 Study Method

For this study, a descriptive method has been used to analyze the production and import situation of fresh vegetables in Nepal. Based on the data observation we have interpreted the result to identify the strategies to reduce trade deficit in fresh vegetables.

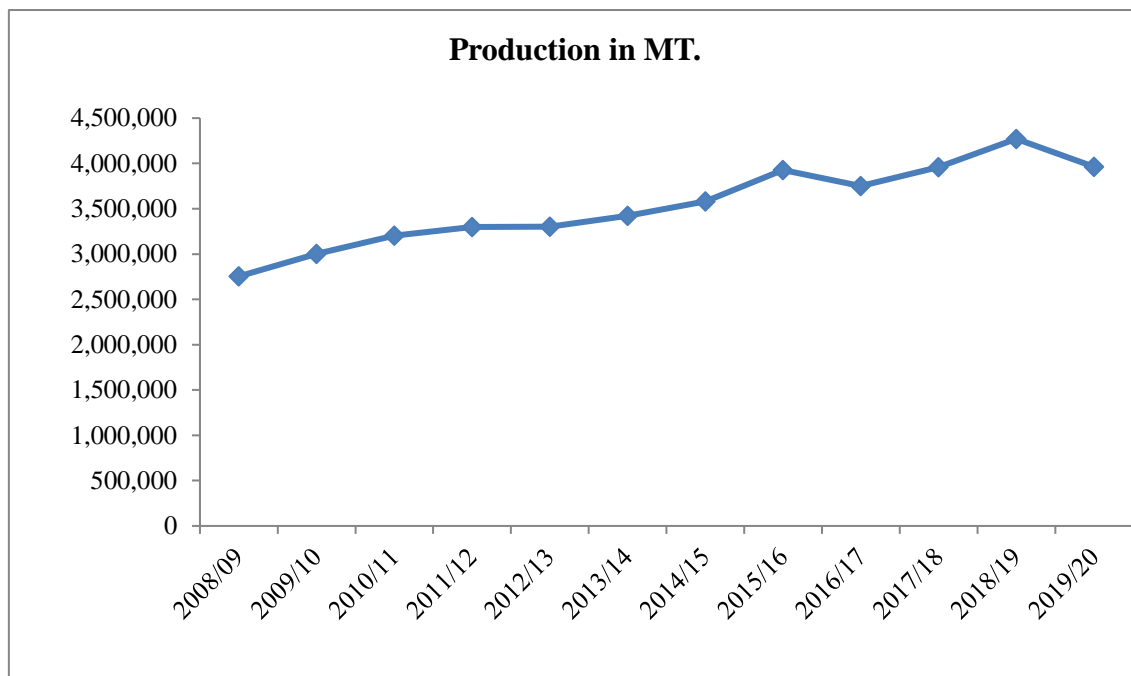
4. Vegetable Production Status in Nepal

Nepalese consume approximately 200 plant species as vegetables. The most common vegetables in Nepal include potato, cauliflower, cabbage, broccoli, tomato, brinjal, onion, garlic, bitter gourd, okra, hot pepper/chilli, sweet pepper, cucumber, pumpkin, sweet potato, peas, cowpeas, radish, cucurbit crops, beans and mustard greens (MoICS, 2019).

As of the fiscal year 2019/20, Nepal cultivated vegetables in 281,132 hectares of land which yielded 3,962,383 MT of vegetables. The productivity per hectare is 14.09 MT. Both the cultivation area and yield have increased over the last 20 years. Out of total production, it is estimated that 40 percent is used for household consumption, and the rest 60 percent is sold in markets. The Terai, Mid-hill, and High-hill regions of Nepal contribute 55 percent, 40 percent, and 5 percent, respectively to national vegetable production.

There are an estimated 3,243,521 households involved in vegetable cultivation, of which 17 percent are women-headed households (CASA, 2020). An average household has 1.8 parcels used for vegetable farming. According to the National Sample Census of Agriculture 2011/12, most farmers (97 percent) cultivate vegetables on their land, while the remainder cultivate on rented land.

Figure1: Trend of Vegetable Production from 2008/09 to 2019/20



Source: MoALD, 2021

Fresh vegetable production as well as cultivation area has been continuously increasing since 2008/09. However, the production of vegetables is increasing at a faster rate than the increment in area. The vegetable production growth is attributed to the favorable climatic condition, availability of seed and fertilizers, irrigation, improved management practices, mechanization in vegetables farming along area expansion. The percentage increase in area and production of vegetables in 2019/20 compared to 2008/09 is 24.86 percent and 43 percent respectively.

In the year 2020, 5.40 percent land area and 7.23 percent vegetable production decreased compared to 2018/19 because of the pandemic. A nationwide lockdown imposed by the government also impacted the fresh vegetable sector. However, In the year 2018/19, 3.60 percent of the fresh vegetable cultivation area and 7.90 percent of production had increased compared to 2017/18.

Table 1 elucidates information about vegetable production, cultivation yield in the year 2019/20. Cauliflower, cabbage, tomato, onion, radish, board leaf mustard, cucumber, bitter gourd, bottle gourd, and brinjal were the most produced vegetables in Nepal in the fiscal year 2019/20. Among them, cabbage is the most exported vegetable of Nepal. Tomato and onion are the most produced vegetables in Nepal, nevertheless, these two vegetables are the most imported too. Onion was cultivated in 20,424 hector land only where its yield production was 13.95 MT. It was cultivated in 7.26 percent of total cultivated land.

Table 1: Fresh Vegetable Production in Nepal

Fresh Vegetable Production in Nepal, 2076/77 (2019/20)				
[Area in Ha., Production in Mt., and Yield in Mt./ha.]				
S.N.	Commodity	Area	Production	Yield
1	Cauliflower	33,685	501,457	14.89
2	Cabbage	28,530	469,726	16.46
3	Broccoli	2,446	27,942	11.42
4	Tomato	21,747	413,761	19.03
5	Radish	16,808	257,335	15.31
6	Broad Leaf Mustard	11,717	160,374	13.69
7	Carrot	2,846	31,066	10.92
8	Turnip	352	4,248	12.08
9	Capsicum	1,470	15,301	10.41
10	Peas	7,398	68,182	9.22
11	French Beans	2,487	24,647	9.91
12	French Beans -Pole Type	4,331	47,032	10.86
13	French Beans -Bush Type	1,372	12,915	9.41
14	French Beans - Sword Type	1,283	11,778	9.18
15	Broad Beans	1,252	8,489	6.78
16	Asparagus Beans	4,184	42,896	10.25
17	Cowpea	3,521	32,535	9.24
18	Other (Legumes)	2,025	17,437	8.61
19	Asparagus	162	1,152	7.12
20	Tree tomato	109	1,043	9.6
21	ChilliAkabare	968	7,230	7.47
22	Chilli	9,195	95,398	10.37
23	Okra	9,337	103,353	11.07
24	Brinjal	8,621	120,303	13.95
25	Onion	20,424	284,926	13.95
26	Cucumber	10,216	158,688	15.53
27	Pumpkin	7,391	112,093	15.17
28	Squash	1,709	25,848	15.12
29	Bitter Gourd	10,336	145,271	14.06
30	Pointed Gourd	3,349	43,558	13
31	Sponge Gourd	7,197	96,126	13.36
32	Ridge Gourd	1,019	12,574	12.33
33	Snake Gourd	1,395	16,567	11.87
34	Bottle Gourd	8,265	127,484	15.43
35	Others(veg.)	33,542	458,994	280.55
	Total	281,132	3,962,383	14.09

Source: MoALD, 2021

Nepal imports a large amount of fresh vegetables from India every day. Cauliflower and cabbage are potential vegetables that grow in Nepalese farms. Government should focus on these vegetables to grow on a large scale not only to manage the domestic demand but also to export in India. Farmers should be provided with training and necessary material like high-value seeds and crops to cultivate and grow all kinds of vegetables on a commercial and economic scale to meet the demand of people.

Table 2: Fresh Vegetables by Districts

Fresh Vegetables by Districts, Fiscal Year 2019/20			
District	Production	Area in Hector	Yield
Saptari	232,596	15,809	14.71
Bara	204,920	11,992	17.09
Kailalisudurpaschim	190,470	12, 638	15.07
Jhapa	162,648	8,940	18.19
Kavrepalanchowkbagmati	159,627	9,966	16.02
Sarlahi	155,747	12,649	12.31
Rautahat	145,875	11,027	13.23
Morang	144,679	9711	14.90
Parsa	139,964	9,126	15.34
Dhankuta	133,457	5983	22.31

Source: MoALD, 2021

Table 2 indicates the top ten districts of Nepal that produce fresh vegetables. Saptari district produces 26,711MT of cabbage and 25,387 MT of cauliflower. This district produces the highest amount of fresh vegetables and vegetables the cultivation land area is the largest among the ten districts. On the other hand, Dhankuta ranked 10th position in producing fresh vegetables with the maximum yield (mt/ha) even though its cultivation area is one-third of the Saptari district. Thus, it can be concluded that Dhankuta is adopting commercial farming and using modern technology in comparison to others.

Similarly, the production of cauliflower in Bara district is 28, 823 MT and 22,275 MT of bitter gourd. Kailali district produces 13,777 MT of chili and 11,889 MT of brinjal in the fiscal year 2019/20. Dhankuta district has produced 54,000 MT of tomato and 39,258 MT of cabbage in the year 2019/20. Saptari, Bara, Kailali, and Sarlahi districts have more cultivation area than Dhankuta but in comparison to the production of fresh vegetables, their production is not high.

Government should prioritize these districts and provide modern tools and techniques for farming fresh vegetables, production could increase, which can substitute import of fresh vegetables. Government institutions should implement more vegetable cultivation programs and projects in these potential districts and provide access to market, finance, built logistics, warehouses, and cold storage. The agricultural extension officer should provide modern agricultural training, provide high-value seeds and tools, and techniques to small and medium farmers. Such policy will improve the ability of farmers to bring improvement in the supply chain of vegetables. The unemployed youth of these districts should also be mobilized in vegetable farming thus converting barren land to arable land and increasing production.

Table 3: Highest Produce Vegetable in Nepal

Commodity	2014/15	2015/16	2016/17	2017/2018	2018/19	2019/20
Potato	2,586,287	2,805,582	2,591,686	3,088,000	3,112,947	3,131,830
Cauliflower	494765	550044.8	-	535007.50	574795	501,457
Cabbage	453600	484036.8	-	485,782	519061	469,726
Tomato	331736	386824.6	-	410,721	406434	413,761
Onion	248584	238590.7	-	239,024	291,538	284,926
Radish	263215	268119.6	-	271,053	287,200	257,335
Broad Mustard Leaf	159205	151774.6	-	162,179	186,897	160,374

Source: TEPC Nepal, 2021

Table 3 presents the highest produced vegetables in Nepal from 2014/15 to 2019/20. Potato is one of the highest produced vegetables in Nepal, with 3.1 million MT of vegetables produced in the year 2019/20. Cauliflower and cabbages are extremely produced vegetables in Nepal. In the same way, cauliflower is one of the vastly exported vegetables by Nepal. A total of 7.1 MT of vegetables were exported in the year 2019/20 and 6.6 MT of vegetables were exported in the year 2018/19. The ability to produce cauliflower and cabbage should increase by engaging all farmers in 77 districts and keeping priority in policy, program, and project, so production and export can be increased. Other potential vegetables are tomato, onion, radish, and broad mustard leaf which can cultivate and produce on a large scale.

5. Market Channel

There is no systematic market channel in Nepal for the sale of vegetables. The common marketing channel is the middlemen and retailers. There is an absence of a well-organized marketing channel in Nepal for fresh vegetables. However, some farmers sell their vegetables to the buyers at the agricultural farm. Local resources people or middlemen collect vegetables from direct smallholder farmers or commercial farmers. These middlemen distribute vegetables to retailers. Likewise, trader or farmer groups collect vegetables from smallholder farmers or commercial scale farmers and they are distributed to the regional markets, national markets, supermarkets, or retailers.

Middlemen collect products from different producers and sell them to retailers, then to consumers who provide employment and income to both producers and the middleman. Furthermore, middlemen bring the product into the marketplace in areas where there is no strong cooperative network and road access to farms is limited. Similarly, farmer cooperatives also collect through collection centers which are managed by farmer marketing groups. The government does not have a proper and organized channel to collect agricultural production. Therefore, the middleman plays a leading role in fixing prices, and farmers always complain that they get less price in comparison to the market.

In Nepal, middle marketers (cooperatives, farmer groups, or middle man) are engaged in collecting the products from different places and delivering the products to the wholesale market. The products from wholesale markets are then supplied to retailers/vegetable shop owners and then to consumers. The distribution of costs and gross income at different levels is important in the business of vegetables. The fresh vegetables are highly biodegradable so it requires more attention during harvesting, packaging, and

transporting from production to the final market. The marketing cost of the vegetables mainly involves the cost of post-harvest activities incurred before reaching the consumer (USAID, 2011).

6. Vegetable Market in Nepal

There are several agricultural markets in Nepal from the government and private sector. All of these markets work informally. Systematic and well-facilitated infrastructure should be developed to run it smoothly and scientifically under the government rules, regulations without hampering the economy, and health of people. Under the department of agriculture, there are ten agricultural markets including the Kalimati vegetable market. Kalimati and Pokhara vegetable markets publish wholesale and retail prices daily on its website, whereas Kalimati publishes it in daily newspapers too.

On the other side, the government has prioritized working in input markets but has done without real emphasis on output markets, so results have often been unsustainable. The supply of agricultural products is limited and the output market should be effectively run and managed by domestic and internally produced vegetables.

The government and private sector run the fresh vegetable market but there is a lack of an organized market. The government owns 10 vegetable markets all over the country, where it monitors only prices in 9 markets (except Kalimati vegetable market). However, the CASA-2020 vegetable sector strategy – Nepal report stated that there are a total of 74 wholesale markets (local, regional and national level) for trading agricultural products, and vegetables comprise the major traded products in these markets. Among the 74 wholesale markets, 13 are major wholesale markets, which are considered national level markets (one in the former Far-Western Development Region, two in the Mid-Western, three in the Western, five in the Central, and two in the Eastern).

Kalimati Wholesale Market is the biggest wholesale market in Nepal. In the fiscal year 2018/19, 246139.63 MT of vegetables were traded in this market. As of the fiscal year 2018/19, 88625.44 MT vegetables were imported from India, which covered 36.01 percent of the total trade of the Kalimati vegetable market.

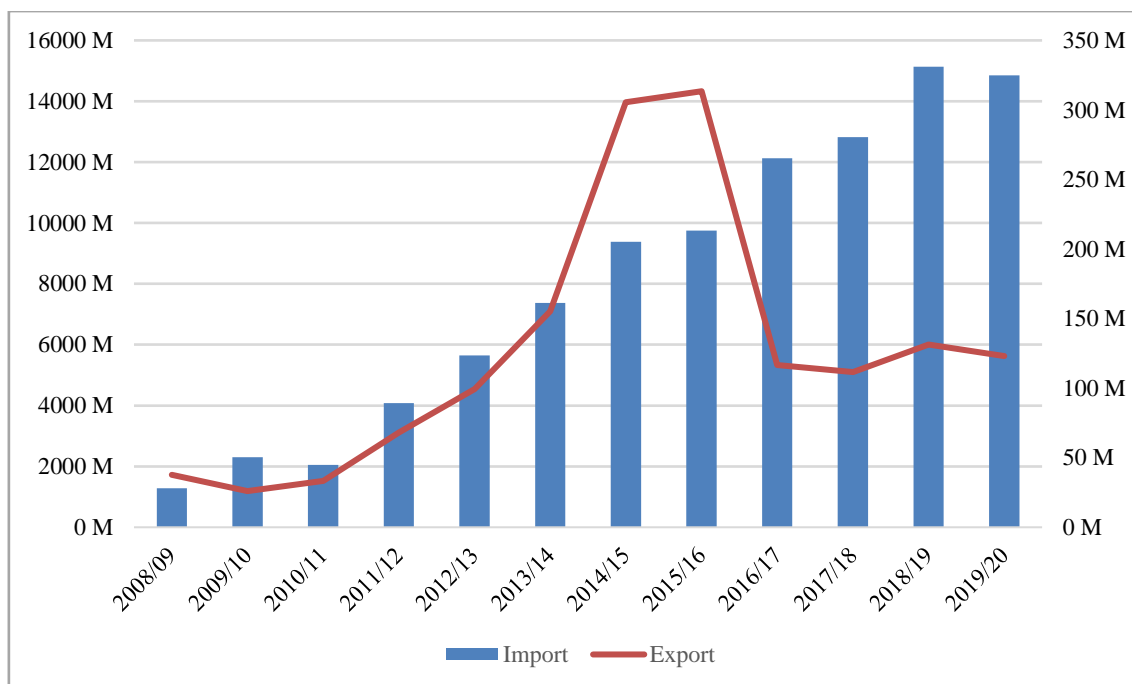
Dharan agricultural market is one of the largest wholesale vegetable markets in the eastern region of Nepal. For this market, the vegetables are collected from the eastern districts of Dhankuta, Bhojpur, Sunsari, Terathum, and Sankhuwashawa. Tomato, chilli, cabbage, cucumber, and cauliflower are the major vegetables traded in this market. Other vegetable markets are Birtamod Agricultural Market Management committee, Sindhuli Agricultural produce market, Surket Agricultural market management committee, Dharan Agricultural market management committee, Butwal Agricultural produce wholesale market center, Pokhara Agricultural produce market, Lalbandi Agricultural produce wholesale market, Sarlahi, Kohalpur Agricultural produce market, and Dhalkebar Agricultural market management committee.

7. Imports and Exports of Vegetables

The pattern of the chart depicts there is a significant difference in the trends of the import and export of fresh vegetables (bar diagram that illustrate the import, line dark yellow provide the information of export). The import rises continuously at the period given, while the export graph rises for a short period and falls after 2015/16 then remains unchanged. In the year 2015, Nepal had an earthquake where all economic and social activities were interrupted for some months. This could be a reason where Nepal lost the international

market leading to the downfall of export. In the year 2008/9, Rs. 1287 million vegetables were imported and Rs. 2306 million vegetables were imported in 2009/10 and it incessantly grew every year. In the year 2016/17, vegetables worth Rs. 12124 million were imported and the most prominent rate of growth was recorded in 2018/19 with Rs. of 15131 million which is 12 percent more than in the year 2008/9. In the year 2019/20, because of the global pandemic, the number of imports decreased to Rs. 14846 million.

Figure 2: Trend of Vegetable Import and Export in Nepal



Source: TEPC Nepal, 2021

Nepal’s vegetable imports have increased over the decades, while exports have decreased. Imports comprised around 70 percent of the total vegetable trade in 2011/12. Most of Nepal’s vegetable trade is with India. This indicates that production had not grown fast enough to meet the rapidly increasing demand for vegetables in Nepal, which points to an opportunity for further commercialization of Nepal’s vegetable sector. The failure to implement plans and programs to become self-sufficient in vegetables has increased the dependency of the Nepali vegetable market on imports.

As per the data published by TEPC 2021, the import of potato and onion is increasing more rapidly compared to other vegetables. In the year 2020, Rs 6329 million fresh potatoes were imported and Rs 1248 million of dry garlic have been imported. The domestic production of vegetables increase by 43 percent between 2008/9 and 2019/20 and the area of production increased by 24.86. Imports of vegetables have been increased by 12 times in the last 10 years. The statistics display the demand for vegetables in a market. All kinds of vegetables were imported and it is increasing every year. The potato and onion are the two largest imported vegetables in Nepal. Out of total imports, potatoes and onions covered 82 percent.

India is the largest export destination for Nepalese vegetables. The bilateral trade treaty between Nepal and India allows duty-free market access to primary and agricultural products on a reciprocal basis. Bangladesh offers opportunities for the export of fresh vegetables and fruits, but their tariffs are higher: as high as 25 percent for tomato, cabbage, lettuce, carrot, and all other green vegetables. There are other non-tariff barriers, beyond the connectivity problems. The prospects for vegetable export to Bhutan seem very bleak due to the small market size. Nepal imports potatoes from Bhutan but there is no agricultural export to that country (SAWTEE, 2016).

Fresh vegetables are exported to India informally in small amounts. The quantity is not sufficiently large to be trucked and there are no collection and storage facilities in Nepal to warrant commercial consignments. Also, quarantine and food safety formalities are very time-consuming. Only a few items like radish, cabbage, cauliflower, squashes, and green peas are exported in bulk (SAWTEE, 2016). Farmers are heavily dependent on the middle person for the export of fresh vegetables in eastern regions. Farmers who produce the vegetables are the last people to receive benefits from the export proceeds. Farmers have incurred net losses on account of the low prices they receive. The lack of commercialization and industrialization in agriculture are the main reason for less production within the country. Similarly, the less utilization of productive areas and the changing demand of consumers are the reason for the increase of imports of fresh vegetables.

8. Reason Behind High Imports

Despite the certain level of growth of vegetable production in Nepal, the fresh vegetable market failed to meet the demand of people, and imports became necessary for smooth supply and to meet the demand. The previous study and research show that three million MT of vegetables were imported every year in the Nepalese market to meet the demand but Trade and Export Promotion Center (TEPC) data shows that almost 1 million MT have been exported every year since 2017/18. We can also not disagree with the previous study and research conducted by an expert, think tank, and research institutes because there is lots of informal trade between Nepal and India due to the open border. There is a huge informal trade of fresh vegetables through Kakarvitta of eastern Nepal and other parts of Nepal. Small vehicles were used to trade fresh vegetables for informal trade which is not counted in national data. In the Terai area, the whole border is open so there is a high chance of informal trade, so the government does not have exact data of informal trade.

Potato is the most growing and producing vegetables in Nepal, but it is one of the highly imported vegetables in Nepal. 40 percent of total import is occupied by potato. This data shows the demand for potatoes in the Nepalese market is very high. On the one hand, the trend of potato cultivation area production is increasing continuously every yearly. Even with increasing, the domestic product fails to meet the Nepalese market. Likewise, potatoes domestically produced are more expensive than imported. This is another reason behind the high import of potatoes in the Nepalese market. Nepali potatoes are expensive due to many reasons like expensive labour, limited land, expensive fertilizer, and seeds. Indian and Bhutanese potatoes are cheap in comparison to Nepali potatoes. In the year 2019/20 Rs 8265 million potatoes were imported in Nepal. Government should take an important step to reduce imports and increase production. Similarly, the farmer should facilitate easy access to the market, transportation, and collection center for a smooth supply chain to farmers.

It is one of the important cash crops to address food insecurity and reduce poverty among smallholder farmers in developing countries like Nepal. Therefore, the National Potato Development Program (NPDP) was established in 1972. Similarly, there is a National Center for Potato, vegetables, and Spice crop Development for the holistic development of fresh vegetables. Therefore, all agricultural-related government institutions should be mobilized and functionalized to meet the vegetable demand of people at the best price. The government and stakeholders should set up a strong top-level government mechanism for a smooth run of the supply chain domestically produced vegetables in a market.

Another highly imported vegetable is onion. Per capita consumption of onion in Nepal is 7.7 kg, which is far below the world average of 10.8 kg. Even then the domestic production is not sufficient to meet the demand of the country resulting in unavoidable imports (Kaini, 2020). In the year 2018/19, Rs. 5623 million vegetables were imported, which is 37 percent out of total vegetables imported. Moreover, Rs. 4225 million vegetables were imported in the year 2019/20 which is 28 percent out of the total vegetables imported. The production of onions is also increasing continuously but there is also an increase in imports. However, very few quantities are only exported in comparison to imports and production. The reason behind the high import of onions is also similar to a potato. The imported Indian onion is cheaper in comparison to the domestically grown onion. Similarly, traders import a large quantity of onion from India at a cheap price and store it in warehouses and distribute it in the off-season in the Nepalese market which indicates there is a high import of onion in data.

Table 4: Price of Fresh Vegetables in September 2021

	Kalimati	Dhalkebar	Pokhara	Birtamod	Butwal	Dharan	Total average
	Price Per Kg						
Commodity	Average	Average	Average	Average	Average	Average	Average
Bitter Gourd	80	60	90	70	28	55	63.83
Bottle Gourd	45	26		50	25		36.5
Cabbage	40	32.4	55	19	27.2	16	31.6
Cauliflower	90	88.4	110	95		97.5	96.18
Christophine	12.5	35	37.5	11	23	15	22.33
Potato Red	57	26.6	39	25.5	25.6	27.5	33.53
Potato White	41.5	24.6	40	22	22		30.02
Pumpkin	42.5	25.6	45	22	27	45	34.51
Radish White	35	42.6	47.5		32.2		39.32
Smooth Gourd	45	21	90	75	12.8		48.76
Okara	55	32.6	70	42.4	27.2	55	47.03
Tomato Big (Indian)	55	70	40	33.2	23.4	26.5	41.35
Tomato Small (Local)	10	60	39			32.5	35.37
Brinjal Round	65	62.6	70		32.2		57.45
Chilli Dry	310	295		330		332	316.75
Chilli Green	55	61	135	110	80	62.5	83.91
Chilli Green (Akbare)	175		300	270		290	258.75
Coriander Green	425		450	270	228		343.25
Garlic Dry Nepali	165	140		150	170	155	156
Onion Dry	40.5	35.6	46	41	41	44	41.35
Carrot	145		125	90	127	80	113.4
Arum	45	28.6		50	40		
Brd Leaf Mustard	175	110		45			

There is a dearth of the uniform price of fresh vegetables all over the country. The vegetables grown domestically and internationally have different prices. The Indian imported vegetables are cheaper than domestically grown vegetables. The seasonal and off-seasonal vegetables also determine the price level. Fluctuations in market arrival largely contribute to the price instability of major agricultural commodities. Therefore, there is a need to have a perfect understanding of the market arrival and price behavior over time and space. The efficient marketing system plays an important role in economic development as it stimulates production, avoids unnecessary fluctuation in output and prices, reduces the unfair share of consumers' prices, and contributes to price stability (Khalon & George, 1985).

The variation of the price depends on whether the vegetable is a domestic product or has been imported. Many factors determine the price of domestic products. Some imported vegetables are cheaper than domestic products. The off-seasonal vegetables are sold at a higher price. Nepalese-grown vegetables are expensive in comparison to Indian imported vegetables. Through the above table, we can see that the price of vegetables in Butwal is cheaper than in other places. The Butwal vegetable market is near the Indian border area. The imported vegetables in this market are cheaper because it saves transportation costs. Similarly, the vegetable is grown in province 2 and Lumbini is easily transported to Butwal, Dhalkebar market. Kalimati vegetable market is more expensive than others. Kalimati vegetable market is a major place for the trading of vegetables in Kathmandu and thus domestically produced vegetables, as well as imported vegetables, have to transport in this market, thereby raising the price of vegetables.

The market imperfections are also providing a disincentive to the growers in increasing vegetable production. The availability of information about market arrivals and existing prices in different markets help the farmers in adjusting their cropping pattern in such a way that they could sell their produce at a time when the prices are reasonably high in the market (Mishra & Kumar, 2014).

There are many constraints like high cost of cultivation, labor shortage, unavailability of suitable cultivars and seed, and weak research and extension support which lead to low productivity. Similarly, the storage of onion bulbs for a long duration in ordinary conditions poses a problem due to high humidity and high temperature from June to September. However, the off-season onion production technique is an effective tool to meet the demand for onion in the lean season. The diverse climatic conditions found in different parts of the country provide comparative advantages for off-season onion production. Exploiting agro-climatic diversity can help a lot. For example, in high mountains, onion bulbs are produced in August-September as a normal season crop which is off-season for mid-hills and terai. The second option is to produce onion bulbs by planting sets during June-July. The sets are produced by sowing seeds in a normal season (Kaini, 2020).

9. Problems of Fresh Vegetable Market in Nepal

The main problem is the shortage of commercial farming of fresh vegetables and low productivity. The lack of knowledge about seeds, and modern techniques of agriculture and limited information about the use of different tools, techniques, and agriculture-related chemical fertilizer is another problem in fresh vegetables. Many smallholders do not have market access or they live far from the market and the government has failed to build the road and other necessary infrastructures for easy transportation of fresh vegetables to the market. Therefore, middlemen dominate the fresh vegetable market in Nepal where

farmers get low pay and profit is enjoyed by middlemen. Likewise, there is no problem with fresh vegetable imports from India to Nepal but it is hard to mobilize domestic products from farmers to market.

Informal Trade of Vegetables

Vegetables are mostly traded informally in the southern border area of Nepal. Cross-border trade is generally carried out on smaller vehicles. Such movement does not involve any proper recording, quarantine, or customs clearance processes. There are also groups of people owning bicycles and pull carts providing cross-border transportation services between exporters and importers on both sides of the border. The field survey revealed that an almost equal volume of informal trade occurs in vegetables and fruits as the formal one. Vegetables and fruits that are not exported in bulk enter the other side in a very informal way (SAWTEE, 2016).

Lack of Cold Storages

The government does not have exact data of cold storage available in Nepal. Cold storages help to store fresh vegetables and off-seasonal vegetables for a long time. Government should take an immediate step to set up cold storage in every district to store large quantities of fresh vegetables for a long time (at least 2-4 days). Such cold storages help to manage import vegetables sustainably. However, according to the Products of Nepal book published by MoICS, it is stated that there are 15 warehouses established for the storage of seeds in different locations such as Kathmandu, Hetauda, Itahari, Janakpur, Bhairahawa, Nepalgunj, Dhangadhi, Jhumka, and Nawalpur. The capacity of seed storage in all these 15 warehouses is 92,000 MT. These warehouses should have access to domestic vegetables and the priority should be domestically produced vegetables rather than imported vegetables.

Lack of Integrated Vegetables Collection Center

There are more smallholder farmers in Nepal whose main occupation is agriculture. But due to no market access, their agricultural product fails to reach the market. Therefore, the government should develop an integrated collection center for easy access to the market from smallholder farmers. It will be more productive and useful if there is one integrated vegetable collection in each local government.

Cheaper Indian Vegetables

Indian vegetables import duty-free in Nepal, Indian government subsidies, and few quarantine checks at the border, so they are cheaper than Nepalese vegetables. They have good packaging, making them attractive. India supplies nearly 40 percent of the total demand of the central vegetable market in Kalimati. Nepal imports three million tons of vegetables from India.

Post-harvest Loss

Fresh vegetables are highly perishable and need to be handled with care to avoid substantial post-harvest losses. The 25 percent to 50 percent losses while transporting from producer to retailer and above 30 percent of post-harvest loss occurs when transporting the vegetables from the farm to wholesalers, the losses increase to 50 percent as the products move to consumers (CASA, 2020).

Low Access to Financing

Lack of capital, skills, and knowledge is the main problem in the Nepalese farmer and agribusiness sector. Even though the government provides agricultural loans and subsidies, it does not reach real farmers and

the agribusiness sector. To commercial and economic agricultural farming, smallholder farmers need big capital. Therefore, there needs to be easy access to finance or cooperation with low interest.

Inadequate Growing Techniques

To increase fresh vegetable production, the current farming system needs to change in the implementation of new techniques and machinery, irrespective of the types applied. Two other necessary elements here are: 1) the extension of the vegetable season not only by using new cultivars but also using various techniques of implementation (hotbeds, greenhouse and plastic tunnels, etc.); 2) setting up anti-hail nets above orchards and plantations to ensure less vulnerability to weather conditions.

10. Recommended Strategies to Reduce the Trade Deficit in Fresh Vegetables

We should focus on increasing volumes of production and achieving cost savings through economies of scale and consequently reducing the import of fresh vegetables. In the case of Nepal, most of the land is covered by hilly and mountain areas where the agricultural productions are low and Terai land needs proper management to cultivate in such a way that yields high productivity using modern tools and techniques. The government should impose a policy like the “green revolution” to increase agriculture production. Some major recommendations are as follows.

Increase Volume of Production

To reduce the trade deficit in fresh vegetables, there should be an increase in domestic production. Government should provide a favorable environment for farmers and youth to engage more in the cultivation of fresh vegetables. Similarly, farmers should provide the training to grow fresh vegetables using modern tools and techniques, so there will be an increase in production with cultivation in limited land. The barren land should be utilized to grow fresh vegetables. The government should provide easy access to financing and technical knowledge of agriculture to unemployed youth and mobilize them to cultivate fresh vegetables. Government should strengthen existing commercial farming across the country and support the establishment of new commercial farming which will further support this objective by facilitating access to higher-quality planting materials without high import costs.

Promote off-season Organic Vegetables

Government and stakeholders should encourage the farmer to farm off-season vegetables. The government, agricultural institutions, and experts should support polyhouse technology, drip irrigation, and conduct off-season vegetable production training for farmers. Commercialization of off-season vegetables is only possible through the mobilization of large groups of farmers in targeted commodities. Favorable land should be identified in large-scale or zone areas and farmers should grow seasonal vegetables on a large and economic scale in Nepal. The increase of off-season fresh vegetables can reduce imports from other countries.

Expand the Focus Area for Vegetable Production

The Prime minister agricultural modernization program (PMAMP) has launched different agricultural programs to increase agricultural production. This project has categorized four different areas, namely Pocket, Block, Zone, and Super-zone, to grow and increase the agricultural production in the country. There is a need for providing integrated services to those production centers in terms of inputs, extension services

transport, and marketing services. Promotion of commercial farming, proper land use planning, the provision of contract farming and collective farming, and irrigation facilities are also required.

Introduce Pest Risk Analysis

Department of Food Technology and Quality Control (DFTQC) constantly monitors pesticide residue levels in food products (Koirala, Tamrakar, 2008). The department of food and quality control (DFQTC) should strongly apply the standard of use of pesticides in fresh vegetables. Likewise, the government should define the standard use of pesticides in consumable vegetables. Nepal government and DFQTC have to strongly implement a policy that uses of high pesticides in fresh vegetables should be banned in importing to the country. The government should limit the use of pesticides in fresh vegetables which are imported. This could help to reduce the sharply increasing import of fresh vegetables in-country and smooth mobilization of domestic vegetables in the country.

Work with Farmers' Groups and Encourage Forming their Cooperatives

Fresh vegetable farmers should have a good nexus and association all over the country to share their ideas and problems. The National Center for potato, vegetable, and spice crop development association is there under the Ministry of Agriculture which provides guidance and training to vegetable farmers. Government should mobilize such institutions for more production and smooth run of domestic supply chain management of fresh vegetables. Fresh vegetable growers should be encouraged to form their associations and cooperatives to bring out their collective voices and work together with support agencies within and outside the government. Farmer and farmer groups must become more nimble in responding to market trends, and this can only be accomplished by disseminating market research and promoting market-oriented production. The sector will benefit from improved coordination between the various actors involved in the value chain, including farmers, intermediaries, exporters, and researchers.

Control Post-harvest Losses

Fresh vegetables are highly perishable and need to be handled with care to avoid substantial post-harvest losses. The 25 percent to 50 percent losses while transporting from producer to retailer and above 30 percent of post-harvest loss occurs when transporting the vegetables from the farm to wholesalers, the losses increase to 50 percent as the products move to consumers (CASA, 2020). The government should devise specific programs to reduce post-harvest losses by educating producers and harvesters about optimum harvesting time, harvesting techniques, cleaning, handling techniques, packaging, and transportation.

Support for Improvement in Logistic

Farmers normally use the traditional bamboo baskets and jute sacks for packaging fruits and vegetables. These are prone to damage during handling and transportation. Plastic crates, fiberboards, and other suitable packaging materials are better for the safekeeping of the goods. The government should encourage the setting up of packaging industries in the country with appropriate incentives and tax rebates. Farmers should be made aware of the benefits of improved packaging. This will help in import management without damage.

Provide Market Information Services to Farmer

Market information is very important in today's world to keep updating the price of vegetables. Government should fix the price of vegetables for farmers and markets. With the development of the internet and mobile,

it is possible to know the prices of products at various stages of the supply chain with little effort. But, this requires supporting the farmers' association or organization and enabling them to be a part of the information collection and dissemination process. Apart from the vegetables, the market should be near residential areas where people have easy access.

Focus on the Development of Hybrid Varieties

Government and farmers should focus and research on hybrid varieties where vegetables can grow in large quantities. NARC or private institutions should take initiative to develop a hybrid. Government should implement such a policy to grow fresh vegetables on a large scale.

Support for Export Promotion and Keep Priority in National policy

The government should include and keep priority fresh vegetables in Nepal trade integration strategy and five-year planning. The government should play a vital role to recognize and minimize the non-tariff barriers to Nepalese vegetables and off-season vegetables for export promotion. The government should keep high priority in national policy and program every year to tackle the trade deficit in fresh vegetables.

Adopt Modern Tools, Technology and Invest in Research

This strategic objective will also encompass activities aimed at increasing investment in R&D for the vegetable sector. R&D is crucially needed in several areas, such as improvement of crop varieties and methods to extend production seasons. It is necessary to adopt modern tools and technology in the agriculture sector for an increase in productivity with limited resources. The government should invest in research of seed, crop, or hybrid seed that increase the quality and quantity of fresh vegetables. Enhance the quality of vegetables and ensure food safety through improved technology, management, and quality control at a primary production level and in the post-harvest stages of the chain (distribution, logistics, processing).

Improve Domestic Supply Chain

There is no mechanism for domestic supply. Government should formulate a secretary-level mechanism to smooth the running of the domestic supply chain as international trade. During a corona pandemic, the fresh vegetables from India easily reached Kathmandu and major cities whereas vegetables from the countryside did not reach the market.

Increase Investment in Fresh Vegetable Research, Development, and Innovation

It is necessary to invest in the research and development of a new variety of seeds, crops that can easily grow in Nepal's favorable environment, climate and soil. NARC and NAST other government institutes should focus on such research and innovation so the country can increase its production. The government should allocate a budget in the R&D of fresh vegetable agriculture or increase such scientific study so that the country will be economically strong.

Establish at Least one Collection Center at Each Ward of the Rural Municipality

It is necessary to set up a collection center at each ward of the rural municipality where there is a lack of access to markets and transportation. Farmers prefer to take their produce to market rather than traders. The direct access to the rural center provides them with the opportunity to know about the demand and supply of vegetables in the market.

11. Conclusion

Every year there is an increase in the production of fresh vegetables but demand is far higher than the domestic production. Thus, there is an increasing trend of importing fresh vegetables in Nepal. Potato and Onion are the topmost import among other fresh vegetables in Nepal. Imported vegetables are cheaper than domestic vegetables so the trend of import is rising rapidly.

There is no alternative to increase the production of fresh vegetables by adopting modern agriculture techniques and the use of modern and high-value seeds that grow in Nepal's favorable climate and soil with limited resources. Commercial and economic farming should be focused and prioritized in the fiscal planning of the local, provincial and central governments. Apart from this, modern tools, technology, human resources with skills and knowledge for the betterment of agriculture should be imported for the increase of production of fresh vegetables and agriculture sector. Government should facilitate importing new technology and easily available fertilizer to farmers.

The government needs to formulate favorable policies in favor of all actors involved in the vegetable sub-sector at the central level while they can provide required support and services, monitor, supervise, and follow up the vegetable production program at the field level. Vertical and horizontal communication and forward and backward linkages can also be made by the concerned authorities at the district and provincial levels. Production incentives or creating a favorable environment for the local vegetable producers should be made in such a way that more numbers of farmers or producers will participate in a vegetable production program. Government should impose high taxes on the import of vegetables to stimulate local production. All stakeholders and government should create such an environment that the cost of production in producing vegetables within the country will be at a cheaper or lower rate than the vegetables imported from abroad.

Therefore, it is necessary to focus on the regular production of seasonal and off-season vegetables in the areas wherever feasible. All vegetable production plans should be as per the demand of the market. For this, assessment of vegetable market demand such as kind/variety and quantity of vegetables is necessary. The establishment of the vegetable collection centers needs to be at the production site and linkage has to be made with the vegetable trade. Side by side, a daily or weekly local market (haat bazar system) has to be developed for the regular supply of vegetables for the local consumer as well as for local traders. Some arrangement is needed to import vegetables from foreign or neighboring countries if local production cannot meet the regular demand for the vegetables in the market. Some cold storage structures need to be developed so that vegetables can be stored whenever there is overproduction. Government should focus on infrastructural development programs such as transportation facilities for transporting vegetables from one area to another or one region to other and from hills to Terai and vice versa.

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