Role of Fruits and Vegetables Processing in Indian Economy

Atasi Choudhury, *Research Scholar,*

Department of Humanities and Social Sciences. OPJS University .Churu ,Rajasthan. 331303.India

INTRODUCTION:

Food processing is considered the fastest growing sector of the Indian economy. The Fruits and Vegetable Processing Industry(FVPI) in India is considered one of the largest sector in terms of production, consumption, economic growth and exports. Although in developing country like India, agriculture is the main support of the economy, the data received from different research articles and analytics portrayed a worrying picture (Janet and Richard 2000).The country waste a major amount (16%) of farm produce, especially the fruits and vegetables, due to a weak cold chain infrastructure and proper post harvest management practices every year(Annual Report of Ministry of Food Processing Industries ,GOI).

India ranks second in terms of production of F and V. In between 2011-12 to 2020-21 fruits production in India increases by 34.46 percent, processed fruits production increased by 48.63 percent. Vegetables production increases by 25.55 percent, processed vegetable production increased by 32.39 percent (Human Resource and Skill Requirements in the Food Processing Sector,2022). The foreign direct investment in the processing sector has also been increasing due to worldwide economic liberalisation. India has the perspective of becoming leading exporter of processed F& V products. (Goyal et.al,2017). With the increase in working women and a change in consumption habits, it is very likely that demand for ready to eat processed foods will also increase (Velu & Kather, 2016). The development of organised retail food products as well as an upsurge in global value chains for the processed food industries contributes to this change on the supply side .(Wilkinson & Rocha,2009). The availability of processing and packaging equipments at a reasonable cost must aid the growth. There is enormous scope for the export of processed products like jam, jelly , marmalade ,pickles ,sauce ,squash etc. Dehydrated and dried vegetables have high domestic demand in India. Fruits and vegetables are perishable ,seasonal, vast , and delicate in nature . Only just about 10% of India's horticultural production get the benefit of adequate cold storage facility(Birthare,2018). Due to their extremely perishable nature ,their production cannot be utilised sufficiently to fulfil domestic demand and to make it more remunerative to farmers.(Gleyn,2009).

In India, the FVPI is presently rising at a compound annual growth rate of 7.62 percent of raw materials. Today's changing lifestyles and appropriate fiscal policies from government can give a considerable boost to the industry's growth (Singh et.al,2009). Progressive steps have also been taken by the government to decrease processing industrial bottlenecks by putting emphasize on processing and storage capabilities and make available finance to the industry sector(Murthy and Yogesh,2014). Both the central and state government are giving

encouragement to the producers by the establishment of community canning centres, training, providing necessary inputs ; and the establishment of commercial processing and packaging centres. (Human Resource and Skill Requirements in the Food Processing Sector,2022).

The past decade has witnessed a fundamental development in India's food processing sector, but still the processing level in India is on a slow track when compared with huge production. Hence, it should be realised that its increase would in turn boost the Indian economy. The government has also increase its focus on this sector and conferred it with several fiscal reliefs and motivation to commercialise (Matapurkar & Arnav,2011).

Moreover , different theories and empirics suggest that the growth of the food processing industry and wastage minimisation are interrelated in various ways. In this context, the FVPI which is a major contributor to the food processing industry in India , has been chosen to conduct some analysis. Here gross value added (GVA) is used as a parameter of economic growth. Different statistical estimations applying the growth trend analysis in this study are based on the following objectives.

- To investigate the scope ,status and importance of the fruits and vegetables processing industry in India in recent years based on its strength , weaknesses, opportunities and threats (SWOT), and political, economic, social and technological (PEST) in section I. It also likes to highlight the new initiatives taken by GOI to boost FVPI in recent years.
- To examine the possible correlation between commercial processing of F&V and the wastage minimisation of fresh F&V in section II.
- To examine the growth of F&V processing and export of processed F&V from India and its impact on wastage minimisation in India section II.
- To analyse the growth of domestic and global demand for India's processed fruits and vegetables products and the role of the F&V processing industry in economic growth using the parameter Gross Value Added(GVA).

LITERATURE REVIEW:

There are many research papers analysing the characteristics of Indian agriculture that it is dominated by huge number of marginal and small farmers and landless labourers who are unable to manage monetary benefits from production of F&V (Dev,2012).Besides in rural areas 56% do not own land and often work as farm labourers. Therefore while their incomes are not only extremely low but they also remain unemployed or underemployed. The supply chain system of farm produce towards market is also fragmented. Various studies observed insufficient infrastructure for storage, packaging , handling and transport of the fresh produce from the place of production to the market and processors(FAQ,2014)(Singh.G,Daultani.Y,Sahu.R,2021)(investigating barriers to growth in the Indian food processing sector,OPSEARCH 59,441-459. As a result ,a bulk amount post-harvest loss takes place every year. The FVPI can play a major role in the future development of horticultural sector by emphasizing on the farming of those crops with specific varieties acceptable for processing(Goyal,2006).

Fruits and Vegetables accounts 90% of in overall production of Indian horticultural sector (Horticultural statistics at a glance,2018). The study has observed an increase in the volume of processed fruits and vegetables in India in the last decade. Analysis of the economic importance of this change shows that it is economically viable and beneficial in minimising the wastage and to increase the contribution of horticulture in Indian agricultural GDP ,which is presently 30.4 percent(icar.org.in horticultural division). In 2020, horticulture was responsible for 37.1 percent of total export of agricultural goods.(Senger,2020). Some studies found that percentage of the total production of fruits and vegetables under commercial processing in India is only 10%. This statistics is also very low in compare to the countries like Philippines at 78 percent, China 23 percent and the USA at 65 percent(Dhanya el al.,2020). Processing of F&V essentially required a more planned and systematic manner. Many of the researches and policy makers also have suggested some of the strategies and policies regarding industrial progress. The study confirms the rising consumption demand for India's processed F&V both in the domestic and international markets at present and in the coming years in the light of various initiatives taken by the government.

Therefore ,growth of FVPI and wastage minimisation of horticultural crops have been identified as two major issues in the context mostly on improved farm income and economic growth is another one. The whole fact has been a fertile research topic, particularly in India as the prevailing literature does not bring those variables (expansion of the FVPI and wastage minimisation of horticultural crops and economic growth) together during the mentioned period and also does not provide the ambiguous outcome. That is why,while the facts and issues related to processing and wastage minimisation has been raised in the context of the Indian economy, then FVPI is inevitably chosen first to continue the research, mostly due to the developing and attractive feature and performance of this sector in the field of export, boosting farm income .(Rajendra et al.,2013) .

Globalisation and liberalisation have brought important challenges and a huge competition to the processing industry. Farms must be in newer approach and need to anticipate and respond to the requirements of clients for their existence and growth. Then we can only think to develop the F&V processing industry as a sunrise industry (Goyal et al.,2016). F&V processing in India is highly decentralised. A huge number of units are in the cottage/home-scale or small scale sectors having a limited capacity of up to 250 tonnes per annum, though gaint Indian and multinational companies have capacities in the range of 30 to 50 tonnes per hour or so (Sharma et al.,2016). India is counted as the largest producer of many fruits and vegetables, but there still a huge gap exist between per capita demand and supply due to huge waste during storage ,handling caused by improper bagging without crating, lack of temperature control vehicles, unavailability of cold chain facilities in various parts of the country for preserving the produce, along with insufficient processing of the horticultural produce, which result in massive losses for the economy (Kachru,2012).

There are several challenges involved in this industry, like the creation of adequate modern specialised cold storage facilities, logistic infrastructure, skilled manpower development through community development programmes and the use of advanced technologyfor ensuring quality standard and productivity. India's processed F&V are comparatively cheaper due to the

large availability of raw materials, cheap labour and many cost effective traditional ways of processing and preserving. This makes them more beautiful in the global market. India still succeeded to export only 20-22 percent of its total production of processed fruits and vegetables per year. In many cases on the ground of low quality the produce from India is many a time rejected by developed countries (Ngarmsak & Jennylynd,2010).

MATERIALS AND METHODS:

The study includes the estimations of the total production of processed fruits and vegetables based on the aggregate processing percentage given by National Horticultural Database and Ministry of Agriculture. The amount which is wasted is being calculated on the basis of cumulative wastage percentage data provided by Central Institute of Post Harvest Engineering and Technology(CIPHET) in terms of volume(lakh tonnes). All percentage ,shares, splits and breakdowns have been determined using secondary sources. Agricultural and Processed food products Export Development Authority (APEDA), Directorate General of Commercial Intelligence and Statistics (DGCIS, Kolkata), Ministry of Commerce and Industry, Anand Agricultural University Gujarat, Associate Chamber of commerce and industry India (ASSOCHAM) to identify and collect information useful for these analytical study of the FVPI in India. This study use data of export by Ministry of Agriculture and APEDA in terms of value (US$ Million).Gross Value Added (GVA) of FVPI is used as a standard measure of economic growth. For finding out relation between and trends of different variables (P, W, GEV, DmD, ED) correlation coefficient and linear regression analysis has been used. It should be mentioned here that the national level time series data on Production, Export, Gross value Export of processed F&V is sufficient to conduct growth trend analysis, and the period of study is also significant in terms of all variables ,especially export of processed fruits and vegetables produce.

RESULT AND DISCUSSION:

SECTION I:

SWOT AND PEST ANALYSIS in recent years:

A SWOT analysis is an instrument for documenting internal strength (S), weakness (W) in an industrial venture, as well as external opportunities (O) and threats (T). A SWOT analysis can critically identify the success factors laid behind the start-up of a FVPI. The SWOT analysis also generates newer pathways in exploring new initiatives, revamping internal policies, considering opportunities to pivot or altering a plan mid way through its execution and planning to achieve the targeted goals. A brief SWOT analysis can reveal the information in a more detailed manner.

PEST Analysis :

A PEST analysis studies the key external factors(Politica, Economic, Social, and Technological) that influence business venture. It can be used in a range of different scenarios and can guide professionals and senior managers in strategic decision making to start an

industrial set up. Generally the PEST analysis is done after SWOT analysis to measure the impact of key external factors in macro economies scale for set up an industrial procedure. Here the PEST analysis can portray the clear information of the key external factors for establishment of F&V processing industry.

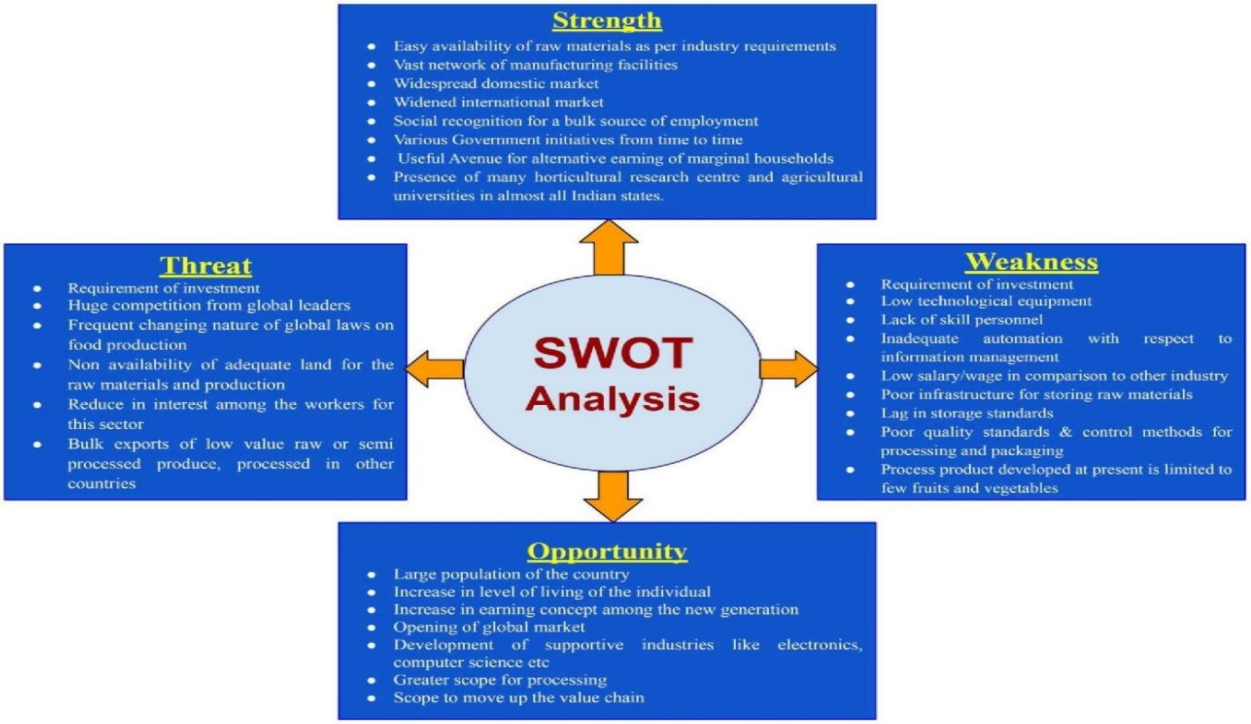


Figure 1: SWOT Analysis of FVPI (Source: compiled by authors based on information from Data Bank on Economic Parameters of the Food Processing Sector – 2011 published by the Ministry of FPI, GOI, New Delhi)

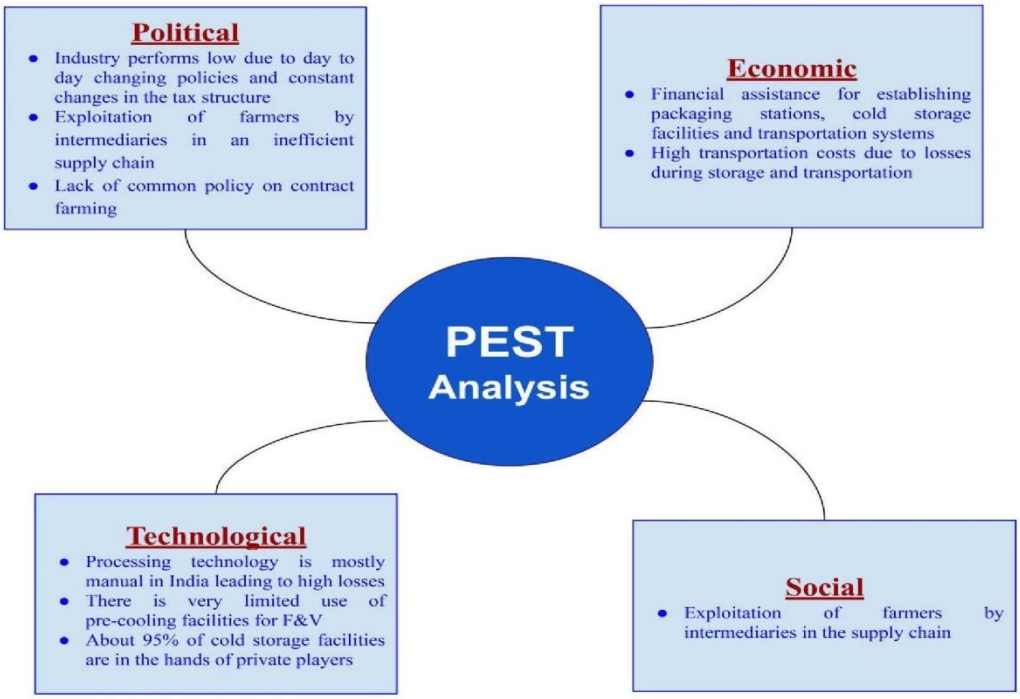


Figure 2: PEST analysis of FVPI (Source: Modified after Sharma et al., 2016)

- Some of the new initiatives are a planned infrastructure spend of around INR 100 lakh crore($ 1trillion) and INR 25 lakh crore to boost up rural economy have put the food processing sector on a high growth trajectory.
- The Pradhan Mantri Kisan Sampada Yojna is a comprehensive package which shall create modern infrastructure with efficient supply chain management from farm to retail outlet.
- More recently , Prime Minister Modi's Atmanirbhar Bharat vision, the scheme of formalisation of micro food processing enterprises is being rolled out with an outlay of INR 1000 crore(Omre el.al., 2018).
- The Food Safety and Standard Authority of India(FSSAI) plans to invest around Rs 482 crore to strengthen the food testing infrastructure in India by upgrading 59 existing food testing laboratories and setting up 62 new testing lab across the country.
- The Indian Council for Fertiliser and Nutrient Research(ICFNR) will adopt international best practices for research in fertiliser sector ,which will enable farmer to get good quality fertilisers at affordable rates and there by achieve food security for the common man.
- The Ministry of food processing industry announced a scheme for Human Resource Development(HRD) in the food processing sector; this will be implemented through State Government under the National Mission of food processing. It has four components as follows.

a) Facilities for infrastructure creation and policy mapping for degree/diploma courses in food processing sector.
b) Entrepreneurship development programme.
c) Food processing training centres.

d) Training at recognised institutions at State/National level.

Section II: Recent Trend Analysis

Production of fresh fruits gradually increased over the decades followed by gradual increase in the overall production of processed fruits in India. The average wastage percentage of fresh fruits witnessed a significant fall of 2,4 percent after 2014-15 in compared to previous years. This decline has been more prominent for those fruits which are major contributor of processed fruit basket of India like mango, banana. However improvement in technology has less effect on FVPI, as this industry in India is dominated by unorganised sector. The latter years of the last decade recorded further fall of 2 percent in wastage of fruits accompanied by sustained increase in the level of processing.

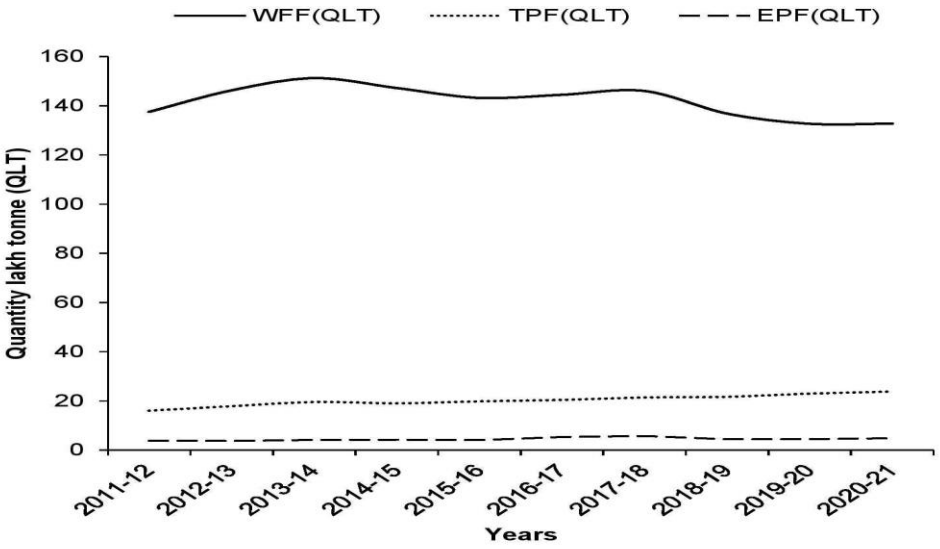


Figure 3: Trends in production of processed fruits and wastage of fresh fruits [WFF. Wastage of Fresh Vegetables; PF, Processed Fruits; EPF, Export of Processed Fruits; QLT, Quantity lakh tonne] (Source: National horticultural Database, Ministry of agriculture and CIPHET database)

Figure3, shows that over the years in between 2011-12 to 2020-21 commercial processing of fruits in India increased by more than 48.62 percent. This trend is expected to continue as demand for Indian processed food is expected to increase both in domestic and international market. Though the overall percentage of processing of fruit is very low but it has found in the graph that commercial processing of fruits in India is increasing gradually over the years. Total production of fresh fruits increases by more than 34.46 percent over the aforesaid period. Whereas the wastage(W) amount decreases by more than 9 .26 percent with the increase in processing(P). The Correlation Coefficient between processing(P) and wastage(W) in case of fruits is -0.48157. Therefore, though the production of fresh fruits increases but there is significant fall in wastage quantity. In the Regression analysis the value of adjusted R^2=0.204 indicates that present level of processing and export of processed F&V is not sufficient for minimisation of current level of wastage. Significance F= (0.450302) indicates that the direct impact of processing and export of processed fruits on wastage minimisation of fruits is not very strong. There is many other factors may responsible. So we need to look deep into deep into this matter. The regression analysis shows that coefficients (PF=-1.85617) indicates

negative relationship between processing and wastage i.e more processing results less wastage but the current level of fruit processing is not showing very high impact on wastage volume. P values are not less than 0.05 for both of the independent variable imply that none of them have effects on wastage alone.

Therefore, combined effort should be taken incorporating infrastructural and technological development along with expansion in the level of processing and export of processed fruits in order to solve the high wastage problem in this sector.

The results of regression analysis indicates that in case of vegetables both processing and export of processed vegetables have significant impact on wastage of fresh vegetables(R^2=0.849797). (P value=0.00042) indicates that processing has strong impact on wastage of vegetables, and both are negatively related (coefficient=-3,78). Export of processed food also have strong impact.

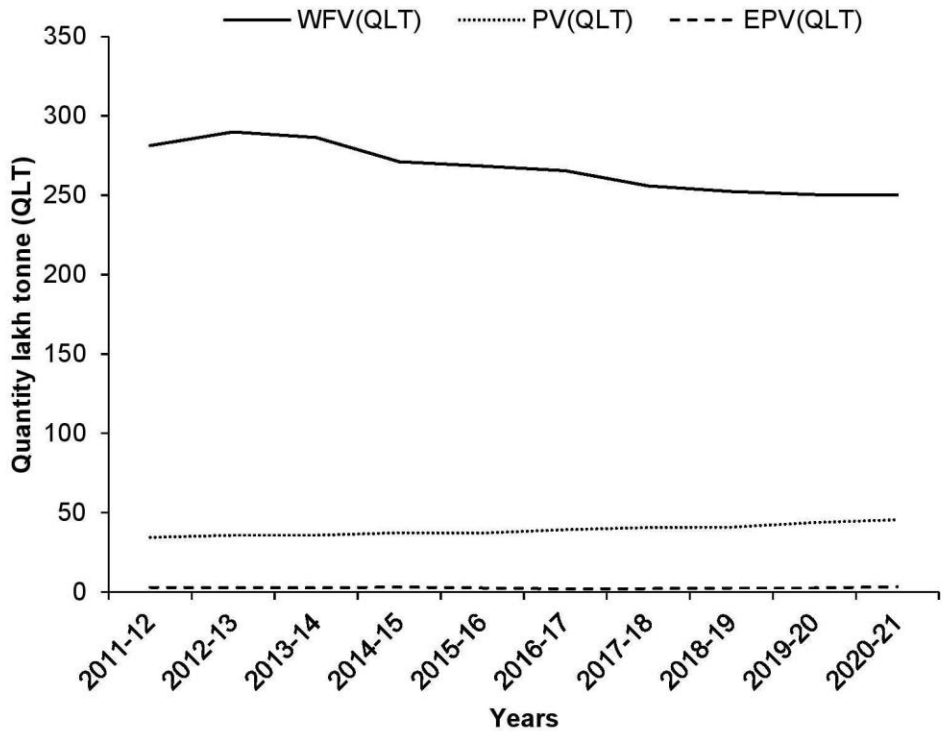


Figure 4: Trends in production of processed vegetables, export of processed vegetables and wastage of fresh vegetables [WFV: Wastage of Fresh Vegetables; PV: Processed Vegetables; EPV: Export of Processed Vegetables; QLT-quantity lakh tonne] (Source: National horticultural Database, Ministry of agriculture and CIPHET database)

Figure4,shows in case of vegetables almost same scenario can be observed. Commercial processing of vegetables increases by more than 32.39 percent in between the year 2011-12 to 2020-21. There were continuous increase in the volume of processed vegetables in the same period. Whereas the wastage of fresh vegetables declines by more than 11 percent in between the aforesaid period. The value of the correlation coefficient between the two variables, level of processing (P) and wastage of fresh (W) for vegetables during the above mentioned period

R=-0.9086, indicate strong negative correlation between the two. The fall in wastage may be attributed to a number of factors but expansion in the level of processing has definitely played an important role in the minimisation of wastage of fresh vegetables. The movement of volume of processing (P) of F&V and the wastage (W) in opposite direction over the years clearly indicates that higher volume of processing results lower volume of wastage of fresh F&V. In India presently commercial processing of F&V is very low. The encouraging fact is that it is increasing steadily over the years.

Table 2.Trends in Production, Processing and Wastage of Fruits, V

egetables and F&V between 2011-12 to 2020-21

	Fruits (%)	Vegetables (%)	F&V (%)
Production	34.46 (I)	25.55 (I)	28.48 (I)
Processed	48.63 (I)	32.39 (I)	37.56 (I)
Wastage	3.49 (D)	11.07 (D)	8.58 (D)
Export	25.84(I)	14.40(I)	20.90(I)

*I denotes Increase and D denotes decrease.

Major part of processed F&V in India includes dried and preserved vegetgables and mango pulp. The current processing levels in F&V stands at a mere 2.32 percent on an average of the overall production. The opportunity can be explored in the form of frozen , canned ,pulp, puree, paste, sauces, snakes, dressings, flakes ,dices, dehydration, pickles, juices, slices , chips, jams, jelly etc. Catering to the growing demand for healthy alternatives, some fruits- based ingredients for ice cream. yogurt and beverages.

India is progressively shifting its attention from export of fresh horticultural products to process ones for better realisation and beat the stringent import quality norms set by West Asian and European countries. India has a highly decentralised F&V processing industry. Let us discuss the export statistics of processed F&V during 2010-11to 2020-21. To investigate the dynamic inter-linkages among Processing (P), Wastage (W), Gross Export Value (GEV) of processed F&V empirically in India, the study obtains the correlation matrix of the variables as presented in table 4. The findings observe high (-) correlation coefficient between P and W, W and GEV and high positive correlation between P and GEV having the value of -0.87,-0.75 and 0.96 respectively.

Table 3. Descriptive Statistics of variables

Statictics	Processing(P)	Wastage(W)	Gross Export volume(GEV)
Mean	59.2999	409.0235	7.712222
Median	58.337	410.825	7.26
Maximum	69.37	437.63	10.32
Minimum	50.432	383	6.52
Std Dev	5.908529	19.84802	1.264365
Observations	10	10	10

(Source :estimated by authors using National horticultural Database/ministry of agriculture and CIPHET database)

Table 4.Correlation Matrix of variables

Variables	Processing(P)	Wastage(W)	Gross export volume(GEV)
Processing	1.00	-0.87	0.96
Wastage	-0.87	1.00	-0.75
Gross export volume	0.96	-0.75	1.00

(Source :estimated by authors based on National horticultural Database/ministry of agriculture and CIPHET estimates)

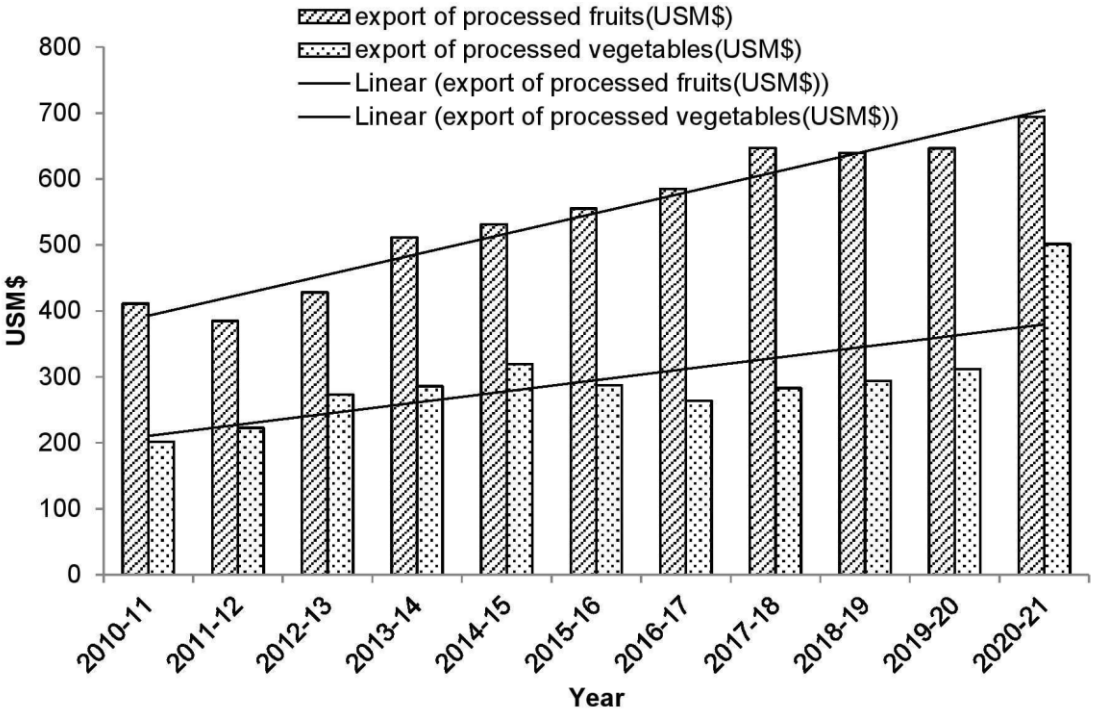


Figure 5: Trends in export of processed fruits and processed vegetables from India (Source: estimated by the authors using DGCIS, Kolkata database)

India's GEV of processed fruits increases almost steadily between the years 2011-12 to 2020-21 with some minute fluctuations. During the mentioned period Gross Export Value (GEV) of processed fruits (US$ Million) increases by 80.48 percent, indicating expansion of global demand for Indian processed fruits and economic growth. The major destinations for Indian processed fruit produce are Bangladesh, UAE, Netherland, Nepal, Malaysia, UK, Sri Lanka , Oman, Qatar etc. Despite Covid 19 pandemic disrupted trade around the World, an overall growth of 8.52 percent achieved in export of processed fruit products in between 2018-19 (639.65US$M) to 2020-21 (694.14 US$M) due to concerted efforts and initiatives taken to facilitate export from India. It is expected that this increasing trend of Gross Export Value (GEV) will continue in the next financial year(2021-22) due to increase in demand especially from Middle East, Far East, USA, UK markets.

Despite increase in GEV of processed fruits its share in overall agricultural export remains almost same (1.6%) and in case of processed vegetables its share increases marginally (0.8 % to 1.22%) over the aforesaid period. This is due to dominance of preserved and semi processed items in the export basket of India, which are then processed further to produce finished product in other countries. The GEV of processed vegetables from India increases by 149.2 percent in between 2010-11(201.268US$M) to 2020-21(501.56US$M) indicating economic growth. The major importers of India's processed vegetables products are USA,UK, Germany ,Thailand ,Canada, Nepal, UAE, Australia, Brazil (APEDA) .

India produces a wide variety of vegetables all over the year. Major exported processed vegetables are sweet corn, tomatoes; pickled vegetables including, cucumber, green tomatoes, onion, radish , cabbages and chillies etc. There is steady and noticeable increase in the GEV of processed vegetables from India between 2018-19(293.95US$M) to 2020-21(501.56US$M) growth rate is more than 70.63 percent instead of the Covid19 constraints. According to APEDA this trend is likely to continue in the coming financial year due to increase in demand from existing importers and addition of some new export destinations like Soudi Arabia, Singapore, South Korea , New Zealand ,Netherland, Japan etc.

Section III: Trend analysis of domestic & export demand for processed.

The domestic demand for processed F&V produce in India. Which has been calculated by subtracting export amount of the processed F&V from total production of processed F&V in India in respective years.

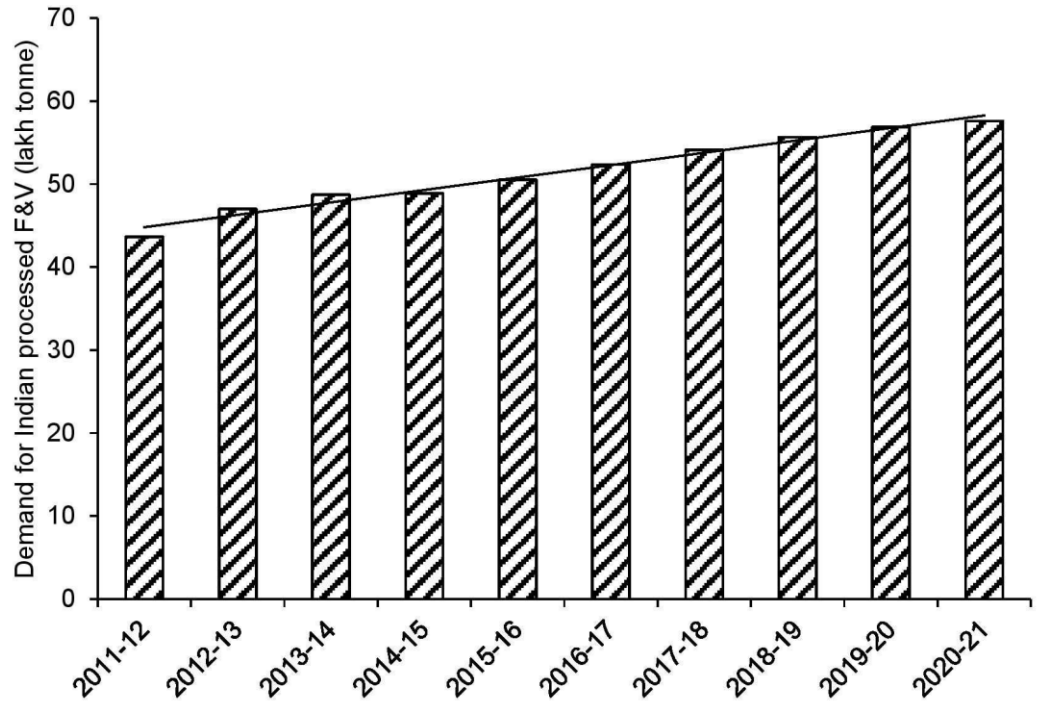


Figure 6: Trends in Domestic demand for Indian processed F&V (Source: Estimated by authors based on production and export data by Anand Agricultural University Gujarat, Ministry of Commerce and Industry and DGCI&S).

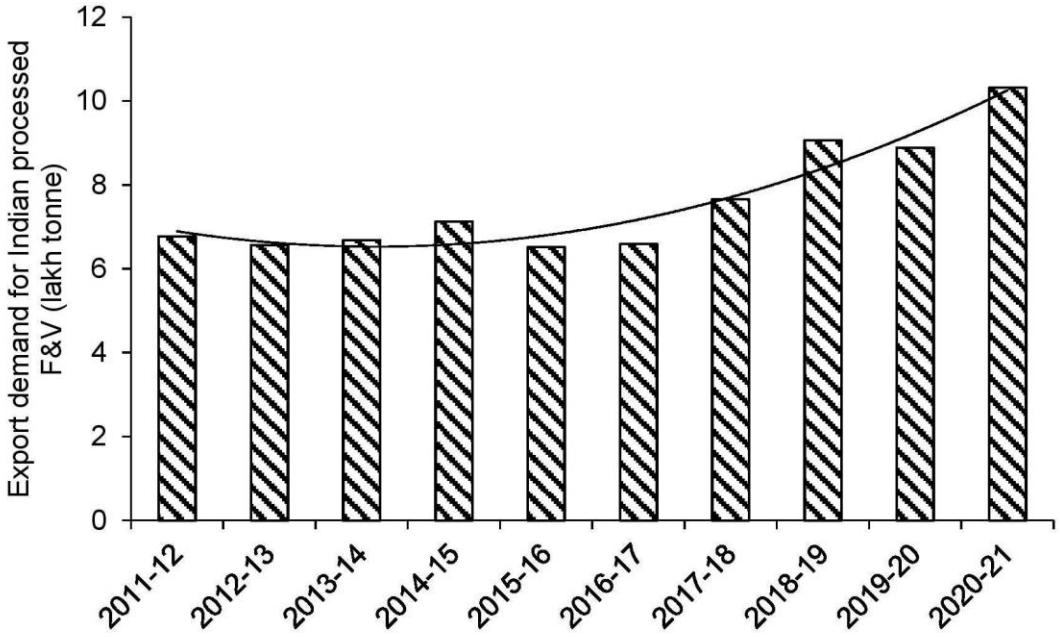


Fig. 7: Trends in export demand for Indian processed F&V (Source: Based on the data base of Anand Agricultural University Gujarat, Ministry of Commerce and Industry and DGCI & S)

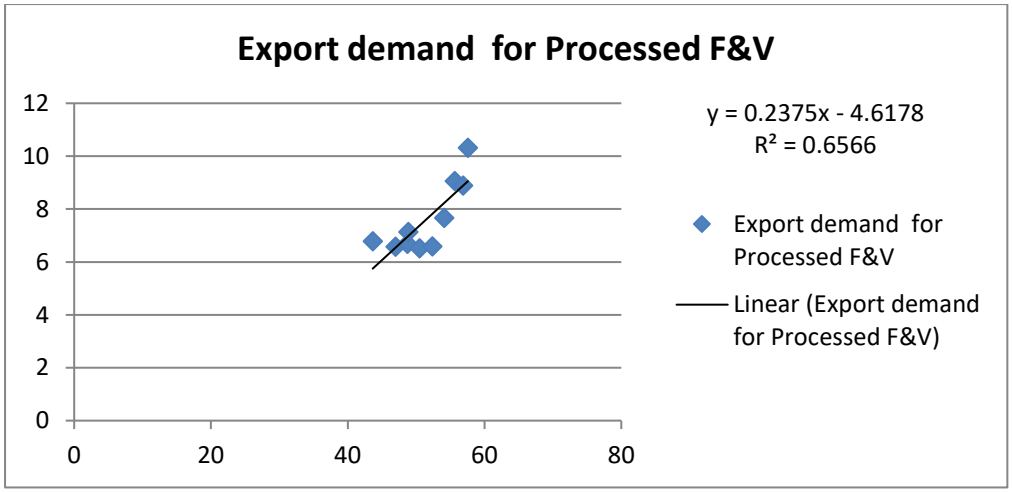


Figure 8, regression line between domestic demand for Indian processed fruits and vegetables and export demand for Indian processed F&V over the years 2011-12 to 2020-21.(Source: estimated by authors based on production and export data by Anand Agricultural University Gujarat, Ministry of Commerce and Industry and DGCI&S).

Figure 8. indicates a sustained rise in domestic demand for domestically processed F&V over the aforesaid period. India was projected as the fastest growing market for the processed F&V from 2014 onwards (F&V processing market, Jan 2018). Domestic processing market has been mostly driven by the rising demand for convenience foods, the growing food service industry, the amplified presence of contemporary retail outlets and increasing awareness about the

benefits of F&V. There has been a positive growth in ready to serve beverages, fruit juices and pulps, dehydrated and frozen fruits and vegetables products, tomato products, pickles, convenience vegetables, spice paste, processed mushroom and curried veg. In between 2011-12 to 2020-21 consumption of domestically processed F&V increases by 31.91 percent which is not very much convincing but during this time it is increasing steadily. Interesting fact is that import of processed F&V in India during this time increases both in terms of quantity and value. In between 2015-16 to 2017-18 import of processed F&V increases by 26.31 percent (54341.53 tonne -68636.93 tonne) in terms of quantity. Where as in terms of value it increases by 44.89 percent (64682.10lakh-93718.56lakh), The leading players of Europe and US focus on tapping the market in India. These figures attracts researchers' attention to the reality that domestic production of processed F&V is not sufficient to fulfil consumption demand in domestic market. Besides the domestic consumption of value added F&V products is low compared to primary processed food in general and fresh F&V in particular.(annual report of ministry of food processing industry 2016-17). The reasons behind the low production of processed F&V is higher incidence of tax and duties including that on packaging , material, lower capacity utilisation, non adaptation of cost effective technology, high cost of finance, infrastructural constraints, inadequate farmers processors linkage leading to dependence upon intermediaries. The smallness of units and their inability for market promotion are also reasons for inadequate expansion of the domestic market. If the FVPI in India at least able to fulfil rising domestic demand only it would able to save valuable foreign exchange invested for importing processed F&V produce. In this way FVPI can contribute more dynamically in the economic growth of the country. Besides ,it is contributing through the expansion of volume and value of processing of F&V over the last decade.

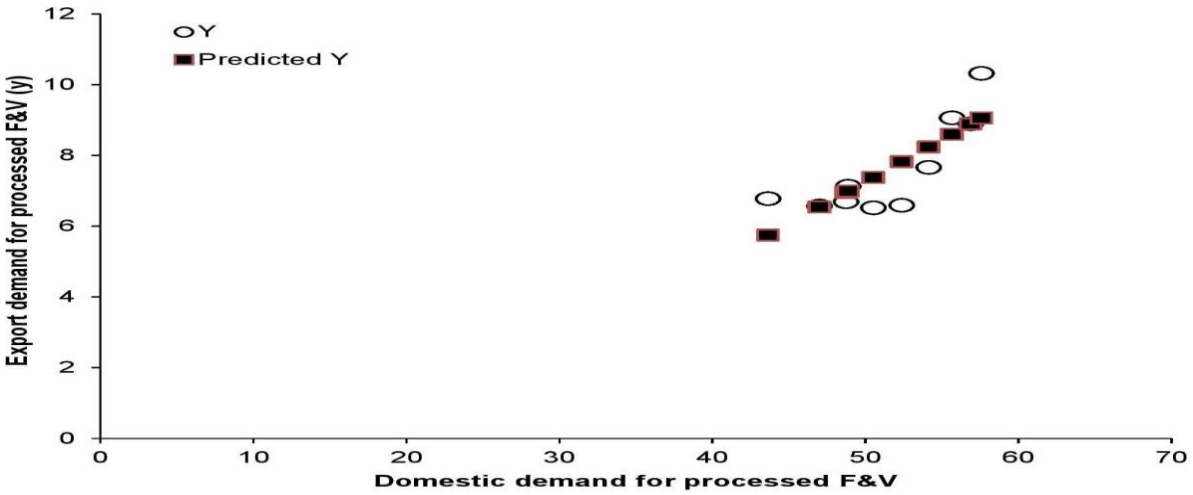
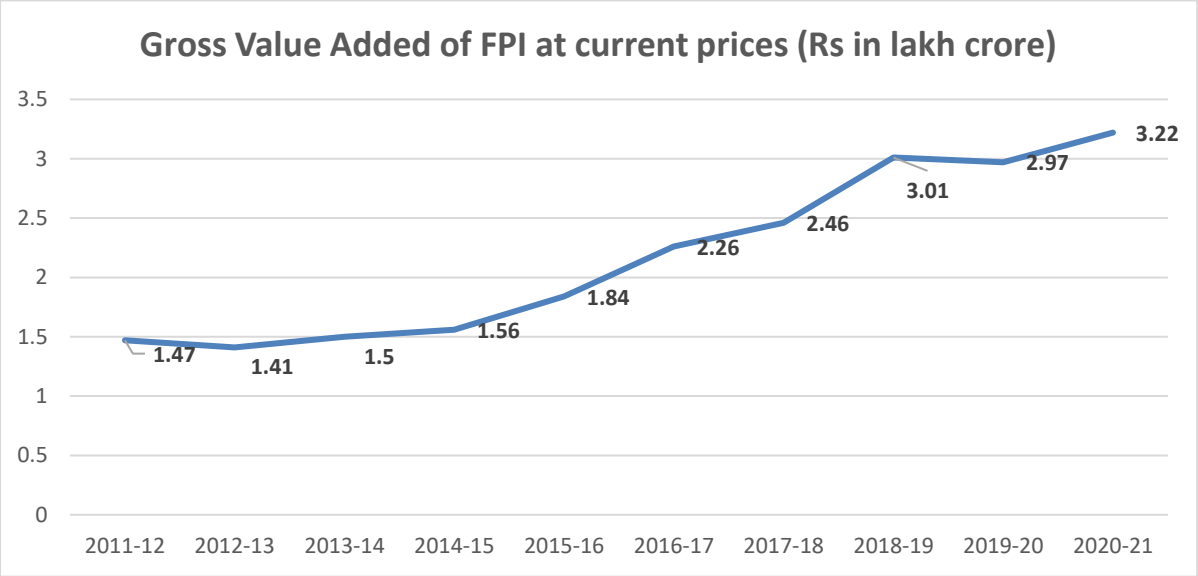


Figure 9: Predicted export demand for Indian processed F&V

Figure9.depicts the export demand for Indian processed F&V continuously increasing after 2015-16 except a marginal fall in 2019-20 due to Covid19 contraints. The outcome of the estimation of time series data in table 6 and regression in fig.3,R^2=0.6566 predicted export demand for Indian processed F&V imply the existence of long run association between domestic demand for Indian processed F&V and export demand for Indian processed F&V in global market. Therefore, demand for Indian processed F&V increasing both in domestic as

well as international market also. This reflects high potential of this sector in energising economic growth by improving GVA.

Figure10, the Gross Value Added (GVA) of FPI at current prices over the study period.



Source : Ministry of food processing industry,GOI

The FVPI is the largest contributor of overall output of FPI in India, among different segments of FPI it contributes 20.9 percent of total output of FPI in India during 2017-18 (Dhanya et al.,2020). Fig 10 shows that the GVA of FPI has constantly increasing except a nominal fall in 2012-13 and during the crisis period of Covid19 during 2019-20.

Mapping policy and research framework for the development of FVPI in India:

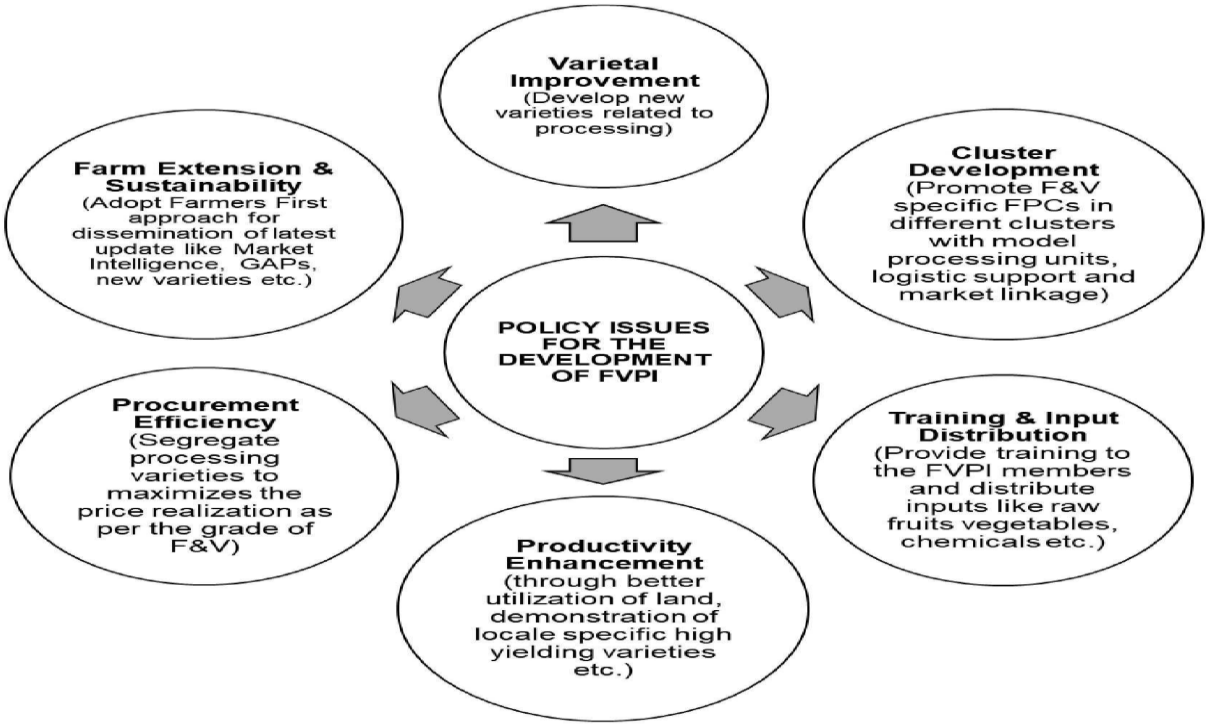


Figure 11: Policy mapping for the development of FVPI in India

The backdrop of policy formulation regarding F&V processing validates a peak level of collective responsibility for agriculture related policies. Policies applicable to F&V processing are suited within various government sectors, namely Agriculture, Food Processing, Commerce and Industry, and Health(particularly with respects to standards),as the policies are related to demand, which are mainly placed within the Agricultural Marketing department (Khandelwal et al.,2019). The Policy mapping must be undergone after setting the appropriate research framework.

Conclusion

The evidence recognised in the article on the basis of outcomes of the correlation test from the time series data developed from FVPI in India during 2010 to 2021 reveals that expansion of processing (P) and growth of gross export value(GEV) have significant impact on wastage of fresh F&V. Moreover the expansion of F&V processing has also a negative effect on wastage. The overall findings of the study are consistent with those of (Birthare,2018) on the role of F&V on Indian economy over the period 1991-92 to 2014-15. An expansion of the processing industry enables the economy to reap the advantage of abundance of raw materials(F&V) and cheap labour, increased earnings from domestic and international markets and alternative employment opportunities for people. Moreover, processing influences minimisation of wastage of raw produce (Raj et al.,2020).

However differences in inter-state level can be rationalised based on the disparity in level of processing, availability of raw materials and infrastructure, policies of the government and institutional development. In future scholars and researchers may conduct their research studies

to incorporate these variables in this research postulate unambiguously to identify the exact ways through which processing and export expansion affect economic growth. Besides, the results of the study is very important for policy nmakers.,while they will design policies. The findings of the study might prescribe that F&V processing should be given special emphasis for its growth and development as it is a vital sector of the economy and that will result a positive effects on gross export value as well as GDP growth. The article also observes that improvement in level of F&V processing positively influence Gross Export Value and employment opportunities, and that is why prior attention to promote F&V processing would have both direct and indirect (through wastage minimisation of fresh produce) positive multiplier effects on economic growth.

The present study is limited to Indian economy only, and that is why there is high scope to expand this study by including other developing countries. Moreover some more advanced time series data econometrics methods like Durbin –Watson Auto Correlation test may be applied with the same data structure to obtain some novel outcomes.

Declaration of Conflicting Interests:

The author declares no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

References:

1. Birthare . S (2018) Scope ,Status and importance of fruits and vegetables industries in India& role of F&V in Indian Economy. (working paper dept of Horticulture.gov.in.APEDA p.14) .
2. Dev .M.S, Small farmers in India :Challenges and Opportunities (2012),(Indira Gandhi Institute of Development Research ,Mumbai) http://www.igidr.ac.in/pdf/publication/WP-2012-014.pdf.p.2-25.
3. Dev,S.M., & Rao, N.C(2005).Food processing and contract farming in Andhra Pradesh:A small farmer perspective. Economic and Political Weekly,2705-2713.
4. Dhanya V(March 2020).Food processing industry in India: Challenges and Potential[RBI bulletin]. Kumar.R and Shukla .A.K of Department of Economic and Policy Research(pp 27-41). Reserve Bank of India.
5. FAO.(2014).A report on postharvest management of fruits and vegetables in Asia-Pacific region.APO and FAO.
6. Singh.G,Daultani.Y,Sahu.R(,2021) Investigating barriers to growth in the Indian food processing sector,OPSEARCH 59,pp 441-459.
7. Glenyn, B.(2009).Cold chain and storage action plan, Chemonics International, US aid from the American people, private sector competitiveness enhancement program (pp 1-50).
8. Goyal, S.K.(2006) Potential in agribusiness-fruit and vegetable processing industry in India. J International Farm Management,3,2-15.
9. Goyal . Poddar Publication Varanasi J.P& Kumar S(2016),Book. Indian Agriculture and Farmers

10. Human resource and skill requirements in the food processing sector (2022)-A report (2011).
11. J.Jenny (2002). Postharvest management of fruits and vegetables. Sydney postharvest laboratory information sheet.
12. Jannet B., and Richard E (2000). Postharvest harvest handling of fruits and vegetables. Appropriate Technology Transfer for Rural Areas (pp 1-8)
13. Kachru R.P (2012).Agro-Processing Industries in India growth-status and prospects[Innovaciones alimentarias INNOVAL C.A].
14. Khandelwal, S., Verma, G., Shaikh, N.I.,Siegel,K.R., Soni, D.,& Thow, A.M(2020). Mapping of policies related to fruits and vegetables accessibility in India. Journal of Hunger and Environmental Nutrition, 15(3) 401-417. https//doi.org/10.1080/19320248.2019.1595254
15. Murthy,T.M.S.,& Yogesh, M.S (2014).A over view of food processing industry in India- challenges and opportunities. Online Interdisciplinary Research Journal,4(5),187-193.
16. Ngarmsak,T., Jennylynd, B.J.(2010). Processing of fresh -cut tropical fruits and vegetables :A technical guide, RAP Publication pp.,72.
17. Olaoye , O.A.(2014). Potential of the agro industry in achieving food security in Nigeria and other sub Saharan African Countries. Journal of Food Security.2(!),33-41