Growth, Nature, and Scope of Food Processing Industries in Punjab

** Rajiv Khosla*

Abstract

Punjab is a landlocked state that used to perform reasonably well in terms of agriculture and industrialization until a few years back. It is today facing numerous problems in both these sectors. Researchers have already raised apprehensions about the sustainability of agriculture in the state. Economic benefits offered by other states remained successful in getting the industries shifted from Punjab. At this juncture, policy makers are increasingly focusing on the development of food processing industries that can be a catalyst in reviving the lost glory of the state. This study attempted to empirically find out the performance and prospects of food processing industries in the state. Specifically, I endeavored to find out the dominance, growth, and competitiveness of food processing industries in Punjab since 1980 - 81 besides identifying the nature of food processing industries. Three - digit level data which is issued by the Ministry of Statistics and Programme Implementation, New Delhi for different industries throughout India is used for the purpose of analysis after working out the concordance to facilitate comparison. On the basis of results, appropriate conclusions were drawn and recommendations were extended for the development of food processing industries in the state.

Keywords : **Three digit, food processing, Punjab**

JEL Classification : O2, R23

Paper Submission Date : October 29, 2018 ; Paper sent back for Revision : April 20, 2019 ; Paper Acceptance Date : April 30 , 2019

The latest report by OECD (2017) entitled *OECD - FAO Agricultural Outlook 2017-26* developed jointly by organization for Economic Cooperation and Development and Food and Agriculture Organization projected that commodity prices would remain low over the next decade (OECD & FAO, 2017). The reasons attributed for this fall in prices descend on both the demand as well as supply side. Since the increase in population growth is expected to slow down (particularly in emerging economies), the reliance on fossil fuels will continue to be high owing to fall in their prices. Accordingly, there will be a reduction in demand for crops and vegetables like maize, sugarcane, and vegetables, which are primarily used in the preparation of ethanol and bio-diesel, ultimately leading to less demand. On the supply side, due to the adoption of new cropping technologies, higher output per animal, use of new areas into cultivation, and expansion of irrigation, etc. will render the price decrease inevitable. This report is assumed to rub salt on the wounds of farmers in India.

Already faulty government policies have ruined the farming occupation in general and farmers in particular. Since liberalization, under the impact of WTO, successive governments allowed the import of food items when domestic production decreased in order to cut down the apprehensions of an increase in domestic prices. Similarly, governments restricted the exports of crops from India, even though the prices in global markets stood high so that prices in domestic markets may be contained from increasing in tandem with global prices. Thus, these restrictions on imports and exports have taken a toll on the economic health of the farmers. In a nutshell, the

* *Associate Professor & Director (Officiating),* Institute of Management, DAV College, Sector 10, Chandigarh. E-mail : rajivkhosla78@gmail.com

DOI : 10.17010/aijer/2019/v8i2/145223

farmers are in receipt of lower prices for their crops when exports are banned, while they are robbed of higher prices for their crops when imports are made by the government. Economists like Gulati (2017) remarked on the restrictions on exports to suppress farm prices as implicit taxes on India's farmers.

Such flawed policies are devastating for the economic health of those states of the union that acted as the 'food bowl of India' and continue to be agrarian in nature like Punjab, Haryana, Uttar Pradesh, etc. These shoddy policies cast their black spell on these states over and above the existing problems with which these states are grappling like steady increase in farm income, over dependence on migrant labour, practice of wheat - rice monoculture, fall in water table, and environmental degradation, etc. At this juncture, experts like Ghuman (2011), Raikhy and Nanda (2000), Sidhu (2002), Sidhu and Johl (2002), Singh (1999), etc. advocated for the development of food processing and agro-based industries that can help to achieve some long term benefits for the state like optimum utilization of natural resources especially soil and water, maintaining sustainability and stability in productivity and income, etc. Thus, the nucleus of development for Punjab's economy in the future lies in the development of food processing industries. The present study is carried out to find out the growth, nature, and prospects of food processing industries in the state of Punjab. The objectives of this study are:

(i) To find out the dominance and growth of food processing industries in Punjab.

(ii) To compare the performance of food processing industries of Punjab vis-à-vis similar industries in other states of India.

(iii) To examine the nature of food processing industries of Punjab.

Database and Methodology

For the purpose of the study, secondary data were collected from various issues of *Annual Survey of Industries* (ASI) published by the Central Statistical Organization, Ministry of Planning, Department of Statistics, Government of India for the years 1980 - 81, 1990 - 91, 2001 - 02, 2010 - 11, and 2013 - 14. Broad classification of industries listed in the group of food processing has undergone drastic reclassification from 1980 - 81 to 2013 - 14. Therefore, in order to calculate accurate and reliable growth rates, grouping of the food processing industry was reclassified on a uniform basis. In other words, dominance, growth rate, and competitiveness of food processing industries are based on the pattern of uniform industries reclassified according to the classification codes of National Industrial Classification - 2008 (refer to the Appendix). First of all, I assessed the share of food processing industries in total food processing group in Punjab in terms of total output, number of factories, number of workers, invested capital, and net value added. It was undertaken to examine the dominance of different food processing industries in Punjab. In order to study the growth of food processing industries, compound growth rate of each of the selected indicators were calculated for different time periods. Trends in growth were studied by computing the compound growth rate through principle of least squares by using the following formula :

$$\text{Log } Y = \text{Log } a + (\text{Log } b)t \quad \text{.....} \quad (1)$$

The data given in ASI reports is on current prices, but for proper comparison, values are deflated with the help of suitable deflator (1993 - 94 = 100). Further, the performance of each food processing industry in Punjab is compared to the same industry in other states of India. To estimate the nature of food processing industries in terms of factors used, regression analysis is used, that is, :

$$Y = AK^{\alpha} L^{\beta} e^{u}$$

where, Y is the output, L is the number of employees, K is the invested capital, u is the stochastic term. Estimates of α and β are obtained by regressing Log Y on log L and log K using principle of OLS (other least squares).

Dominance and Growth of Punjab's Food Processing Industries

It is evident from the Table 1 that the manufacture of grain mill products, starches, and prepared animal feeds industry has unilaterally swept the other food processing industries in all the parameters taken for the purpose of this study. Opening up of the economy in 1991 has, in particular, helped this industry to grow swiftly as its performance has enhanced in the post-liberalization period. Diagonally opposite is the case of slaughtering, preparation, and preservation of meat industry, which performed well in the decade before liberalization and faced problems afterwards. However, in the past few years, this industry seems to have revived a little owing to an increase in the number of hotels and rise in fast food chains in the region. Along with this, another industry, that is, manufacture of dairy products, which was performing well before liberalization and also in the decade immediately after liberalization (since 1991), started to lose momentum after that. Thus, despite being one of the

Table 1. Contribution of Different Food Processing Industries to the Food Processing Group in Punjab

(%)

Industry Name	Year	Total Output	Number of Factories	Number of Workers	Invested Capital	Net Value Added
Slaughtering, preparation, and preservation of meat	1980 - 81	33.33	17.33	10.95	17.56	18.72
Manufacture of dairy products		11.89	1.47	3.50	16.17	17.51
Manufacture of grain mill products, starches, and prepared animal feeds		42.75	72.80	56.83	44.64	34.67
Manufacture of other food products		8.54	6.13	24.72	16.20	24.39
Manufacture of beverages		3.49	2.27	3.99	5.42	4.72
Total		100.00	100.00	100.00	100.00	100.00
Slaughtering, preparation, and preservation of meat	1990 - 91	37.98	13.49	12.93	18.94	18.37
Manufacture of dairy products		13.83	1.41	6.00	17.51	31.46
Manufacture of grain mill products, starches, and prepared animal feeds		31.00	78.12	61.50	33.67	17.70
Manufacture of other food products		10.08	3.61	12.65	22.21	15.37
Manufacture of beverages		7.11	3.37	6.93	7.67	17.10
Total		100.00	100.00	100.00	100.00	100.00
Slaughtering, preparation, and preservation of meat	2000 - 01	24.07	5.39	7.09	14.06	8.16
Manufacture of dairy products		23.49	3.03	8.23	12.61	52.24
Manufacture of grain mill products, starches, and prepared animal feeds		32.99	82.20	60.48	30.53	16.47
Manufacture of other food products		11.94	5.80	16.69	31.19	15.33
Manufacture of beverages		7.51	3.57	7.51	11.61	7.80
Total		100.00	100.00	100.00	100.00	100.00

Slaughtering, preparation, and preservation of meat	2010 - 11	25.50	10.95	12.12	24.05	6.17
Manufacture of dairy products		12.99	2.05	6.60	5.88	9.14
Manufacture of grain mill products, starches, and prepared animal feeds		34.12	79.86	61.09	46.14	15.25
Manufacture of other food products		9.89	3.23	11.21	11.67	12.04
Manufacture of beverages		17.51	3.91	8.98	12.25	57.40
Total		100.00	100.00	100.00	100.00	100.00
Slaughtering, preparation, and preservation of meat	2013 - 14	20.19	10.12	9.14	14.69	13.62
Manufacture of dairy products		13.12	1.83	7.85	7.37	7.37
Manufacture of grain mill products, starches, and prepared animal feeds		46.97	81.34	61.44	53.92	43.36
Manufacture of other food products		7.83	3.02	12.45	13.94	6.83
Manufacture of beverages		11.89	3.70	9.12	10.08	28.82
Total		100.00	100.00	100.00	100.00	100.00

Source: Supplement to Annual Survey of Industries (various years).

highest milk producing states in the country, the industry failed to sustain, perhaps due to the non - availability of cheap fodder for animals owing to a decline in water reserves. Further, in case of other food products and beverages industries, even the allurements extended by different ruling governments in the form of VAT or CST, stamp duty, property tax, electricity duty, etc. could not foster their growth.

Since dominance of an industry is not the only parameter to rate an industry as performing or non - performing ; hence, I have attempted to find out the growth of different food processing industries in different time periods. As far as the growth of food processing industries is concerned, it becomes apparent from Table 2 that except manufacture of grain mill products, starches, and prepared animal feeds industry, none of the other food processing industries from the state of Punjab have thrived in the post - liberalization period. Although in case of two industries, that is, slaughtering, preparation, and preservation of meat and manufacture of beverages, of late, in the years 2000 - 01 to 2013 - 14, some improvement was observed in case of the selected variables ; yet, the overall growth remained far less satisfactory in the post liberalization period. In fact, in the decade immediately after liberalization (1991 onwards), all the variables for slaughtering, preparation, and preservation of meat and manufacture of beverages industries exhibited a dismal performance. The growth also remained far

Table 2 . Growth of Food Processing Industries in Punjab

(in %)

Name of the Industry	Characteristics	1980-81 to 1990-91	1990-91 to 2000-01	2000-01 to 2013-14	1980-81 to 2013-14
Slaughtering, preparation,	Number of factories	2.84	-7.37	9.42	2.30
and preservation of meat	Number of workers	6.15	-0.85	2.95	2.74
	Invested capital	22.02	10.63	12.72	14.75
	Total output	19.38	7.01	9.88	11.72
	Net value added	19.81	6.27	13.38	13.06
	Profit	19.94	6.77	12.63	12.94

Manufacture of dairy products	Number of factories	5.05	9.60	0.90	4.61
	Number of workers	10.19	8.66	0.77	5.77
	Invested capital	22.07	10.29	8.14	12.71
	Total output	19.63	-25.48	6.74	-0.69
	Net value added	27.27	21.25	-4.97	11.25
	Profit	28.77	23.59	-15.55	6.93
Manufacture of grain mill products,	Number of factories	6.20	2.04	4.53	4.27
starches, and prepared animal feeds	Number of workers	5.24	5.11	1.22	3.53
	Invested capital	17.73	12.86	17.03	15.99
	Total output	14.11	12.71	14.11	13.70
	Net value added	12.22	14.43	17.13	14.87
	Profit	3.59	-28.39	77.62	16.58
Manufacture of other food products	Number of factories	0.00	6.46	-0.17	1.79
	Number of workers	-2.36	8.24	-0.99	1.23
	Invested capital	24.98	17.91	6.09	14.84
	Total output	19.81	13.92	7.97	13.09
	Net value added	14.62	15.22	3.17	9.93
	Profit	4.61	-27.46	27.87	20.66
Manufacture of beverages	Number of factories	9.72	2.11	4.86	5.44
	Number of workers	10.32	6.13	2.52	5.83
	Invested capital	25.36	18.81	11.24	17.47
	Total output	26.53	12.63	14.98	17.55
	Net value added	36.52	6.55	20.00	20.36
	Profit	54.08	-5.14	31.12	25.01

Source : Supplement to Annual Survey of Industries (various years).

from satisfactory in all the parameters taken up for this study in the post liberalization period in case of manufacture of dairy products and manufacture of other food products. On the whole, it may be summed up that both in terms of dominance and growth only one industry, that is, manufacture of grain mill products, starches, and prepared animal feed industry performed well in the food processing group in Punjab. However, an industry performing well within the state is no consideration to assume that it is competitive vis-à-vis other Indian states.

An industry may be performing well in terms of net value added per unit of invested capital, but it may still stand bleak chances of expansion in the future if its counterparts in other Indian states are showing even better performance. In the next section, I have compared the performance of Punjab's food processing industries with similar food processing industries in major states (except seven North - Eastern states, Goa, and five union territories) of India in terms of net value added per unit of invested capital and profit per unit of invested capital.

Competitiveness of Punjab's Food Processing Industry

It becomes clear from Table 3 that only manufacture of beverages industry turned out to be competitive at the all India level. Unfortunately, other food processing industries from the state of Punjab did not make into even the first 10 industries at the all India level precisely, in terms of net value added per unit of value added, slaughtering, preparation, and preservation of meat and manufacture of dairy products. Manufacture of grain mill products, starches, and prepared animal feeds and manufacture of other food products ranked at 10th, 17th, 16th, and 17th

ranks, respectively. Similarly, in terms of profit per unit of value added, slaughtering, preparation, and preservation of meat ; manufacture of dairy products ; manufacture of grain mill products, starches, and prepared animal feeds ; and manufacture of other food products ranked 9th, 16th, 15th, and 20th, respectively. Astonishingly, manufacture of grain mill products, starches, and prepared animal feeds industry that performed well in terms of dominance and growth in the state failed to perform well at the all India level. It is pertinent to mention that Punjab's neighboring hill state, Himachal Pradesh, turned out to be competitive in four out of five (except manufacture of other food products) industries when compared at the all India level. Besides, the state of Himachal Pradesh also bagged the second rank at the all India level in manufacture of dairy products and

Table 3. Performance of Food Processing Industries of Punjab vis-à-vis Other Leading Indian States in 2013-14

Industry	State	Net Value Added per Unit of Invested Capital	Net Value Added per Unit of Invested Capital
Slaughtering, preparation,	Delhi	3.408	2.722
and preservation of meat	Karnataka	0.503	0.374
	Uttar Pradesh	0.403	0.269
	Himachal Pradesh	0.369	0.229
	All India	0.360	0.220
	Rajasthan	0.326	0.195
	Punjab	0.231 (X)	0.104 (IX)
Manufacture of dairy products	Jharkhand	5.250	4.935
	Himachal Pradesh	1.058	0.791
	Telangana	0.742	0.592
	Chattisgarh	0.694	0.160
	Orissa (Odisha)	0.688	0.322
	All India	0.646	0.391
	Punjab	0.249 (XVII)	0.039 (XVI)
Manufacture of grain mill products,	Uttarakhand	0.510	0.399
starches, and prepared animal feeds	Andhra Pradesh	0.324	0.155
	Chattisgarh	0.317	0.136
	Himachal Pradesh	0.310	0.163
	Gujarat	0.303	0.138
	All India	0.250	0.114
	Punjab	0.201 (XVI)	0.078 (XV)
Manufacture of other food products	Kerala	0.496	0.119
	Jharkhand	0.455	0.061
	Delhi	0.447	0.162
	J & K	0.436	0.330
	Assam	0.429	0.271
	All India	0.253	0.080
	Punjab	0.122 (XVII)	-0.080 (XX)
Manufacture of beverages	Punjab	0.713 (I)	0.556 (I)

Himachal Pradesh	0.681	0.473
Delhi	0.672	-0.483
Karnataka	0.463	0.300
Madhya Pradesh	0.458	0.339
Kerala	0.439	0.135
All India	0.333	0.131

Source: Supplement to Annual Survey of Industries (various years).

Table 4. Estimates of Cobb - Douglas Production Function for the Selected Food Processing Industries

Time Period : 2013-14	**Dependent Variable : Log Output**
Explanatory Variable	**Regression Coefficient**
Constant	1.826
	(2.925)
t-value	0.624
Log (*K*)	0.730
	(1.377)
t - value	0.530
Log (*L*)	0.004
	(1.219)
t - value	0.004
Returns to scale	0.734
R^2	0.688
F	2.013

Note. Standard errors of the estimates are shown in the parentheses.

Y = Output; *L* = No. of workers; *K* = Invested capital

beverages industry where Punjab used to have a competitive edge vis-à-vis other states a few years ago (Khosla, 2012). It seems that special incentives like tax related concessions, power concessions, availability of developed plots at no profit - no loss, additional incentives to special category entrepreneurs, and installation of pollution-control devices, etc. played a catalyst role in the development of industries in the state that has got topographic constraints. It has turned out to be a model for other states to emulate, particularly states like Punjab, which have sizeable production of food grains, fruits, vegetables, and livestock.

From the Table 4, it is seen that the output elasticities of capital and labour are 0.730 and 0.004, respectively for the food processing industries for the time period from 2013 - 14. This means that holding the labour input constant, a 1% increase in capital input leads to an average of about 0.730% increase in production output. Similarly, holding the capital input constant, a 1% increase in labour input leads to an average of about 0.004% increase in production output. Apparently, the results point toward decreasing returns to scale and capital intensive nature of food processing industries. Although a complementary nature of labour and capital for the food processing sector is highlighted ; yet, keeping in mind the large pool of labour in the state, it is advised to use competitive labour intensive technology, which can generate additional employment opportunities. Genuineness of the results is verified by the high values of coefficient of determination (R^2). The value of R^2 for these firms is 0.688, which reveals that nearly 69% of the total variation of *Y* (output) is explained by *K* (capital) and *L* (labour).

Table 5. Estimates of Cobb - Douglas Production Function for the Selected Food Processing Industries

Years		Constant	Labour	Capital	R^2	Returns to Scale
1980-81	*B*	-1.186	-2.644	4.481	0.981	1.837
	t-value	-0.853	-6.442	6.889		Increasing
1990-91	*B*	-2.037	-2.270	3.750	0.453	1.480
	t-value	-0.222	-1.233	1.181		Increasing
2000-01	*B*	5.349	0.528	-0.481	0.265	0.047
	t-value	1.230	0.717	-0.352		Decreasing
2010-11	*B*	2.674	-0.091	0.641	0.748	0.550
	t-value	2.049	-0.197	1.257		Decreasing

Source : Author's calculations from Supplement to Annual Survey of Industries, Various years.

Results for the year 2013-14 alone do not represent much about the nature of food processing industries in the state. Hence, in order to get a comparative statement, I assessed the elasticities of capital and labour, coefficient of determination, and returns to scale for the time periods 1980-81, 1990-91, 2000-01, and 2010-11. The results in Table 5 indicate that in the pre-liberalization period, that is, in the years 1980-81 and 1990-91, although food processing industries of Punjab were subjected to increasing returns to scale, the output was negatively related to labour (positively related to capital). However, in the post-liberalization period, that is, in the years 2000-01 and 2010-11, diminishing returns to scale started setting in. A cursory look at the recent figures divulges the complementary nature of labour and capital for the industrial sector in the state which implies that more use of capital is capable of generating additional employment opportunities. In other words, setting up of food-industrial units in the state can fortify the chances of employment. Hence, it becomes imperative for the government to set up food processing industries at a war footing pace. A series of recommendations are offered in the next section that can help offer some direction to the policy makers to develop the food processing industries in the state.

Conclusions and Policy Implications

Agriculture in India remains entangled in the cobweb cycle of production. Agricultural output faces the problem of inadequate take off or slackened demand turn by turn. This topsy-turvy situation directly affects the prices and ultimately takes a toll on the farming community. Besides, the flawed government policies are further proving disastrous for agriculture and are casting a black spell on the states that are economically dependent upon agriculture. In order to mitigate the problem, experts reckon the development of food processing industries in states like Punjab as the savior. The study discusses growth, nature, and prospects of food processing industries in Punjab. In terms of dominance and growth, only one industry, that is, manufacture of grain mill products, starches, and prepared animal feeds industry has performed well in the food processing group in Punjab. However, the industry failed to perform at the all India level vis-à-vis other major states of India. From Punjab, manufacture of beverages industry turned out to be highly competitive. Further, the results reveal that in the post-liberalization era, food processing industries have started experiencing the diminishing returns to scale. Despite all odds, food processing industries in Punjab still need to be developed on a war footing basis, both to offer respite to the ailing agriculture, and to bring back Punjab's lost glory.

The following recommendations may help in realizing the full potential of the food processing industries in the state :

Ä First, there is a need to sensitize producers and entrepreneurs about the existing schemes of the government

towards the development of industries and quality industrial output like Credit Linked Capital Subsidy Scheme, Design Clinic scheme for design expertise, reduce waste in manufacturing, etc. Lack of awareness about these schemes is resulting in the under-utilization of these schemes on one hand, and poor industrial output on the other.

Ä Secondly, our focus now needs to be shifted from 'marketing the produced products' to 'producing products that can be processed' which need to be processed efficiently, that is, where the state has a competitive edge vis-à-vis other states, and it meets global quality standards. For this, the state should endeavor to procure and propagate appropriate technologies and introduce quality control measures.

Ä To create generic demand in case of processed food items, education of the people, particularly in rural areas, is very essential. Education must be given by the government regarding the use of various processed food items hygienically prepared and packed. Unless this kind of education is there, people will not be willing to look at processed food at par with self- cooked foods. Another way to create demand is to conduct research on behavioral tastes. This will also help to 'produce that can be processed' which is best suited to the people's taste and preferences.

Ä There is an emergent need to encourage the state agricultural universities to commence courses in food packaging, processing, bio-technology, information technology in agriculture, and such allied fields. Punjab Agriculture University being a pioneer in the field must take an initiative and devise some mechanism whereby food-processors become partners in the research and development effort of the food processing industry in the state.

Ä Last but not the least, there is a need to establish quality improvement centres for different food-based products. Small food processing firm operators should be given help and training in these centres to improve and standardize the quality of their products. It will make these industries more competitive in the international market. Most of the Arabian countries (nearest to India and so, products can be airlifted) like Iran, Libya, Kuwait, Iraq, Israel, and Lebanon import food-based products from European and American countries at high rates. Agricultural and dairy products at much cheaper rates can be provided to these countries from Punjab, which can help the state overcome its inherent problems.

Limitations of the Study and Scope for Further Research

Secondary data collected from various issues of ASI were used for the purpose of analysis. However, due to reclassification of industries, the food processing sector has undergone drastic reclassification from 1980-81 to 2013-14. An endeavor is made by reclassifying the industries by developing a concordance table according to the classification codes of National Industrial Classification - 2008 (refer to the Appendix) ; yet, it is felt that if the data at four-digit levels is made available, unambiguous results can be derived.

This study used data for Punjab state only. Going forward, researchers can focus either on comparing the food processing industries in two states, that is, Punjab and Haryana to identify how the same industries are performing in two neighboring states or export prospects of different food processing industries from the food surplus states can be studied.

References

Ghuman, B. S. (2011, May 13). Industry alone can rescue Punjab. *The Tribune.* Retrieved from https://www.tribuneindia.com/2011/20110513/edit.htm

Gulati, A. (2017, March 15). From plate to plough: A finger on the pulses. *The Indian Express.* Retrieved from https://indianexpress.com/article/opinion/columns/from-plate-to-plough-a-finger-on-the-pulses-narendra-modi-central-government-market-policy-4569167/

Khosla, R. (2012). Production efficiency of the selected agro based industries in Punjab. *Prabandhan: Indian Journal of Management, 5* (2), 21 - 26. DOI: 10.17010/pijom/2012/v5i2/60129

OECD & FAO. (2017). *OECD-FAO agricultural outlook 2017 - 2026.* Paris: OECD. DOI : http://dx.doi.org/10.1787/agr_outlook-2017-en

Raikhy, P. S., & Nanda, P. (2000). Agro-industries in Punjab - Potential and suggested framework. In R. S. Bawa & P. S. Raikhy (eds.), *Punjab economy: Emerging issues* (pp. 266 - 278). Amritsar : GNDU Press.

Sidhu, H. S. (2002). Some urgent steps: Crisis in agrarian economy in Punjab. *Economic and Political Weekly, 37* (30), 3132 - 3138. Retrieved from https://www.epw.in/journal/2002/30/review-agriculture-review-issues-specials/crisis-agrarian-economy-punjab.html

Sidhu, R.S., & Johl, S. S. (2002). Three decades of intensive agriculture in Punjab : Socio-economic and environmental consequences. In Johl, S. S. & S. K. Ray (eds.), *Future of Punjab agriculture*. Chandigarh, India : Centre for Research in Rural and Industrial Development.

Singh, S. (1999). Green revolution and agro-industrialization: A case study of primary food processing industries in the Indian Punjab. *International Journal of Punjab Studies, 6* (1), 55 - 83.

Appendix.

Appendix Table A1. Concordance Table

Name of the Industry	National Industrial Classification (1970)	National Industrial Classification (NIC, 1987)	National Industrial Classification (NIC, 1998)	National Industrial (NIC, Classification (NIC, 2008)
Slaughtering, preparation, and preservation of meat	200+202+203+ 210+211+212	200+202+203+ 210+211+212	151	101+102+103+104
Manufacture of dairy products	201	201	152	105
Manufacture of grain mill products, starches, and prepared animal feeds	204+217	204+217	153	106+108
Manufacture of other food products	205+206+207+208+ 209+213+214+215+ 218+219	205+206+207+208+ 209+213+214+215+ 218+219	154	107
Manufacture of beverages	216+220+221+ 222+223+224	216+220+221+ 222+223+224	155	110

About the Author

Dr. Rajiv Khosla has written 40 research papers in national and international journals of repute and has chaired sessions at international conferences held at Vienna and Indonesia. Three research scholars have been conferred with Ph.D. degrees under his guidance. He is also associated with different universities in context of academics and research.