International Journal of Management, IT & Engineering
Vol. 9 Issue 6, June 2019,
ISSN: 2249-0558
Impact Factor: 7.119Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.comDouble-Blind
Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gate as well as in Cabell's Directories of Publishing Opportunities, U.S.A

PROBLEM OF POST-HARVEST LOSSES FOR PERISHABLE CROPS IN AGRICULTURAL PRODUCTION IN BUNDELKHAND REGIONS

NitinSrivastava[1], Prof. C.B. Singh[2]
Department of Banking Economics and Finance
[1,2]Bundelkhand University

Abstract

The main objective of this article is to learn about the concepts and problems of food losses after harvesting in perishable crops. It examined the various concepts of food loss after harvest, the importance of perishable crops, the causes of food losses, environmental considerations and their influence on food losses. We also looked for solutions to some of the problems identified. It has been established by the review that the factors that contribute to these food losses include; The initial quality of the harvest, mechanical injuries, temperature, storage atmosphere, genetic factors and environmental influence. To minimize these problems, appropriate agricultural techniques should be put into practice, such as the general principles of extending the useful life of these crops. There must be proper management of temperature, humidity and effective methods to prevent these losses. Since most national governments recognize that food losses after harvesting are complex, therefore, it requires a commitment to an integrated approach, involving many organizations, including local communities and groups. Hence the research main focus on distribution strategies for minimising post-harvest losses for agricultural produce in selected households of Bundelkhand regions.

1. OVERVIEW

The fruit and vegetable losses after harvest are more severe in developing countries than in well-developed countries. A further limitation to the improvement of this situation is that in most developing countries the number of scientists concerned about food losses after harvest is significantly lower than those involved in production research. In the early days of horticulture in the wolf's developed countries, large losses occurred in the same way as they are today in developing countries[1-6].

India is the country whose largest portion of population depends on agriculture or agricultural activity, report says nearly 50% employment of the population is solely based on the agriculture activities. Artiuch. P. et al (2012)[7]

In India factors like demographics and legislation that limits farm size to less than 50 acres. The average farmer belt work with just 1-2 hectare and report indicates 70% of farmers have less than 1hectare Artiuch. P. et al (2012)[7]. Other stakeholder of supply chain including transportation companies, traders' commission agents, market operators, consultants, shipping and storage companies are highly fragmented. In current scenario these stockholders are getting benefitted to the large agriculture player

logistics corporation instead of small farmers which have covers the major portion of agriculture.

The Increased industrialization in technologically advanced nations gradually led to improvements in crop management. The elaborate harvesting equipment has replaced the raw harvesting tools. The collection centers were strategically established in the main production areas. The containers have been reshaped to add more protection to the product. Commercial storage facilities have been installed and quality standards have been adopted. Engineers and economists have become increasingly aware of the behavior of raw materials. The concurrent advances in refrigeration technology in developed countries have enabled cold chains to be established for all post-harvest and handling operations. At the institutional level, post-harvest research has begun. Pilot packers have been installed, along with the development of intensive training programs, the improvement of product quality and the reduction of post-harvest losses have become the main concern of producers, intermediaries, marketing specialists and consumers. Today millions of people have enormous volumes of quality vegetable crops produced in technologically advanced countries through better post-harvest management. Therefore, historically and by necessity, post-harvest technology is part of the normal development processes in agriculture[8, 9].

2. OBJECTIVES OF THE STUDY

1. To evaluate the gaps for distribution losses and its impact on price level of agricultural produce.
2. To explore the concepts and problems of food losses after harvesting in perishable crops and its distribution strategies.

3. RESEARCH METHOD

This research covered the area of Uttar Pradesh. In this research covered each district (Jhansi, Jalaon, Banda and Hamirpur) of Bundelkhand regions in Uttar Pradesh taken into consideration.

Sample size determination

An attempt is made to highlight the existing general situation of the selected 240 households with regards to farm size, sex, age, marital status, education, farming experiences and distance from market and income.

Types and effectiveness of different storage technologies

Farmers used various methods and types of facilities to store their crops after harvests. The crop storage methods adopted in the study areas includes the use polypropylyne (PP) bags, cribs, tins, metal silos and wooden silos/traditional granaries ('vihenge').

The measurable examinations were completed utilizing the all-around perceived factual programming SPSS. Further, Microsoft Word, Microsoft Excel

wereresorted to for producing diagrams and tables. Descriptive measurements, for example, Mean, Percentage, Frequency and Standard Deviation have been utilized to depict demographic aspects and status variables of the experimental and control groups.

4. MINIMISING POST-HARVEST LOSSES IN SELECTED HOUSEHOLDS OF BUNDELKHAND REGIONS: AN ANALYSIS

From the tables given demographic profile of farmer which are interviewed, loses of crop during storage and transportation.

Table 1: Descriptive analysis of age of farmers

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Age	240	29	76	48.30	10.180

Table 2: Number of dependent members of the family on farmers

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Dependent	240	2	8	3.80	1.269

Table 3: Education Qualification of farmers

Education	Frequency	Percent
upto 5th	18	7.5
upto 10th	106	44.2
upto 12th	58	24.2
college/university	58	24.2
Total	240	100.0

Table 4: Experience of the farmer

Farming Experience (in years)	Frequency	Percent
less than 10	14	5.8
11 to 15	63	26.3
16 to 20	62	25.8
more than 20	101	42.1
Total	240	100.0

Table 5: Category of the farmers based on production

Category of Farmer	Frequency	Percent
small (1-2 hectare)	168	70.0
medium (2-10 hectare)	48	20.0
large (>10 hectare)	24	10.0
Total	240	100.0

Table 6: Field (in hectare) held by farmers

International Journal of Management, IT & Engineering
Vol. 9 Issue 6, June 2019,
ISSN: 2249-0558
Impact Factor: 7.119Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.comDouble-Blind
Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gate as well as in Cabell's Directories of Publishing Opportunities, U.S.A

Land hold by farmer	N	Minimum (in hectare)	Maximum (in hectare)	Mean (in hectare)	Std. Deviation (in hectare)
own	240	2	26	6.28	7.127
lease in	240	0	16	.59	1.800
lease out	240	0	5	.08	.641
total	240	2	31	6.74	7.190

Table 7: Cultivated area out of total holding by farmers

Area (in hectare)	Frequency	Percent
1 to 2	108	45.0
2 to 10	98	40.8
more than 10	34	14.2
Total	240	100.0

Table 8: Production of non-perishable and perishable crops in quintals

Name of crop	N	Minimum (in quintals)	Maximum (in quintals)	Mean (in quintals)	Std. Deviation (in quintals)
Non-Perishable					
Rice	178	10	130	39.72	39.467
Wheat	226	56	280	105.67	66.825
Pulses	44	2	20	8.55	5.896
Oil seeds	46	1	7	3.26	1.843
Perishable					
Fruit	44	2	50	16.50	10.900
Vegetables	128	4	100	41.80	23.683

Table 9: Aggregate production of non-perishable and perishable crops in quintals

Type of crop	N	Minimum (in quintals)	Maximum (in quintals)	Mean (in quintals)	Std. Deviation (in quintals)
Perishable	128	4	130	47.47	26.780
Non-Perishable	240	56	435	131.15	105.614

Table 10: Quantity of crops disposed in quintals

Disposal of crop produced	N	Minimum (in quintals)	Maximum (in quintals)	Mean (in quintals)	Std. Deviation (in quintals)
Non-Perishable					
Quantity Produce	240	56	435	131.15	105.614
Self-Consumption	240	5	55	17.41	12.833
Market surplus	240	46	395	113.73	94.824
Perishable					
Quantity Produce	128	4	130	47.47	26.780
Self-Consumption	128	0	20	5.02	4.289
Market surplus	128	3	125	42.41	24.725

Table 11: Type of road from field to the house of farmer

Type of road	Frequency	Percent
Kuccha	0	0
Pakka	240	100.0

Table 12: Distance to be covered from field to house in kilometers

Distance	Frequency	Percent
2-5 km	114	47.5
5-10 km	90	37.5
More than 10 km	36	15.0
Total	240	100.0

Table 13: Use of packaging material

Use of packaging material	Frequency	Percent
yes	223	92.9
no	17	7.1
Total	240	100.0

Table 15 Loss of crops during transportation

Type of crop	N	Minimum	Maximum	Mean	Std. Deviation
Perishable	115	0	20	3.22	3.514
Non-Perishable	195	0	23	5.65	4.256

Table 16: Availability of precautionary measures from insects

Precautionary measures availability	Frequency	Percent
yes	228	95.0
no	12	5.0
Total	240	100.0

Table 17: Prevention of crops with available precautions

Precautionary measures help	Frequency	Percent
no	13	5.7
yes	215	94.29
Total	228	100.0

Table 18: Type of packaging used for transportation by intermediaries

Type Packaging	Frequency	Percent
Loose pack	0	0
multilayer pattern pack	5	4.6
multilayer size graded pack	43	39.8
single layer pack	60	55.6
Total	108	100.0

Table 19:Food loss in consumer's locality in a day

Quantity of loss	Frequency	Percent
Upto 1 ton	44	30.6
Upto 2 ton	27	18.8
Upto 3 ton	39	27.1
More than 3 ton	34	23.6
Total	144	100.0

Table 20: Need of change in distribution strategy

Change	Frequency	Percent
Strongly agree	73	50.7
Agree	71	49.3
Disagree	0	0
Strongly disagree	0	0
Total	144	100

5. FINDINGS OF ANALYSIS

The participants involved in the study were observed that male dominated with average age between 29 to 76 years and head of their respective family. None of them was dependent on their families, but 2 to 8 people with an average of 3.8 people, were dependent on them. out of total 240 farmers, 44.2% of the farmers had education qualification upto 10^{th} standard followed by those studied upto 12^{th} standard (24.2%) and college/university degree (24.2%). education rather than higher education.

- **Farmer Profile**

Famers having less than 10 years to more than 20 years, It was seen that 42.1% of the farmers were having experience of more than 20 years followed by those having 16 to 20 years (25.8%) and 11 to 15 years of experience. The farmer of the profile were examined that the average household size of farmers, It was seen that on average 6.74 hectare of field was held by the farmers and all of the farmers were not having their land on lease.

Land Details

The land details was examined that the Out of that 6.74, 6.28 hectare of field was their own, 0.59 hectare of field was taken on lease and 0.08 hectare was leased out to others. The total land size as small (1 to 2 hectare), medium (2 to 10 hectare) and large (more than 10 hectare). It is observed that 70% of the farmers were having field between 1 to 2 hectare followed by the medium (20%) and large (10%) size producers the cultivated area out of the total field hold by the farmers and It was seen that 45% of the farmers were having it between 1 to 2 hectare, followed by those having area from 2 to 10 hectare (40.8%) and more than 10 hectare (14.2%).

Perishable and Non-Perishable crop production

It has been found that the type of crops as non-perishable and perishable crops and their production in quintals. It was seen that 178 farmers were producing rice with an average production on 39.78 quintals, 226 farmers were producing wheat with mean production of 105.67 quintals and 44 farmers were growing fruits with an average production of 16.50 quintals.

Aggregated production of crops by farmers

It has been found that the aggregate production of non-perishable and perishable crops in quintals. It is observed that128 farmers were growing perishable crops and all 240 were growing non-perishable crops on their fields. The 128 farmers producing perishable crops were growing cops in the

International Journal of Management, IT & Engineering
Vol. 9 Issue 6, June 2019,
ISSN: 2249-0558
Impact Factor: 7.119Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.comDouble-Blind
Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gate as well as in Cabell's Directories of Publishing Opportunities, U.S.A

range of 4 to 130 quintals with the mean production 47.47 quintals. On the other hand, farmers having non-perishable crops were growing 131.15 quintals of crops on average.

Disposal of Non-Perishable and Perishable crop

It has been found that the quantity of non-perishable and perishable crops disposed in quintals. It was seen that out of 240 farmers producing non-perishable crops, on average 17.41 quintals was self-consumed by them and 113.73 quintals was sent to market. On the other hand out of on an average 47.47 quintals production of perishable crops, 5.02 quintals was for self-consumption and 42.41 quintals was getting send to the market.

Approach from field to in-house and distance between them

The distance that farmer were covering was categorized into 4 as those having it less than 2 km, those having distance from 2 to 5 km, 5 to 10 km and more than 10 km. It was seen that 47.5% of the farmers were having the distance from field to their house within 2 km followed by those having it between 5 to 10 km.

Packaging used for transportation

It has been found that 92.9% of the farmers use packaging material for transportation, whereas 7.1% don't, It was seen that out of those 92.9% of the farmers using packaging material, 74.6% farmers were using loose-fill jumble packs and 38% and 6% of the were using single layer and multilayer pattern packs, respectively.

Loss of crops during transportation

It is observed that the mean loss of perishable crop was 3.22 quintals whereas average loss of non-perishable crop was 5.65 quintals per farmer.

Precautionary Measures

It was found that 95% of the farmers had precautionary measures available to protect their crops from insects and 94.29% of them were able to prevent it also.

Type of packaging used for transportation by intermediaries

It was found that the type of packaging use during transportation of the crops. It is observed that 55.6% of the packaging was single layer followed by the multilayer size graded packs (39.8%) and multilayer pattern packs (4.6%).

Status of food loss in consumer's locality in a day

It was found that the everyday food loss in consumer's locality. And it is observed that 30.6% of the consumer's locality had food loss upto 1 ton followed by those having loss upto 3 ton (27.1%) and even more than that (23.6%).

Source of food loss in market as per consumer

It was found that the sources which are responsible for the food loss in the market as per consumer. It is found that 32.6%, 25% and 22.9% of the consumers believed that the retailers, commission agents and middle men, respectively, are responsible for the loss that occurred.

Need of change in distribution strategies

It was revealed that 50.7% of the consumers strongly agree that there is need of changing distribution strategies to minimize the loss of agricultural products and none of the consumer disagree with the same.

6. CONCLUSION

This research also provides the fair idea where there is a lack in terms of facility, resources, infrastructure etc. This research would assist with investigating the genuine image of the storage office like warehouses, cold storage setup in chose research territory. This research will likewise assist with understanding the pretended by government bodies or government in managing these distribution losses. The result of the research will assist us with understanding the post-harvest losses because of distribution disappointment. Research enables the government's bodies and private setup to comprehend the need of the investment specifically portion of distribution to chain. It likewise assists with distinguishing the office accessible as far as cold storage, warehouses, cold transportation and so forth. This research likewise assists with understanding the patterns of the distribution channel of past years and what are the government activities in regards to the equivalent.

It was found that the outcome (loss at transportation) is transformed by logarithmic function due to the presence of positive skewness with heavy tails in the observed loss of farmers during transportation. And after transformation, its skewness lowered down to -0.094.

Effect of gender

Effect of farmer's gender on the loss of crops in transportation at farmer level, below given two hypotheses were formed and tested. The absence of female farmers, the gender variable became redundant and the model applied was unable to find any of its effect.

Effect of age

It was found that the effect was significant and we had sufficient evidence to reject the null hypothesis. It showed that one year increase in the age of farmer increased the log(loss of crops) by 0.011 quintals.

Effect of marital status

It was seen that because of the absence of unmarried farmers, the independent variable (marital status) became redundant and the model applied was unable to calculate any of its effect.

- **Effect of education**

It was found that the effect was significant and we had sufficient evidence to reject the null hypothesis. The change in the log(loss) occurred by the farmers who studied college and those who had primary education was not significant. And the log(loss of crops) by the farmers who studied upto high school was significantly lower, by 0.634 quintals, by those who studied upto college or university

- **Effect of the mode of transport used by the farmer**

It was found that the effect was not statistically significant and we were failed to reject the null hypothesis of no effect.

- **Effect of kuccha and pakka road available from field to house**

It was seen that because of the absence of farmers using kaccha road, the approach variable became redundant and the model applied was unable to find any of its effect.

- **Effect of the packaging type use by the farmer**

It was seen that the effect was statistically significant and we reject the null hypothesis. It was described that the log(loss of crops) during transportation significantly decreased by 0.646 quintals with the use of multilayer pattern packs as compared to the single layer packs.

REFERENCES

[1]. Shukla M and Jharkharia S 2013 Agri-fresh produce supply chain management: a state-of-the-art literature review. Int. J. Oper. Prod. Manag. 33(2): 114–158
[2]. Tsolakis N K, Keramydas C A,Toka A K, Aidonis D A and Iakovou E T 2014 Agrifood supply chain management: a comprehensive hierarchical decision-making framework and a critical taxonomy. Biosyst. Eng. 120: 47–64
[3]. Rajkumar P 2010 Food mileage: an indicator of evolution of agricultural outsourcing. J. Technol. Manag. Innov. 5(2):37–46
[4]. Samuel M V, Shah M and Sahay B S 2012 An insight into agri-food supply chains: a review. Int. J. Value Chain Manag. 6(2): 115–143
[5]. Ghosh N 2013 India's agricultural marketing: market reforms and emergence of new channels. New Delhi: Springer
[6]. Hegde R N and Madhuri N V 2013 A study on marketing infrastructure for fruits and vegetables in India. National Institute of Rural Development, Hyderabad, http://www.nird.org.in/NIRD_Docs/rs2013/RS 91.pdf
[7]. Balaji M and Arshinder K 2016 Modeling the causes of food wastage in Indian perishable food supply chain. Resour.Conserv. Recycl. 114: 153–167
[8]. Rais M and Sheoran A 2015 Scope of supply chain management in fruits and vegetables in India. J. Food Process. Technol. 6(3): 1–7
[9]. Kundu T 2013 Design of a sustainable supply chain model for the Indian agri-food sector: an interdisciplinary approach. MTech Thesis, Jadavpur University, Kolkata