

## Study on how to Minimize Post - Harvest Damage to Vegetables during Road Transport

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### 1. Introduction

Agriculture is the main livelihood of Sri Lankans. Sri Lanka vegetables produces around 710000 metric tons annually (Weerasinghe & Priyadharsan, 2017). There are over 30% in vegetables been wasted while passing through the supply chain from farm gate to the final consumer. Improper harvest handling, improper packaging and transportation, disease and inadequate storage facilities for the increase in post-harvest waste. As a result of this reasons, a significant amount of the product is destroyed. Vegetables are transported in Sri Lanka through various modes of transport. But most developing countries, priority has been given to road transport. In handling the overall post-harvest waste in vegetable production, a significant waste occurs during transportation. Thus, the loss due to post-harvest vegetable damage affects producers as well as consumers. Producers lose out by reducing their share of the price paid by customers and consumer must pay higher price for substandard vegetables. The economy would be losses crores of rupees due to total cost of the losses of vegetables. vegetables are lost during postharvest operations and the value of this loss is approximately Rs. Million 9000 (Cardoen et al., 2015).

The maximum amount of food loss and waste is a mismatch between supply and demand (Raut et al., 2019). In this way, the wastage generated by transport also influences the difference between supply and demand. Accordingly, the wastage caused by this transport affects the entire economy. Here I studied on how to reduce the wastage of vegetable through road transport.

But I conducted these investigations with the Manning market. However, these data may change if the research is centered on another economic center. And I used a questionnaire method to collect this data. But if the data is collected in another way, this data may change.

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I also considered this research road transport mode, but this data may change in other modes of vegetable transport. On the other hand, I should have done this research at a time when the corona epidemic is spreading rapidly. However, these data may change if this research is performed at normal period. Because of that reason the findings are difficult to generalize in into another context. Therefore, future decision should identify or use this concept or the information(finding) with keeping that limitation in their mind.

## **2. Research Methodology**

For this research, information was obtained from primary data sources and secondary data sources as well. The Researcher used the questionnaire method to collect data for this research. This research is conducted in Manning market.

The study has continued using Convenience sampling method as non-probability sampling method and through it select the sample from the transporters who transport the vegetable to the Manning market. There researchers take 150 respondents and test them, which is more appropriate for a questionnaire.

After collecting the data, the questionnaires will be analyzed & interpreted to identify the solution for the research objectives The researcher use IBM SPSS statistics and Microsoft excel for analysis and data is expected to be analyzed by Descriptive Statistics, Bivariate Analysis and Advanced Analysis such as table and charts as well as test method such as chi square testing. I used chi-square and correlation analysis as bivariate analysis. I used factor analysis and multiple regression analysis as advanced analysis. With the help of SPSS analysis system there will be details on data tables to represent the numerical figures of the finding as well as Bar charts, Pie charts and line charts used to show those findings graphically making it convenient to understand the weightings.

## **3. Results and Discussion**

According to the survey data, female vegetable transporters are less than male transporters. Then, use of normal road is more likely to cause post-harvest damage. use of poly sacks is more likely to cause post harvest

damage. Furthermore, nature of the vehicles and transport distance have an impact on post-harvest damage.

Chi-square distribution is also used to test the autonomy between two variables.

Table 3: impact of factors on post-harvest damage

<b>Chi-Square Tests</b>				
	Asymptotic Significance (2-sided)			
	Road Infrastructure	Nature of the package	Nature of the vehicles	Transport distance
H <sub>0</sub> hypotheses	Road infrastructure does not affect post-harvest damage.	Nature of the harvest packaging does not affect post-harvest damage.	Nature of the harvest packaging does not affect post-harvest damage.	Transport distance does not affect post-harvest damage.
Pearson Chi-Square	.000	.000	.000	.000
Likelihood Ratio	.000	.000	.000	.000
Linear-by-Linear Association	.963	.000	.000	.000

*Source: Sample survey data, 2022*

Table 1 the shows the values obtained according to Pearson's Chi square test conducted to test the relationship between post-harvest damage with road infrastructure, nature of package, nature of vehicles and transport distance. The significance level of all Chi square tests is  $0.000 < 0.05$ . Therefore, H<sub>0</sub> hypotheses is rejected at a level of 95% confidence level. Then researcher can be concluded that all factors have relationship between post-harvest damage.

Table 4: Identify the factors that contribute to post-harvest damage

<b>Rotated Component Matrix<sup>a</sup></b>		
	Component	
	1	2
Nature of Road Infrastructure	-.135	.829
The nature of packaging	.268	.679
Nature of Vehicle	-.766	.715
Distance from farm to market (Km)	.707	.106

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

*Source: Sample survey data, 2022*

Here one factor under the first component and three factors under the second component are considered as the principal components. Accordingly, the nature of road, the nature of packaging, nature of the vehicles, and distance from farm to market are the principal components affecting post-harvest damage.

Table 5: Multiple regression analysis table for post-harvest damage

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	18.409	.752		24.468	.000
	Nature of Road	-1.587	.251	-.084	-6.316	.000
	The nature of packaging	-2.589	.228	-.153	-11.364	.000
	Nature of Vehicle	-1.138	.150	-.101	-7.575	.000
	Distance from farm to market (Km)	.048	.002	.345	25.810	.000

a. Dependent Variable: Percentage of vegetable wasted

*Source: Sample survey data, 2022*

Accordingly, the multiple regression model can be summarized as follow.

$$Y = 18.409 - 1.587D_1 - 2.589D_2 - 1.138D_3 + 0.048X_1 + U_i$$

According to this model, post-harvest losses increase by 18.409 while other factors affecting post-harvest losses remain unchanged. If the road infrastructure is affected by post-harvest damage, then the post-harvest damage is 16.822. That is, post-harvest damage is relatively high. If the post-harvest packaging affects post-harvest damage, the post-harvest damage is 15.817. That is, post-harvest damage is relatively high. If the nature of the post-harvest damage, the post-harvest damage is 17.271. That is, post-harvest damage is relatively

high. As the distance from the farm to the market increases one by one, the post-harvest damage increases by 4.8%.

#### **4. Conclusions and recommendations**

The purpose of this study was to identify the efficiency of vegetable transport and to make suggestions for minimizing post-harvest damage to vegetables in road transport and the main study problem was how to transport vegetables efficiently. The main objective of the research was to identify the efficiency of vegetable transport and to make proposals to minimize post-harvest damage to vegetables in road transport. In addition, how about the impact of road infrastructure on post-harvest damage during vegetables transportation in Sri Lanka? does the nature of the harvest packaging affect the post-harvest damage during the vegetable transportation in Sri Lanka? how about the nature of vehicles used for transportation and whether the type of vehicle has a relationship to the destruction of vegetable in Sri Lanka? what are the factors effect post-harvest damage in road transport in Sri Lanka? Needed to be addressed. Accordingly, a sample of 100 was obtained as a research sample targeting vegetable transporters at the Manning Market in the western province and the sample was selected under the Convenience sampling method. The study was conducted using secondary data and information was obtained through questionnaires and interviews. Accordingly, statistical analysis methodology has been used to analyze the data obtained from the respondents. Data analysis methods such as descriptive analysis, correlation analysis, chi-square analysis, multiple regression analysis, and factor analysis were used.

Considering the correlation, improvement of road infrastructure, improvement in quality of packaging, improvement in quality of vehicles transported etc. can reduce post-harvest damage. Also, transportation distance has a positive effect on post-harvest damage. That is, post-harvest damage increase as distance increase.

Factor analysis confirmed that the overall nature of the road infrastructure, the nature of the packaging, nature of the vehicles, and the post-harvest distance are important components. Accordingly, these four factors have been shown to have a major impact on post-harvest damage.

Factors such as road infrastructure, nature of crops, nature of traffic, transport distance all affect post-harvest damage.

Finally, the multiple regression analysis is used here. Accordingly, the nature of the road here has a negative impact on post-harvest damage. That is, as road infrastructure improves, post-harvest damage gradually decreases. Harvest packaging also has a negative impact on post-harvest. Accordingly, harvest packaging improves, post-harvest damage is minimized. Also, the nature of the vehicles has a negative impact on the post-harvest damage. Accordingly, even if the nature of the vehicle is good, the post-harvest will be less. Also, the distance transported has a positive effect on post-harvest damage. That is, harvest damage is minimized as the transport distance is reduced. Therefore, the multiple regression analysis shows that post-harvest damage is affected by road infrastructure, harvest packaging, the nature of the vehicles and the distance traveled.

## References

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