The Commodity Application System Assessment Method (CSAM) on Post harvest Handling of Citrus *Keprok* (*Citrus reticulate*) from the District of Pupuan to Denpasar

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Abstract

This study aims to identify the causes of impact and damage of post-harvest handling of citrus from Pupuan District to Denpasar District and determine how to implement the best handling systems. The study group consists of farmers in the Pupuan District, Tabanan. Samples were taken by purposive sampling method with 62 farmers from three villages. Data was collected through questionnaires from participants handling tangerines from farmers, wholesalers, transporters and retailers. Factors causing damaged tangerines were identified at the farm level in the process of sorting and packing at the level of the wholesaler in the process of dismantling and sorting and a higher level with retailers handling stock for display. The impact of post-harvest losses at farm level is 10%, wholesalers and suppliers 11% and retailers18%.

Keywords: *citrus, CSAM, Pupuan.*

1. INTRODUCTION

Recently, the production of citrus fruit in Bali was low, many were brought from outside of Bali (Anon, 2010). One of the varieties of tangerines produced and developed in Tabanan region of Bali is a citrus *keprok* variety. In Bali, the tangerine is an important commodity, because in addition to daily consumption, in Bali ordinary people use tangerines for ceremonial purposes. Based on past and current consumption data, citrus fruit consumption in Bali is expected to continually increase. Data shows citrus consumption in 2000 reached more than 7000tons, in 2005 more than 10,000tons and by 2010 had reached 13,900.80 thousand tones (Anonym, 2010).

One of the citrus marketing problems faced is the high percentage of loss and damage to citrus in the marketing chain. Until now farmers showed little attention to the problem, due to a lack of knowledge of post-harvest handling systems once they left the farm. Tangerines produced by farmers have several distribution channels before they reach the consumer. Different distribution channels lead to different levels of treatment and care resulting in varying levels of damage to the product. The greater the distance of distribution lines, the more variation experienced in handling so the greater the level of damage (Admadi, 2008).

Application of CSAM (Commodity System Assessment Method) aims to identify and describe the problem and identify and formulate appropriate solutions to the factors that affect the quality of handling, loss, damage, economic losses in the chain of distribution or marketing of horticultural products (Admadi 2008). Application of CSAM and strengthening the implementation of the distribution chain will help to provide quality horticultural products that can compete in the market. Implementation of such a system is very important because the quality of horticultural products, especially in Bali has high variation, with levels ranging from 20-50% production loss (Admadi, 2008).

2. RESEARCH METHODOLOGY

2.1. Place and Time Research

The study was conducted in Pupuan District, Tabanan Regency. Sampling start took place from March to May 2011. This involved all farmers and stakeholders involved in the distribution of fruit citrus Pupuan to Denpasar. According to the method of Singarimbun and Effendi (1989), samples were taken of 30% of all citrus farmers who are in 3 villages, namely: Batungsel village 17 farmers, Bangsing village 31 farmers and Belimbing village 14 farmers. For collectors, suppliers and retailers the snowball sampling technique was used. (Sugiyono, 1997).

3. RESULTS AND DISCUSSION

3.1 Post-harvest Handling Systems of Citrus Growers Pupuan to Denpasar.

In Pupuan District there are 3 farm areas with 62 farmers. Collectors at village level consist of 4 people who distribute up to Denpasar only 2 people and there are 7 retailers who sell tangerines.

Table 1. Product Handling Stages

Personnel	Postharvest Handling System		
Farmer	Distance	Time (hour)	Handling
	1	**2**	**3**
1. Harvesting	±20 m	07.00-09.00	By: pruning scissors or by hand
2. Collecting	±2 m	07.00-09.00	Container:bamboo baskets or plastic bags
3. Transportation	±35 km	09.00-09.30	Transported by vehicle to the warehouse
4. Sorting	±3-4 m	09.30	Washed and checked for flaws
5. Packaging	±1 m	10.00	Packed in bamboo baskets
Collectors	**1**	**2**	**3**
1.Transport	±46 km	11.00-12.30	1. Motor vehicle transport, or 2. Collectors using own transport
2. Unloading	±4-5 m	12.30 – 13.00	Basket lowered from the van
3. Sorting and grading quality	±2 m	13.00-14.00	Warehouse sorting by size, age and condition are then separated according to class: A, B, C and D.
4. Scaling	±2 m	14.00-14.20	Scaling each class
5. Packaging	±2 m	14.20-15.20	Is packed with paper lined plastic or bamboo basket
6. Storage	±3-4 m	12-36 hours	Stored in the warehouse, and delivered next day to retailers.
7. Transport	± 10 km	Morning or afternoon	Delivered by motor vehicle.
Retailer	**1**	**2**	**3**
a. Unloading	±2-3 m	Morning or afternoon	Removed from plastic or bamboo baskets
b. Inspection	-	Morning or afternoon	Checked with damaged stock immediately returned to collectors
c. Displays	-	Morning until afternoon	With bamboo baskets or plastic baskets on display without stacking.

3.2 Identification of Damage and its Causes in Post-Harvest Citrus Keprok

At the farm level, factors were identified as the cause of the damage was at the time of picking sorting. Fruit was harvested in the morning, still wet with dew with the resulting moist surface creating mold and fungus growth creating fruit susceptible to damage. Harvesting done with fruit removed directly from the tree by hand without pruning shears also led to defective or damaged fruit identified when sorting.

At the wholesale level, factors that cause damage were identified at the stage of unloading and sorting. Packaging with bamboo baskets and poor treatment after leaving the farm may cause significant damage. Upon arriving at the warehouse, tangerines are lowered from the pickup and removed from the baskets and sorted according to fruit size (grading). Poor handling at this stage often causes fruit to fruit clash and bruising resulting in defective fruit.

At the retail level, product display factors were identified as the cause of most damage. The fruit is displayed in containers not designed for the task, without protection or temperature control, sometimes in direct sunlight. Conditions with open air displays will cause the fruit to rapidly decline in quality and be easily damaged.

From the observation data showed that the average damage tangerine farmers who qualified at the level reaches 10%, at the level of the collectors reaches 11% at the retail level has reached 18%. The high-level damage at the retailers is the result of poor handling and display methods with no temperature control for displayed fruit and improper display modules, resulting in heavy losses.

3.3 The Impact of Post-harvest Handling of Citrus Keprok

The impact of post-harvest handling of tangerines in distribution shows variations of losses at each level of distribution. The impact of post-harvest handling of citrus based on the level of post-harvest loss can be seen in Table 2.

The table shows that significant effects and impact of post-harvest loss with varying percentages. Relative losses were at,

- The retail level of 18%,
- The collectors level of 11%
- While at the level of farmers by 10%

Table 2. The Percentage Impact of the Loss Of Post-Harvest Handling.

	Not Significant	Significant	Very Significant
A. Farmers 1. Harvest	- 	 √	 -
2. Transportation	√	-	-
3. Sorting and cleaning	√	√(10%)	-
4. Packing	√	-	-
B. Collectors 1. Transportation	√ 	 -	 -
2. Unloading	-	√ (5%)	-
3. Sorting	-	√ (6%)	-
4. Grading of quality	√	-	-
5. Packing	√	-	-
6. Storing	√	-	-
7. Transportation	√	-	-
C. Retailers 1. Unloading	√ 	-	-
2. Inspection	√	-	-
3. Display	-	√ (18%)	-

Remark: Not Significant: <5%, Significant :5-30%, Highly Significant :>30% (La Gra, 1999)

4.CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

a. Harvest and Post-harvest handling systems of tangerines need to be improved at all levels with the highest care to be taken at each level, the most care needed
   - At thesupplierlevel(7 levels),
   - Then with the farmers(5 levels)
   - And subsequently with retailers (3 levels).

b. Factors which caused the greatest amount ofdamage are:
   - Poor picking and post-harvest sorting and handling ofcitrusat the farm level
   - Sorting and unpacking at thecollectors/ wholesalers level,
   - Poor displaying of fruit at retailerlevel.

c. The impact of the loss of post-harvest handling tangerines at
   - The farm levelis10%,
   - The collectors/wholesalers level is11%,
   - And at the retail level: 18%.

4.2 Recommendation

Information on the improvement in handling of citrus that reduces damage and loss needs to be delivered to businesses by the competent authority so that businesses are more careful in handling the product, thus delivering cheaper product prices and high quality tangerines will be able to compete with imported citrus products.

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