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Product Flow and Challenges in the Pomelo (*Citrus maxima*) Industry in Northern Mindanao, Philippines

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Abstract

The high demand for Davao pomelo and its suitability to the local climate in the Philippines have given rise to expansion potentials and provided possibilities in curbing poverty levels in the agricultural sector of the region. In order to design intervention projects and policies, the present study investigated the pomelo industry in Northern Mindanao covering specifically the product flow and challenges in the industry. The study area was four provinces of Northern Mindanao, namely Bukidnon, Lanao del Norte, Misamis Occidental, and Misamis Oriental. The data were gathered using a semi-structured questionnaire with 22 respondents composed of 9 pomelo producers and 13 traders. The majority of the pomelo products that were sold in the markets in Northern Mindanao come from outside the region, such as Davao and Cotabato provinces, while pomelo produced in the region were sold outside the region. Among the three marketing chains of pomelo, the producer to consumer is considered the most efficient chain based on the estimated losses. Challenges in the pomelo industry include the lack of technical knowledge among the producers, poor quality of the pomelo, high buying price, and information asymmetry. Improvement in the industry could be enhanced by addressing the challenges identified.

Keywords

Pomelo marketing, marketing chain, supply chain

Introduction

Pomelo (*Citrus maxima*) is a citrus fruit native to Malaysia and South East Asia. It is extensively grown in the Philippines because it is widely adapted to local soil and climatic conditions. The last available information on the production of pomelo in the Philippines was reported in the study of Pangan and Alaba in 2008 entitled "Supply Chain of Pomelo in Davao Region". Shown in their report was the

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comparison of pomelo production among different regions in the country as well as the comparison of pomelo production from different provinces in the Davao region. They also reported that the Philippine's pomelo production experienced an average decline of 3% (Pangan & Alaba, 2008). Issues that have been identified in pomelo production include low profitability, land conversion or crop shifting, lack of institutional support to motivate and encourage pomelo farmers, non-adoption of good agricultural practices, improper insect pest management to promote farm productivity, and poor post-harvest facilities and product handling (Patayon, 2018). Additionally, control of the citrus rind borer as the major insect pest for pomelo, which claims around 60% to 80% (Gavarra, 1988) of the entire produce, might still be affecting the commercial productivity of pomelo farmers.

In terms of marketing pomelo, Pangan and Alaba (2008) reported about the high marketing margin of middlemen in the pomelo supply chains making the fruit's price highly sensitive to its supply. They documented high product losses ranging from 30% to 50% that were experienced during the handling activities of middlemen such as wholesalers while minimal losses of around 5% were experienced by the retailers. These findings in 2008 were indications of existing problems and issues surrounding the different channels and nodes in the pomelo supply chain, which directly affect the fruit's retail price.

Although pomelo is faced with production and marketing constraints, there is still a huge potential of the commodity. Lustria et al. as cited by Radores *et al.* (2021) reported that the Philippines exported pomelo in 1999-2001, but due to increasing domestic consumer demand, the country began importing pomelo from other countries. This demand is a window for expansion potentials which would provide possibilities in alleviating poverty in the region. In order to identify the areas for improvement on these possible potentials, there is a need to assess the industry in the region and update the literature on the status of the pomelo industry in the region, hence, this study.

The present study aimed to trace the product flow of pomelo and determine its challenges. Product flow included the movement of goods from the supplier to the customer, as well as any customer returns or service needs. Analysis of this flow helped to identify the key players, peso share of each player, volume of pomelo handled, the average selling price, estimated losses, and the modes of payment. Further, this paper identifies the challenges in the pomelo industry at the farmer and traders' levels. These are vital pieces of information in the pomelo industry in the region, which may become the basis for crafting intervention initiatives in the improvement of the industry.

Methodology

Study area, sampling, and methods

The research study covered four provinces in Northern Mindanao, namely Bukidnon, Misamis Oriental, Misamis Occidental, and Lanao del Norte. Northern Mindanao is located in the southern part of the Philippines. **Figure 1** presents a map of Northern Mindanao highlighting the four provinces of the study site, and the locations of the producers and traders. Enclosed in the green rectangle are the provinces in the region. The producers are located in Quezon, Bukidnon; Alubijid, Misamis Oriental; and Baliangao, Misamis Occidental. Areas outside the green rectangle are sources of pomelo coming from outside the region, including Cotabato City and Davao City.

The pomelo producers and traders in the said areas were the respondents of the study who were selected using purposive sampling. This is a non-probability sampling method where the elements selected for the sample are chosen by the judgment of the researchers (Black, 2010). Farmer respondents were selected from the recommendations of the city or the municipal agriculture office in the areas while trader respondents were selected based on their availability and willingness to provide information during data gathering.

The study employed the interview method in data collection. Interviewing is a method of data collection that involves two or more people

exchanging information through a series of questions and answers (DeCarlo, 2018). The questions were designed by the researchers following the objectives of the study.

A total of 22 respondents were interviewed using a pre-structured questionnaire. There were 9 pomelo producers and 13 traders who were interviewed. Most of the pomelo producers were located in Misamis Occidental, particularly in the municipality of Baliangao. The traders included six wholesaler-retailers and seven retailers. The number of respondents was the available recipients at the time of data gathering. In addition, the researchers were constrained by travel restrictions because of the COVID-19 pandemic at the time of the data gathering, hence, the smaller sample size. The interviews among the respondents were conducted from July to October 2021, which was still during the height of the COVID-19 pandemic in the region.

Data collection and data analysis

Primary data were gathered through a semi-structured questionnaire, which was pre-tested for the purpose. The questionnaire was designed in such a way that it captured the qualitative information needed in order to learn about the product flow and challenges of the pomelo industry. Product flow covered the geographical flow and the key players of pomelo production and distribution across the region. The challenges were the issues and concerns identified as pomelo flows from the point of production to the point of last sale. The data were presented in Figures and Tables, and were discussed accordingly.

Results and Discussion

Product flow of pomelo

The pomelo product flow illustrates the movement of pomelo from the point of production to the point of consumption. It exemplifies the different players involved and their geographical locations, volume handled, peso share of each player, average selling price, estimated losses, and the mode of payment.

Figure 2 presents the flow of pomelo from the farmers located within the region to traders outside the region. One farmer was located in

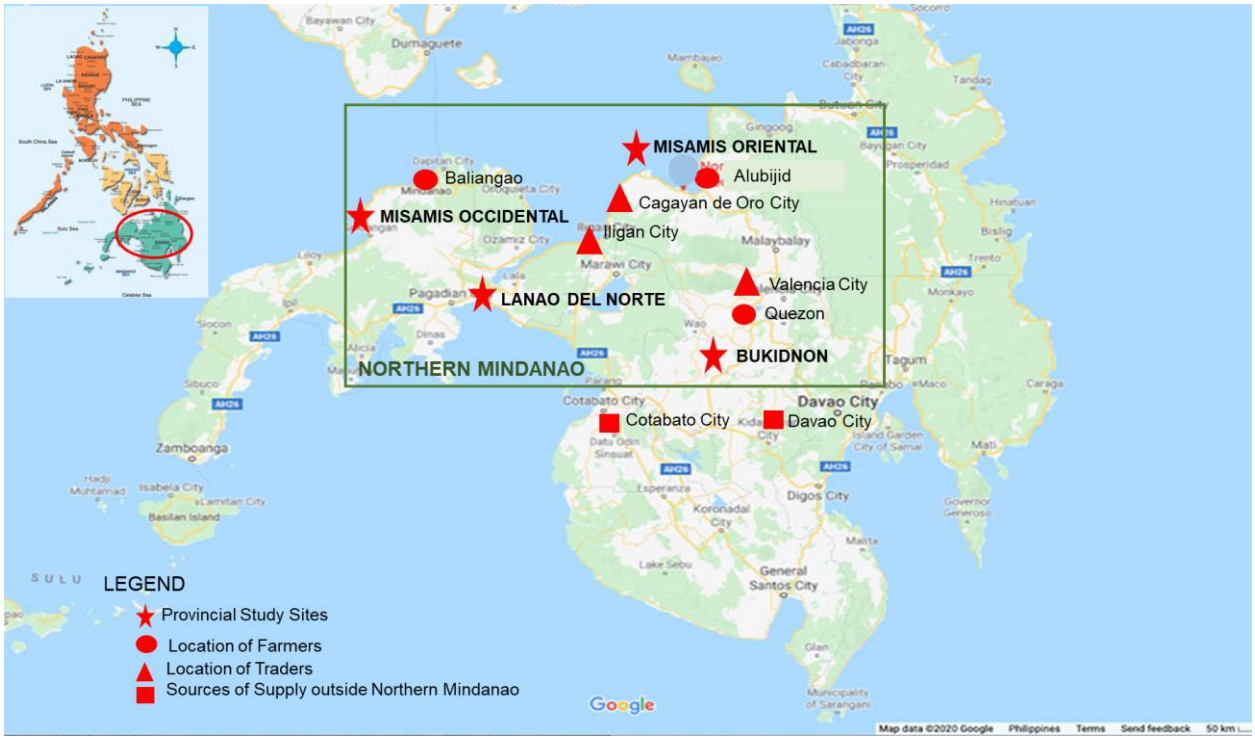

Figure 1. Study sites in Northern Mindanao. (*Source: Map modified from Google*)

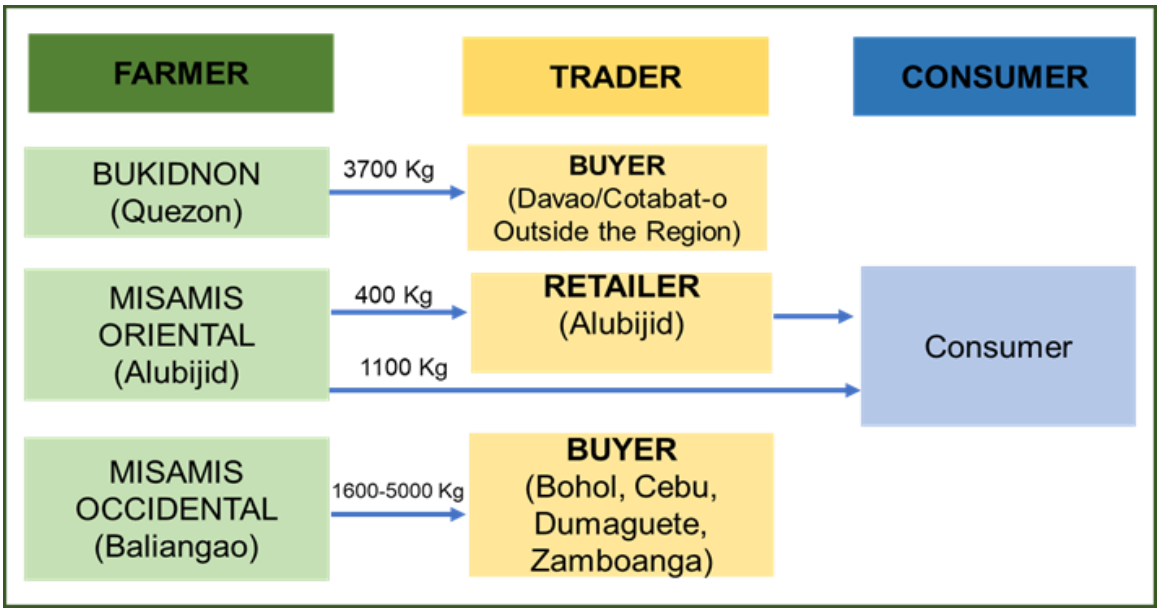

Figure 2. Product Flow of Pomelo from Farmers in Northern Mindanao

Quezon, Bukidnon, one was from Alubijid, Misamis Oriental, and seven were from Baliangao, Misamis Occidental.

In Bukidnon, all the pomelos produced by the farmer were sold to a trader from Mlang, Cotabato and/or Calinan, Davao City, whoever happens to contact the farmer first and negotiate. It should be noted that "buyer" is the term used for traders outside the region since the researchers were not able to interview them because their locations were not covered by the study. Hence, their roles were not ascertained. The buyers from outside the region were those who went to the farm to pay for the harvesting, sorting, and grading, and buy all the produce, including the rejected ones. The farmer was able to sell 3700kg of pomelo in one cropping season. This was the only farmer who had two cropping seasons each year. Pomelos classified as Class A and B are priced higher while rejected pomelos are priced lower. Selling to the said buyers was more convenient for the farmer because he would no longer incur additional costs for the harvesting and would be able to save time looking for buyers for his produce.

The sole producer of pomelo in Misamis Oriental practiced online selling directly to the consumers at a volume of 1100kg while a smaller volume of around 400kg was sold to retailers in the nearby barangays who came to his farm. The farmer found it convenient to sell the pomelo online because of travel restrictions due to the Covid-19 pandemic. Further, the farmer was able to set the price and sell pomelo given the market prevailing price in the area.

Further, the pomelos produced from the province of Misamis Occidental were mostly marketed outside of the region, such as Bohol, Cebu, Dumaguete, and Zamboanga Peninsula. The "Pakyaw" (all-in) system through eyeball estimates was the common buying practice in the province. Some farmers reported a volume of 1600kg to 5000kg yield per hectare year although some did not know the volume they produced because of the "pakyaw" system. Many buyers from different provinces travelled to the farms to negotiate and bid their price. Farmers then had the option to sell their produce to the highest bidder. Pomelos that were brought by traders from Bohol, Cebu, and Dumaguete were subsequently transported via the Plaridel seaport in Plaridel, Misamis Occidental. The low-quality or the rejected pomelos were then sold in the locality at a very low price.

Figure 3 presents the product flow of pomelo coming from outside the region. The volumes shown in the figure are the volumes handled by the traders for their single

transactions with sellers from the source. These transactions happened once or twice a month.

The majority of the pomelo products that were sold in the local markets within Northern Mindanao came from outside the region such as Davao and Cotabato provinces. The wholesaler-retailers located in Bukidnon, Lanao del Norte, and Misamis Oriental provinces transacted with the so called "handlers" or "disers" in Davao or Cotabato and not directly with the farmers. The handlers facilitated the trading of pomelo outside the region, hence, traders from Northern Mindanao could not penetrate the farm to do transactions directly with the farmers. Some of these handlers were the ambulant sellers who also delivered pomelo to different wholesaler-retailers or retailers in the region, which usually happened during the peak harvest season of the commodity.

The wholesaler-retailer in Bukidnon procured around 1500kg of pomelo from the suppliers in Davao or Cotabato where half (750kg) of this volume was sold to retailers in the province and the other half was sold to consumers. This wholesaler-retailer went to Davao or Cotabato to procure pomelo and was the one who shouldered the labor and transportation costs for the acquisition.

Meanwhile, the wholesaler-retailers from Lanao del Norte also sourced out pomelo products from the Davao and Cotabato regions. They went directly to a bagsakan (drop-off point for fruits and vegetables) point in Davao and Cotabato or waited for a handler to deliver the pomelo to them. The ones who went to the drop-off points were also trading fruits other than pomelo such as durian. The wholesaler-retailer sold 1000 to 2000kg of pomelo to the retailers located in Iligan City, Lanao del Norte, and Marawi City, Lanao del Sur, and around 500kg of the volume they handled was sold to the consumers. On the other hand, some retailers in Lanao del Norte sourced out pomelo from the Davao region via Sultan Naga Dimaporo, Lanao del Norte Road while others waited for the ambulant seller from Davao to deliver to their respective stalls.

Furthermore, a huge wholesaler-retailer in Cagayan de Oro City, who also sourced their pomelo from Cotabato or Davao, supplied pomelo to the huge supermarkets in the region like Robinsons Supermarket and to other retailers around Northern Mindanao. The wholesaler-retailer would buy around 2500kg of pomelo per

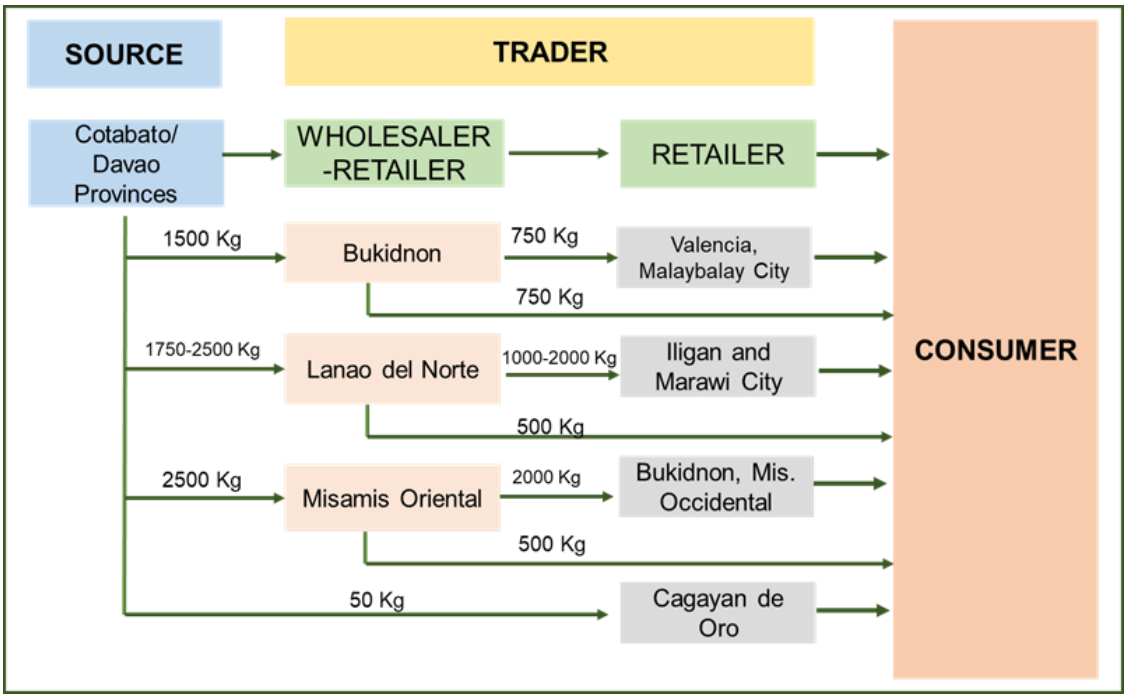

Figure 3. Product Flow of Pomelo from Outside Northern Mindanao

transaction where 2000kg was sold to retailers not only in Misamis Oriental but also in Bukidnon. From Davao or Cotabato, the fruits were transported via sea vessels and were picked-up by the wholesaler-retailer in the Macabalan Port, Cagayan de Oro City.

The product flow of pomelo cut across regions, from an area where there was sufficient supply to the area where there was less or an absence of the supply. Pomelos produced in the region were not utilized within the region while the region's current supply was sourced from outside the region. The traders involved in performing the various activities were necessary in the flow of the product. This was also true in the findings of Nurfadilah *et al.* (2017) in their study of the supply chain of pomelo oranges in Indonesia.

Marketing chains of pomelo

Figures 4a, b, and c display the specific product flows of pomelo in the region, which are termed as marketing chains. There were three identified marketing chains involving the producers, wholesaler-retailers, and retailers. The figures also include information on the peso share of each player, volume of pomelo handled, the average selling price, estimated losses, and the mode of payment. The peso share measures what percent of the final price goes to each player. It was computed by dividing the selling price of each player by the final price of the product times 100.

The first chain (**Figure 4a**) involves the producer who directly sold their products to the consumer and shows that the producer got 100% of the share of the peso. The producer sold pomelo for 75 pesos per kg, which was the existing market price, and received the whole 75 pesos since there were no middleman involved.

The second chain (**Figure 4b**) involved the wholesale/retailer and the retailer before the product reached the consumer. In this chain, the price depended on the quality classification of the product. It could also be seen that 34% to 39% of the final price was received by the wholesaler/retailer while the retailers had a peso share of 61% to 66%.

Finally, in the third chain (**Figure 4c**) where the retailer sold their product to the consumer, the retailer had a 100% share of the peso. This means that if the retailer sold the pomelo for 80 pesos per kg then the whole 80 pesos would be received by the retailer. It should be noted that the marketing chain did not start with the producer since the source was from outside the region which was no longer covered by the locale of the study.

In terms of payment, the three different chains examined preferred cash as payment in all of the transactions.

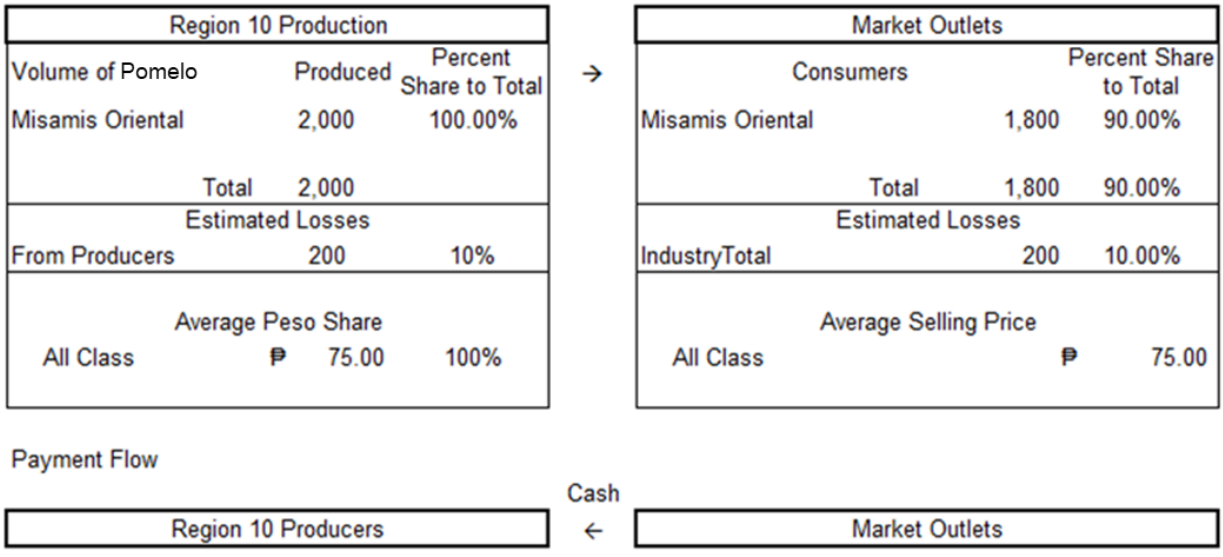

Figure 4a. Marketing Chain 1: Producer to Consumer

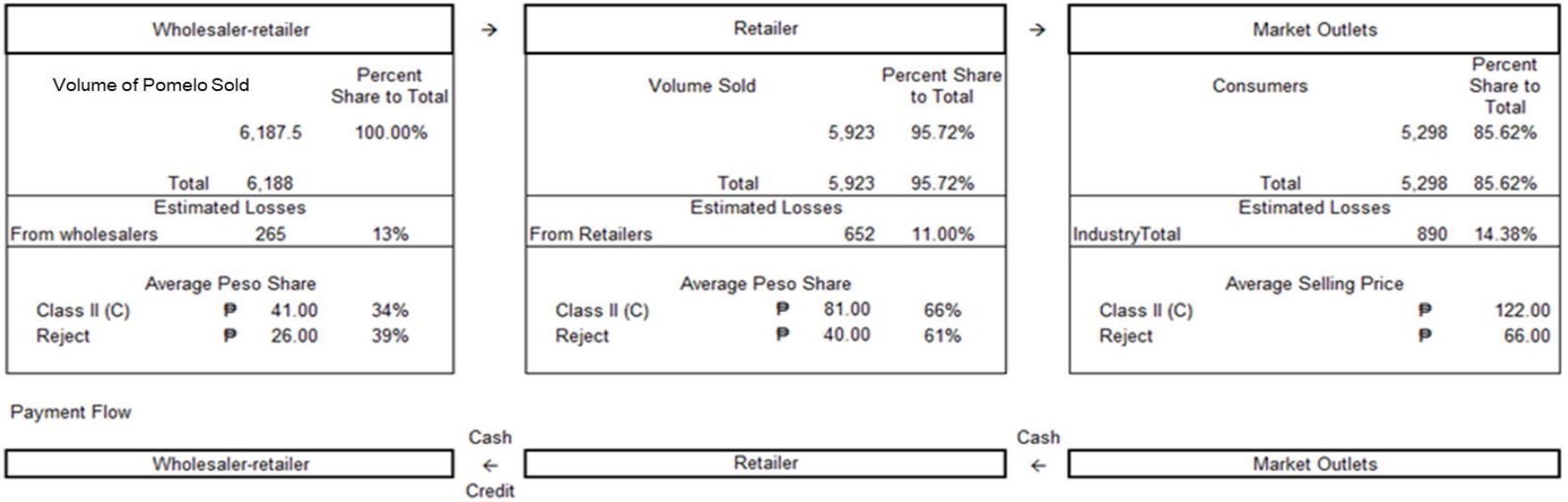

Figure 4b. Marketing Chain 2: Wholesaler/Retailer to Retailer to Consumer

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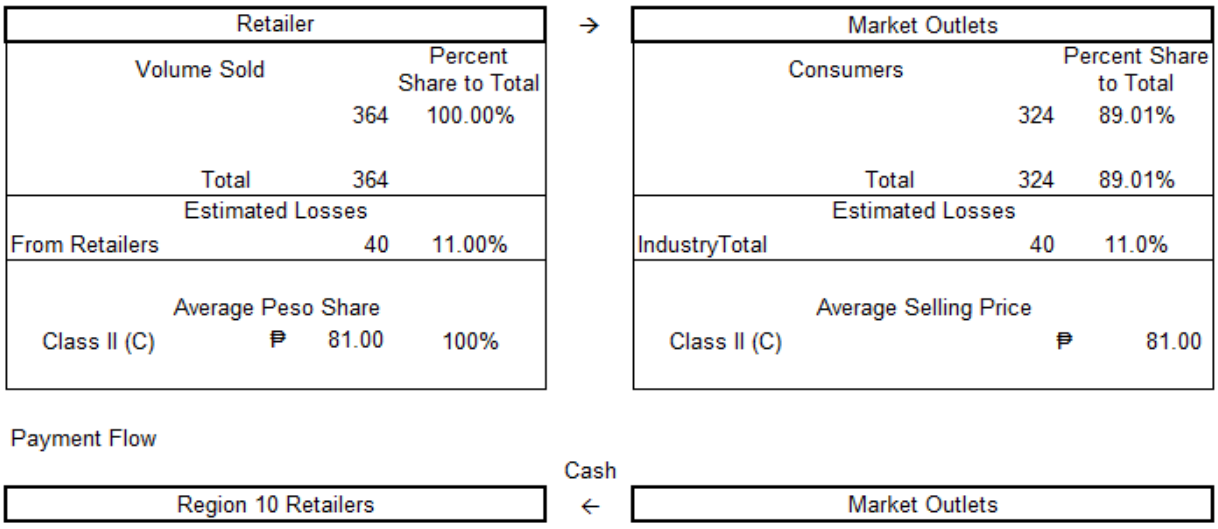

Figure 4c. Marketing Chain 3: Retailer to Consumer

Challenges in the pomelo industry

Table 1 shows the external influences identified in the pomelo industry in Northern Mindanao. All of the pomelo producers in the region claimed that they did not have technical training on pomelo production and they often encountered problems in production. The most reported issue was on pest infestations, which economically affect the level of output. This finding agrees with Patayon (2018). Farmers tended to address the issue by using different kinds of pesticides to spray the pomelo trees more frequently than desired, which was unnecessary and costly. Intensive use of pesticides is detrimental to the health of the farmers. Farmers in Misamis Occidental only harvested once a year while the farmer in Bukidnon was able to harvest twice a year. Harvesting twice a year is more advantageous than harvesting once a year to cover the monthly costs incurred by the farmer in maintaining the farm.

On the trader's end, 23% of them reported the issue of poor quality of the pomelo product. This was the most reported reason that contributed to the losses of the trader. The pomelos were already packed (sacked) when the wholesaler-retailer picked the fruits up from the supplier so the traders did not have the opportunity to assess the quality and appearance of the products. There were times that the procured product had dried flesh that was not saleable among customers. The wholesaler-retailers could not exchange the dried product with a new one since oftentimes they could no longer contact the supplier since they were just random sellers. In the case of some traders who knew their suppliers, the pomelo was replaced but only up to 30% to 50% of the total amount paid.

Further, 85% of the traders claimed to have a problem with the unstable supply and sourcing of pomelo. Most of the pomelo products in the market came from the Davao and Cotabato region. During the off-season, pomelo was not highly available in the market. The unavailability of the product resulted in the higher price of pomelo compared to other citrus products. During the off-season in Davao and Cotabato, traders did not have another source of pomelo, so they had to wait for the time when pomelo was available. The sources of pomelo were distant, which resulted in higher transportation costs and losses due to bruises on the pomelo during transportation. Meanwhile, 23% of the traders claimed that the high buying price of the commodity influenced the trading of the commodity. At a higher buying price, traders procured less volume of the commodity.

Finally, information asymmetry was identified to be an issue in pomelo trading as reported by 92% of the traders. From the node of the trader, wholesaler-retailers and retailers did

Table 1. Challenges in the Pomelo Industry in Northern Mindanao

External Influences	Freq	% Response
Farmers		
Lack of Technical Knowledge	9	100%
Traders		
Poor Quality of the pomelo	3	23%
High buying price	3	23%
Unstable supply of pomelo	11	85%
Information Asymmetry	12	92%

not receive information about the variety and classification of the pomelo they were selling. They were also not aware of the source of the pomelo within the region because according to them, they heard that pomelo produced in the region were native varieties, which were not preferred by the consumers. In terms of pricing, farmers were at a disadvantage because they only took the price offered by the buyer since there was no other way of validating and assessing the price.

Conclusions

Most of the pomelo sold in the markets of Northern Mindanao came from the Davao and Cotabato regions, which are outside the Northern Mindanao region. On the contrary, the pomelo produced in the region was sold to traders in other regions. There is a possibility that the pomelo produced in Bukidnon goes to Davao and Cotabato then comes back to Bukidnon in a longer route. This is the result of information asymmetry in the industry. Among the three marketing chains of pomelo, the direct marketing of the producer to the consumer is considered the most efficient chain based on the estimated losses and this chain allows the farmer to obtain a higher return.

The challenges in the industry are areas in which intervention projects or policies could be designed in order to boost the industry. The farmers lack of technical knowledge in production, especially on pest management, could be addressed through capability building. Trainings should be given to pomelo farmers giving consideration to good agricultural practices thus, increasing the farmers' efficiency rate. Traders should be organized and should be educated about pomelo varieties and classification. Linking the traders to the pomelo farmers in the region may lessen losses due to bruises as a result of long-distance travel to Davao and Cotabato.

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