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Perceptions of Southern Mindanao Farmers On the Quality of Temperate Vegetables

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Perceptions of Southern Mindanao Farmers On the Quality of Temperate Vegetables¹

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Abstract

In Barangay Kapatagan, Digos City, Southern Mindanao Philippines, vegetable farmers hold a specific worldview on what quality vegetables are. This paper aims to define this worldview, compare this with expectations of marketing intermediaries down the vegetable supply chain, and assess the gaps between these views. Discrepancies between and among the definitions of the different groups affect the entire chain because of incompatible decisions in production, marketing and quality management. These decisions contribute to the efficiency or inefficiency of the entire chain.

Introduction

Current Philippine research priorities under the Department of Science and Technology (DOST) National Science and Technology Agenda (NSTA) 1999-2004, is anchored on enhanced productivity of vegetables, including variety improvement, biotechnology, integrated pest management, soil and water management, postharvest handling, processing and seed production. Research efforts on marketing issues like quality standards, quality assurance systems, food safety development and market prospects are given highest priority (Lantican, 2000:34, 58-59).

Objectives of the study

Inconsistent quality of vegetables is one of the most common problems in marketing vegetables in the Philippines. Key players in the vegetable supply chain experience limited access to reliable and accurate market information pertaining to quality requirements (Lantican, 2000:18). Wholesalers, retailers, farmers and other actors in the supply chain have varying perceptions in defining the quality of vegetables. The differences in these perceptions are the gaps that need to be identified and eventually addressed.

This study aims:

1. to describe the farmers' perception of quality vegetables;
2. to compare these with the perceptions of the other members of the supply chain; and
3. to assess the gaps between the farmers' definition of quality and the view of the rest of the supply chain.

¹ Data for this paper is taken from the ACIAR funded project ASEM2000/101 "Improving the Efficiency of the Agribusiness Supply Chain and Quality Management for Small Agricultural Producers in Mindanao", undertaken by Curtin University of Technology, University of the Philippines in Mindanao and SEAMEO Regional Center for Graduate Studies and Research in Agriculture (SEARCA).

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Meanings of Quality

The major challenge in any marketing system is to ensure quality and minimize losses. However, there are varying definitions of quality.

One popular view is that quality is intangible, similar to truth, beauty, and goodness (Burrill and Ledolter, 1999). It is also seen as a “feature of excellence” or an ideal (Saunders; APICS Dictionary; Burrill and Ledolter, 1999). On the other hand, quality is seen as a combination of characteristics that are critical in establishing a product’s consumer acceptability, including fitness of use, freedom from deficiencies and provision of satisfaction, (Satin, 1997 in Manalili, 1999; Saunders, 1997; Juran and Gryna, 1998 in Saunders, 1997; and APICS Dictionary in Fredendall and Hill, 2001).

The food industry defines quality as an integrated measure of purity, flavour, texture, colour, appearance, and workmanship (Satin, 1997). This is an idea similar to total quality. “The concept of total quality, however, widens attention to include all aspects of the offering, including service and delivery time” (Saunders, 1997: 187).

Marketers define quality as value or a consumer’s perception of the worth of the product in relation to price (Satin, 1997; Saunders, 1997:184-187; APICS Dictionary in Fredendall and Hill, 2001). Quality also refers to a product’s consistent adherence or conformance to a standard, specification or requirement (Satin; Saunders; Fredendall and Hill, 2001:55; Crosby, 1979 as quoted in Burrill and Ledolter, 1999).

What about the small farmers of Kapatagan, Southern Mindanao? How do they define quality in vegetables they produce? How are their perceptions of quality different or similar to the definitions of the other players in the vegetable supply chain?

Methodology

Data for this paper came from a research project funded by the Australian Centre for International Agricultural Research (ACIAR). Various data gathering methods were used. In the Kapatagan village, key informants were interviewed, focus group discussions were conducted among farmers and agents, and a survey of households was undertaken using purposive sampling method, depending on the farmer households’ willingness to participate in the study.

The village was clustered into four (4) according to the natural terrain. The first cluster had 172 households and 23 participated in the survey. The second cluster had a total of 347 households and 56 households agreed to be interviewed; third cluster, 39 of the total 366 households and 89 of the 809 households of the fourth cluster. The sample households of the survey comprise 12.2% of the total number of households in the village.

Information from other players of the vegetable supply chain were taken from interviews with farmers from other temperate vegetable areas in Southern Mindanao, Central Mindanao, and Northern Mindanao. Wholesalers from Divisoria, the largest wholesale market in Metro Manila, were also interviewed, as well as supermarkets in Davao City and Metro Manila.

Background of the Study

Southern Mindanao is composed of the Provinces of Davao, Davao del Sur, Compostela Valley, Davao Oriental, Sultan Kudarat and the Cities of Davao, Tacurong and Digos. The area is accessible through air, water, and land. Excluding Sultan Kudarat and Tacurong City, all other areas in Southern Mindanao faces Davao Gulf. As a result, there are various wharves and ports found within its areas, catering to both domestic and international cargoes. There are also domestic passenger ships that have weekly schedules of travel to Surigao, Zamboanga City, General Santos City in Mindanao, Iloilo and Cebu in the Visayas, and Manila in Luzon.

There is one international airport in Davao City that offers domestic flights daily and direct flights to Singapore and Manado, Indonesia few times a week. In land transportation, the area is very accessible through the public buses and public utility jeepneys that travel from Davao City Overland Transport Terminal to other places in Mindanao, and to the Visayas and Luzon islands.

Aside from the accessibility of the area, Southern Mindanao also offers favorable climate, especially for growing agricultural crops. Among its products are banana, copra, and vegetables such as bell pepper, onion, tomato, cabbage, potato, carrots, cauliflower, ginger, pechay, and carrots.

The Department of Agriculture identified three key vegetable production areas in Southern Mindanao and facilitated the organization of the Vegetable Industry Council of Southern Mindanao (VICSMIN). The three key vegetable areas are Maragusan in Compostela Valley, Marilog District in Davao City, and Kapatagan in Davao del Sur.

According to Mr. Rufino Odtojan³ of the Department of Agriculture (DA) XI in his speech in the Southern Mindanao Congress last March 2002, the prospects for the local vegetable industry are *“towards market-oriented vegetable production, more focused research and technology interventions, the need for availability of high quality and disease-free planting materials, increasing demand for organically-grown vegetables, innovative marketing strategy, improved post-harvest handling and practices, and increase per capita consumption”*.

The Project Site

*Barangay*⁴ Kapatagan was created on May 10, 1971 under Republic Act No. 6210, despite the fact that it was declared as a National Park in 1932 during the Commonwealth Government. Logging operations started in the 1960's and continued to proliferate. When the logging workers started bringing their families, settlement areas were established. After the logging companies ceased operations, some of the workers remained. They started utilizing the area for agricultural purposes particularly coffee plantation. Residents from nearby towns started coming because of the promise of fertile, productive and vast lands in Kapatagan.

³ Manager, Regional Integrated Agricultural Research Center (RIARC)

⁴ Village; the Smallest Local Government Unit in the Philippines.

As of January 2002, the total population of Kapatagan was 8,193 with 1,694 households. Most of the constituents were farmers (80%), while others were businessmen (15%), and professionals (5%).

The name *Kapatagan* means “plains” or “flat lands”. However, its topography ranges from level to gently sloping terrain (0% to 8%), strongly sloping (18 to 20%) and hilly areas (30% to 50%). The level terrain is the center of the Village. According to the Village records, its land use as of 2001 was 2,500 hectares or 37.45% of its 6,675 total land area. It lies at the foot



Figure 1: Map of the Philippines
Source: Lonely Planet



Figure 2: Map of Davao del Sur
Source: Growth with Equity in Mindanao (GEM)

Kapatagan, Digos, Davao del Sur

of Mt. Apo⁵ with an elevation of around 1,100-1,600 meters above sea level.

The climate is cool at 22 to 25 degrees centigrade with no pronounced maximum rain period or long dry season. Prevalent wind direction is NE to SW throughout the year (Mercado et al, 2000). It is safe from typhoons because it lies outside the typhoon belt and is further protected

by its mountainous borders. Kapatagan is an ideal place for planting temperate vegetables (cabbage, tomatoes, bell pepper, Chinese cabbage, Kentucky beans, carrots), coffee, root crops and other agricultural products. Modes of transportation both for the people and the products include horses, motorcycles, jeepneys, tricycles, trucks, and L300 vans.

⁵ It is the highest peak in the Philippines with an elevation of 2,954 meters above sea level.

Vegetables produced in Kapatagan are marketed mainly to the surrounding towns, including Digos City, Kidapawan City, Cotabato City and Davao City. Other Mindanao buyers come from Cagayan de Oro City and Surigao and Agusan provinces. There are also some buyers from the Visayas, such as Tacloban City, Iloilo City and Cebu City.

Most transactions happen during the market days: Monday, Thursday, Saturday (Kidapawan City, Cotabato City, Surigao City, Tacloban City, Iloilo City, Cebu City, etc.); everyday for Davao City and Digos City. The farmers, locally known as planters, bring their products from their farms or “gardens” to the Trading Post in the center of the village, through the *karyador*⁶. Marketing is done by the “*ahente*” or agent/middleman who receives the produce from the farmers at the Trading Post in Kapatagan. Then the *ahente* will pass on the produce to the buyers with P1-2 peso per kilogram profit margin. Most buyers decide the price. Farmers are generally price takers. In some cases, buyers pre-order some vegetables and agents would find the supply from various farm. Negotiations for the price happen during the trading day. Most of the vegetables are sold within the day, particularly in the morning and sold at wholesale. There are also owners and operators of *bodegas* or warehouses who buy the vegetables, especially potatoes.

Some Issues in the Kapatagan Supply Chain

Several issues have become apparent in the Kapatagan supply chain. First, the sustainability of farms in Kapatagan is seriously challenged because of the insecure land ownership. Farmers pay taxes on the use of the land but do not have title to the land because Kapatagan is part of a national park. Different government agencies have different ideas of whether the farmers should stay or not.

Figure 3: A View of the Project Site, Barangay Kapatagan
Source: Project Materials



Second, the production of quality vegetables begins with the agronomic practices of the farmers. In Kapatagan, traditional farming is used but farmers generally have poor agronomic practices, basically because of the lack of technical knowledge or lack of financing for the proper farm inputs. Third, farmers have very little market knowledge and rely mostly on what their buyers will say about the market. Most of them see their market as the person who takes the goods off their hands, and rarely look beyond the trader.

Fourth, Kapatagan, as can be seen in Figure 3, have very poor road conditions and rough terrain. Until 2002, many of the roads leading to the farms are unpaved. The village received access to electricity only in year 2000. They have no access to irrigation in the farms, or plumbing in their homes.

Fifth, different stakeholders in the supply chain do not see each other as partners but as persons who need to be watched. While there is some degree of trust among several farmers and their buyers, other farmers feel that the traders may not be giving them the right price information.

Most critical for this paper is the issue of poor quality of produce of the farmers from Kapatagan. Data from the farm level show that they have very low productivity on almost every crop except tomato and maize, compared to national averages, based on the survey of the farm outputs. The quality of their cabbages and carrots are poor based on the observations of the project team on the site, mainly due to the poor agronomic practices and the poor infrastructure causing further damage to the vegetables.

Therefore, it has become important to address the quality issues in the production and management of the small farmers in Kapatagan. This paper will look into the way farmers think about quality vegetables as a starting point for the larger study of improving the vegetable supply chain in Kapatagan.

Findings and Discussion

Farmers' Quality Criteria

Attributes to define quality in vegetables used in the survey came from the farmers themselves during the initial visits to the village. In preliminary face-to-face interviews with the farmers, they were asked to describe, in their own words and language, what quality in vegetables mean. Some would simply describe features of vegetables in general, while others would first state what vegetable they would like to describe. For those who proceed to describe without qualifying the vegetable, they would give general comments like that which is not rotten (*kanang dili lata*), or that which has a few worms. Their initial descriptions would give us a general sense of the level of quality awareness of the farmers of Kapatagan. They are primarily concerned only with wilting or freshness, and pest infestation of vegetables.

Farmers described the vegetables they grew using the descriptors in the vernacular and these descriptors were translated into English. Other attributes from secondary materials that define vegetable quality were added to the list. These list of attributes were used in the survey. Eleven attributes were used: shape, size, weight, maturity, color, freedom from pest, no or little physical defect, no or little mechanical injury, cleanliness, freshness, and firmness.

Farmers were asked to rank the 11 attributes of quality in vegetables according to order of importance, 1 being the most important and 11 the least important. In order to avoid confusion, farmers ranked only vegetables they planted, beginning with the primary crop, until the tertiary crop, if any. For this paper, only the rankings of the primary crop were used.

Of the 207 farmers surveyed, 195 responded to the question that asked them to rank the importance of vegetable attributes of the primary vegetable they planted. Table 1 shows the primary vegetables planted by the number of farmers.

Table 1
Primary Crops by Number of Farmers

Primary Vegetable Planted	Number of Farmers	Percent
Cabbage	79	38.2%
Tomatoes	35	16.9%
Potato	34	16.4%
Carrots	27	13.0%
Chinese cabbage	11	5.3%
Kentucky beans	6	2.9%
Others	15	7.2%
TOTAL	207	100%

Source: Survey of Kapatagan farmers, 2002.

Cabbage was considered as the most saleable vegetable in retail by 45.6% of the farmers surveyed. Most farmers in Kapatagan (38.2%) planted cabbages. In Table1, tomatoes (16.9%) and potatoes (16.4%) follow as the second most planted crop in Kapatagan. Other crops planted were chayote, bell pepper, onions and eggplant.

Based on their primary crops, the farmers were then asked to rank the 11 quality attributes according to their order of importance. Table 2 shows the mode and the median of the responses of the farmers. Table 3 shows the mean.

SHAPE. From the responses in Table 2 and 3, shape as a quality attribute of vegetables is important from the perspective of the farmer for Chinese cabbage and tomatoes. On the other hand, farmers who planted potatoes and Kentucky beans did not put much importance on shape. This is because the sales of these two vegetables are not dependent on its shape.

SIZE. Size is most important for potatoes and tomatoes using the mode and the mean while it ranked 4 for tomatoes, potatoes and Kentucky beans when judging from the median.

WEIGHT. The modal response for weight is 1 for Chinese cabbage and Kentucky beans. Weight is considered a quality criterion for Chinese cabbage because heavier Chinese cabbages are more compact and will sell better. The farmers call this “bus-ok”, literally compact. For potatoes, the modal response is 2. Weight plays a relatively important role in quality for these 3 crops from the perspective of the farmer.

MATURITY. Maturity would refer to the appropriateness of the maturity of the product at the time of harvest (Lizada, 2000). This seems to be an important quality attribute for the farmers for almost all the crops.

COLOR. Farmers used the attribute color only when describing tomatoes.

FREEDOM FROM PEST INJURY. There were also respondents who said that quality vegetables were those that are free of pests and diseases. The mode, median and mean of the rankings of the farmers show that freedom from pest and diseases are important quality attributes. During the in depth interviews with some farmers, some of them noted that vegetables with a few insects were of good quality. Farmers referred to the vegetables as “*naay ulod*” or with worms, since the insects are observed in the larvae stage and “*tung naay buslot* (those with holes)”, for leafy vegetables. They explained that the presence of these insects is proof of food safety. If an insect survived, the vegetable is perceived to be free from chemicals. These farmers however clarified that there must only be one or two of such pests in each head of cabbage or lettuce. Beyond that, is be considered an infestation.

Farmers in Kapatagan were very concerned about the infestation of the diamondback moth currently spreading to almost all the farms. Many farms were considered as failures because not enough pesticides were used to prevent the damage.

FREEDOM FROM PHYSICAL DEFECTS. Physical defects are those defects, which may arise from hereditary abnormalities, unfavorable growing conditions or insect injury. Some farmers made a distinction between physical injury and insect injury, even while the literature for postharvest technology (Lizada, 1993) classified insect injury under physical defect. However, the farmers also enumerated physical attributes such as “*hamis*” (smooth), and “*sinaw*” (shiny) as characteristics of quality vegetables. From the rankings of the farmers, freedom from physical defect is a quality attribute for Chinese cabbage.

Table 2
Rankings of the Quality Attributes per Crop: Mode and Median

Attribute	Statistic	Cabbage N=79	Tomatoes N=35	Potato N=34	Carrots N=27	Chinese cabbage N=11	Kentucky Beans N=6
Shape	Mode	6	2	9	5	2	8
	Median	7	5	7	6	8	7.5
Size	Mode	8	2	1	9	9	3/7
	Median	6	4	4	6	9	4
Weight	Mode	7	10	2	4	1	1
	Median	7	8	6	7	6	1.5
Maturity	Mode	1/10	1	1	1	1	2
	Median	6	5	2	4	2	2
Color	Mode	11	1	11	11	3	6
	Median	8	5	10	9	8	6
Freedom from pest	Mode	1/3	2	3	2/3	2	7
	Median	3	5	3.5	5	3	7
Physical defect	Mode	10	6	2	4/6	3	10
	Median	6	6	5	6	3	9.5
Mechanical injury	Mode	5/11	11	3	8/10	4	11
	Median	7	7	6	9	8	8.5
Cleanliness	Mode	1	5	8	1	2/4/5/6	4
	Median	5	5	8	3	6	4.5
Freshness	Mode	1	6	4/7/10	5/9	6	4
	Median	5	6	6	6	5	4.5
Firmness	Mode	3	7	9	3	5	5
	Median	5	7	7.5	5	6	7

Source: Survey of Kapatagan farmers, 2002.

FREEDOM FROM MECHANICAL INJURY. Mechanical injuries are those that may be caused by careless handling, packaging or storage, like impact damage, pressure or compression, vibration. These damages are abrasions especially in potatoes and tomatoes, bruising, distortions, cracks, cuts, punctures, skin breaks, skinning, or splitting (Lizada, 1993). Many of the farmers did not give this quality attribute a high rank. This may be due to the fact that the farms to market roads from Kapatagan to the retail markets are very bad so that farmers feel powerless to prevent the mechanical damage.

There is a standard practice in Kapatagan of deducting 30% off the volume weight of leafy vegetables as allowance for risk and shrinkage, locally known as “*reseko*”. Shrinkage and other forms of mechanical injury affect the quality of leafy vegetables.

Table 3
Rankings of Quality Attributes per Crop: Mean

	Cabbage	Tomatoes	Potato	Carrots	Chinese cabbage	Kentucky Beans	Bell Pepper
Shape	6.68	5.06	6.53	6.11	6.18	6.17	5.67
Size	5.53	4.60	4.47	5.85	6.82	4.80	5.33
Weight	6.73	6.71	6.18	6.30	4.73	3.83	6.00
Maturity	6.10	5.20	3.82	4.67	4.18	3.50	4.33
Color	6.79	5.60	8.38	8.19	6.27	6.00	4.00
Freedom from pest	4.72	5.86	4.32	5.07	5.22	6.00	4.00
Physical defect	6.38	6.00	5.35	5.44	4.18	7.50	7.33
Mechanical injury	6.77	6.40	6.21	7.74	7.36	7.50	5.67
Cleanliness	4.71	5.66	7.12	3.85	4.64	5.83	5.67
Freshness	4.96	6.40	6.00	5.85	5.09	5.17	6.67
Firmness	5.63	6.74	7.21	5.00	5.91	7.00	7.67

Source: Survey of Kapatagan farmers, 2002.

CLEANLINESS. Cleanliness means that the vegetable is free from any dirt or stains. In the survey, most of the farmers who planted cabbage and carrots said these two vegetables should be clean to be of good quality.

FRESHNESS. Quality of the cabbage is also defined by its freshness, according to the modal and the mean rankings of the farmers. Firmness is a literal translation of the often-mentioned attribute of the farmers “*kanang dili lata*” (literally, those which are not rotten).

FIRMNESS. However, when ranked with other quality attributes, firmness was not rated as high as maturity, freedom from pests / disease damage or size and cleanliness.

ATTRIBUTES IMPORTANT TO THE FARMER. The attributes for crops that are important from the perspective of the farmers are those over which they have some degree of control, like maturity at harvest and freedom from pests. The farmers decide when to harvest their crops and can control the quality of their produce by preventing insect infestation through proper cultural practices. Size and cleanliness of the produce affect the price they receive for their produce, hence farmers would tend to give these quality attributes higher ranks.

Farmers gave very low ranks to attributes like free from mechanical injury, especially for crops like carrots and Chinese cabbage. This explains why the packaging of the vegetables in Kapatagan use sacks except for tomatoes that is in crates. The sacks do not provide any protection against mechanical injuries but it allows flexibility in the amount of produce, which can be tightly packed in. While packaging in sacks induces more mechanical damage, farmers are paid by the weight and the sizes of the produce as well as the physical appearance. Damages to the appearance of the vegetables caused by mechanical injuries in harvest or transit, are apparently not perceived by farmers as adverse to them.

Packaging affects the degree of mechanical injury sustained by the crop. In terms of packaging from the farm, the Kapatagan farmers use different methods for the different vegetables. For cabbage, they use sacks and plastic twine ("*pisi*" or "*tie-backs*"). One sack of cabbage is approximately 53-69 kilogram. However, there are instances when the sack could carry more than 69 kilograms especially if the sack is extended using banana trunks or "*bunny*". Farmers will extend the capacity of the sacks for 12 inches by attaching banana trunks around the opening of the sack. The extension of the sack made of banana trunks will be secured by plastic twine. It is also the same packaging and "extension" with Chinese cabbage. From a minimum weight of 50 kilograms, a sack could reach around 65-70 kilograms, depending on how well the sacks are extended.

On the other hand, carrots are seldom packed beyond the normal capacity of the sack because the more exposed the carrot, the more it will be prone to bruises and transport damage. Carrots are also heavier than leafy vegetables. One sack approximately weighs around 61-82 kilograms. Meanwhile, potatoes are also packed in sacks and one sack weighs approximately 61-90 kilograms. While the use of sacks is one of the easiest way to pack vegetables, it is the most prone to mechanical injuries in transport.

Tomatoes are packed in wooden crates for protection from bruises and other transport damages. All of the abovementioned vegetables are packed from the farm unwashed. The dirt or soil from the farm could add more to the weight of the sack.

Correlation of the Quality Attributes

Table 4 shows the significant correlations among the different attributes. Only correlations with at least .05 probabilities are shown in the table. Although in terms of magnitude, the correlation coefficient of pest/disease damage and mechanical injury is only at .280, its significance is at 99 % confidence level. One of the reasons for this finding is the perception of the farmers that a “sick” vegetable is more prone to handling, packaging and transport damages. In a related matter, data from the formal and informal interviews, focused group discussions, and workshops with the farmers could explain the shape and size correlation (better shape=good size) and mechanical injury and freshness (the more damages, the lesser the freshness) at 95 % confidence level.

However, one finding in the survey showed that color and shape have correlation coefficient of .151 at 95 % confidence level. This information is new to the authors and it needs further investigation why this data came up. It is possible that well shaped vegetables exhibit better color than oddly shaped ones.

On the other hand, the inversely correlated attributes at ninety nine percent confidence level are pest/disease damage with size (-.257) and shape (-.241), and physical defect and shape (-.189). Irregular shapes and sizes in vegetables as well as under weights are often caused by pest infestation or some other physical abnormality brought about by poor cultural practices or inadequate farm inputs.

Mechanical injury is also inversely correlated with size (-.184), weight (-.191), color (-.182), cleanliness and maturity (-.276). This is because attributes like shape, size weight, color, cleanliness and maturity are positive attributes and freedom from mechanical injury although positively stated is really an avoidance of a negative attribute of vegetable quality or lack of it.

At ninety five percent level of confidence, the significant inverse correlations are color and maturity (-.141), pest/disease damage with weight (-.158) and color (-.173), physical defect with color (-.139) and weight (-.166). Color and maturity are inversely related because the maturity level of the vegetable at the time of harvest affects the color. Vegetables harvested later tend to have better color like in tomatoes.

Table 4
Rank Correlation Coefficient of Quality Attributes

		Size	Colour	Pest Disease damage	Physical defect	Mechanical injury	Cleanliness	Freshness	Firmness
Shape	Correlation Coefficient	.170	.151	-.241	-.189			-.163	
	Sig. (2-taild)	.015	.031	.001	.007			.020	
Size	Correlation Coefficient			-.257		-.184		-.299	
	Sig. (2-taild)			.000		.008		.000	
Weight	Correlation Coefficient			-.158	-.166	-.191		-.151	-.167
	Sig. (2-taild)			.025	.018	.006		.031	.017
Maturity	Correlation Coefficient		-.141			-.170	-.276		
	Sig. (2-taild)		.044			.015	.000		
Colour	Correlation Coefficient			-.173	-.139	-.182			
	Sig. (2-taild)			.014	.047	.009			
Pest Disease damage	Correlation Coefficient					.280	-.142		
	Sig. (2-taild)					.000	.043		
Mechanical injury	Correlation Coefficient							.160	
	Sig. (2-taild)							.022	

Source: Survey of Kapatagan farmers, 2002.

In the case of Kapatagan, results of the survey showed that farmers also have the same perceptions as other Southern Mindanao farmers. In an interview with a farmer from Marilog, another village in Southern Mindanao, he believed that quality tomatoes should be good to look at, large and shiny. The emphasis on the physical characteristics of vegetables is the same for Marilog as it is in Kapatagan. The Marilog farmer also believed that cabbages and other leafy vegetables like lettuce should not be completely free of pests. The visibility of a few pests, he says, is proof that the vegetable has just the appropriate amount of chemicals. A woman farmer from the same area does not completely agree. She said that cabbage should have no holes, no black spots. She also thinks that the variety of the cabbage must be the big and flat ones.

Taste was not a primary consideration in the minds of the Kapatagan farmers while the farmer interviewed in Marilog immediately mentioned taste. Carrots should be large, around 6 inches in length and 1.5 inches in diameter. They should also be washed. A female farmer from the same area also described quality carrots to be of medium size, about 6 inches in length and 2 inches in diameter. It should have no leaves and must be washed at the wholesaler level in

Bangkerohan⁷ because washed vegetables rot faster than unwashed ones, according to the woman.

In Maragusan, one farmer described quality tomatoes according to their sizes. Large tomatoes should be 2.5 inches in diameter, medium should be 1.5 inches while small are those less than 1.5 inches in diameter. He also believed that vegetables should be air dried before they were packed to lengthen the shelf life of the vegetables.

Color is seldom used to describe the quality of vegetables, except for one lady farmer in another village of Southern Mindanao. She said the vegetables like broccoli must be very green with no white spots.

In Northern Mindanao, farmers believed that they have a competitive advantage over Southern Mindanao vegetable farmers because they have better quality vegetables. One farmer from Northern Mindanao said that they have quality seeds and technology. He believed that quality cannot be achieved from seeds alone, but seedlings that are adaptable to the environment of the local farm through appropriate technology. In this sense, the Northern Mindanao farmer seems to be more knowledgeable in marketing vegetables because they compare their advantages with their direct competitors, the Southern Mindanao farmers. The Kapatagan farmers especially, have little information about other vegetable growing areas. In fact, only 12% of the farmers interviewed have seen another vegetable growing area. Areas seen were Calinan and Marilog, both in Davao City. However, many of the Kapatagan farmers still think that their vegetables are of better quality than other areas. We have yet to determine the reason for their opinion.

Very few farmers in Kapatagan mention the nutritional content (salubrity) of their crops as a descriptor of quality. Most of their definitions of the quality of their produce rested on the physical characteristics of the product, something that can be validated with their eyes, like shape and size. Taste was also mentioned only after some prodding. While some farmers related quality to price, this construct did not become part of the definitions which the farmers used to define quality.

Farmers' Perception of Ultimate Buyers' Quality Criteria

An open-ended question was asked of the farmers, "What criteria do you think the ultimate consumer uses in choosing and buying fresh vegetables?" The respondents enumerated several criteria they perceived the ultimate consumers' use in choosing vegetables. Most of the physical attributes mentioned were smooth skin (especially for tomatoes), compact and in good shape (for cabbages), and no stains (for potatoes). Ultimate buyers were also perceived to choose fresh produce without any damages, worms, holes or bruises in it. The respondents also mentioned that exact maturity of the produce as another factor considered by the buyers. However, the farmers did not mention 'taste' as a quality criterion of the ultimate buyer.

⁷ One of the biggest wholesale market in Mindanao, located in Davao City.

Table 5
Farmer Perceptions of the Quality Criteria of the Ultimate Consumers

Attributes	Mean	Std. Deviation
Desired variety	5.76	0.81
Desired size	5.66	0.74
Desired shape	5.60	0.87
Color	5.68	0.69
Freedom from pests/ diseases	5.71	1.08
Freedom from physical damage and defects	5.80	0.69
Freedom from chemical residues	4.31	1.85
Keeping quality at home	4.98	1.25
Produce is pre-packed	5.22	1.50
Well-graded	5.94	0.44
Tastes good	5.82	0.63
Cooking characteristics	5.68	0.80
Freshness	5.97	0.17
Competitive price	3.08	2.01

Source: Survey of Kapatagan farmers, 2002.

The respondents were then asked to rate in a scale of 1 to 6 where 1 is “not at all important” and 6 is “very important”, how important they thought certain attributes were to the consumer who purchases the vegetables they have grown in a retail store or wet market. Quality attributes used were those mentioned by the farmers in the open-ended question, including attributes from secondary literature. Table 5 shows that majority of the respondents’ perceived that consumers give high importance on buying vegetables that are of desired variety, size and shape, color, free from pests and diseases, free from physical damage and defects. It was also perceived that consumers put high regard on well-graded, good taste and fresh vegetable. The cooking characteristics of the vegetable were also another important variable for the consumer, according to the farmers. On the other hand, respondents had varied opinions and perceptions regarding the absence of chemical residues, keeping quality at home, and pre-packed produce. During the in depth interviews with farmers, some of them showed some concern over

chemical residues and mentioned that the presence of one or two larvae in the crops may be a way to safeguard oneself against high levels of chemicals in vegetables.

Meanwhile, competitive price has the lowest importance at mean of 3.08. This may mean that the farmers believe that the ultimate consumers value the desired variety shape and size more. They think that the price of their produce will not be affected by the improved quality, since the prices they receive from the agents and buyers remain consistently low.

Size is also a quality attribute as defined by the farmer from Marilog, but he also said that consumers want vegetables that can be consumed by the family in one serving or one meal. This would prevent wastage due to unutilized vegetables in the consumer's kitchen.

The cultural practices of the farmers were also not included in the definition of the quality of the produce even if the agronomic practices could actually dictate the quality of their produce. While some farmers voiced interest in integrated pest management and organic farming, the farmers did not use these constructs as quality attributes either in their choice of descriptors or in their perception of the consumers' quality criteria.

Quality Criteria of other Players in the Supply Chain

Divisoria wholesalers of vegetables believed that the vegetables of Mindanao were not the right kind of vegetables for the Luzon market. One wholesaler said that the shape of the cabbage that the Manila market wants is obloid shape or the variety commonly called as scorpion while the variety grown in Mindanao is flat (*haya*) and is described by Manila market vendors as more bitter in taste.

Meanwhile, supermarkets look for variety of assortment of vegetables in each growing area. They would rather transact with just one person or cooperative in that locality. With this one contact, they expect to source different vegetables as needed for the retail market. If a particular vegetable growing area does not have the assortment needed by the retail market, the supermarkets will find other sources that give them the right assortment. One of the big supermarkets in Davao used to source their vegetables directly from the farm areas in Kapatagan. However, it was not sustained because they were unable to fill the assortment that they needed. They are currently transacting with the wholesale market.

In Metro Manila, the retailers expected a prompt and regular delivery of the vegetable since they have a market to maintain. Otherwise, if the supplier cannot deliver, the retailer would look for other sources to sustain its operation. Retailers also emphasized that quality for them was not just the vegetable's characteristics but the punctuality and consistency of the supplier of vegetables.

One of the representatives of a large supermarket chain in Metro Manila thought that the carrots grown in the Philippines tastes bland and do not have the sweet quality of carrots from other countries. This supermarket imports vegetables from Australia.

Other representatives interviewed said that cabbages should be approximately 400 grams per head, with no open holes. They usually remove up to three layers of leaves from each head of cabbage. They also thought that cabbages from Mindanao taste bitter. As stated earlier, most farmers in Kapatagan did not mention taste.

A large supermarket chain planned to develop a manual of standards for their suppliers to help them achieve the specifications that the end user market wants. This manual will make a distinction between produce during the summer and during the wet seasons. However, up to this writing, the manual has not been developed.

Just like the farmers and wholesalers in Southern Mindanao, supermarkets were also not concerned with the chemical residues in vegetables since they said that the BCD⁸ market segments do not concern themselves with chemicals either.

In a study by Agbayani, et al (2000), they interviewed 100 institutional buyers of vegetables in Cagayan de Oro City in Northern Mindanao to determine the quality specifications of these users. Preference was given to size as an indicator of quality, with the medium size preferred for cabbages. For carrots, 4 to 5 inches in length is preferred. Freshness was the main quality criterion identified by vegetable retailers, wholesalers and household respondents in Cagayan de Oro.

Growth with Equity in Mindanao, a USAID funded project released a set of definitions for the quality of vegetables. Size and shape as well as color were the primary descriptors used for vegetable quality.

Consumption of vegetables in the Philippines is still below the recommended yearly allowance by the Food and Nutrition Research Institute (FNRI). Considering the importance of vegetables, it is alarming to note that the Philippines has one of the lowest consumption per capita of vegetables (Lantican, 2000). For consumers, price is the primary consideration for choosing vegetables since vegetables have a high cost compared to other staples. In order to understand quality Burrill and Ledolter (1999), asked typical consumers for their definition. The results showed that “to most people, quality is an exclusive vague concept that they cannot pin down; but they make judgment about quality all the time.”

Summary

The gap in perceptions of the farmers and market intermediaries is manifested in the study presented. The farmers defined quality according to the physical and biological characteristics of the vegetable such as weight, size, shape, color, pest/mechanical and physical damages/defects, free from mechanical injury, clean fresh and firm. Price was also mentioned as an indicator of quality. However, the market intermediaries defined quality not only in the attributes described by the farmers but most especially in terms of timely delivery and consistent supply. The right maturity of the vegetable, referring to the right timing of harvest was important to the farmer but not to market intermediary. Market intermediaries are concerned with mechanical injuries but the farmers are not. The desired vegetable variety, taste and cooking characteristics are important to the intermediaries but the farmers rarely consider these. The market intermediaries connect the producer and the end-user so they interact with both players. They are concerned with the delivery of goods so that they would have a consistent supply of merchandise with the proper assortment and in the desired

⁸ Refer to socio-economic classifications of households equivalent to lower upper income for B, middle class for C, and upper lower class for D.

varieties. Logistical issues are crucial to them because they bear the risk of carrying the inventory. Table 6 summarizes the similarities or differences in perception of Southern Mindanao farmers with the perceptions of their market intermediaries.

Conclusions

Farmers use quality attributes that are within their control like the right maturity of the vegetable or the freedom from pest injury. Weight is an important attribute for farmers because it affects their earnings. However, the farmers do not feel that it is within their financial or physical power to consider other seemingly non-controllable quality attributes.

Many of the problems related to the quality of the vegetables produced are due to the agronomic practices of the small farmers and the low level of their awareness of what is important to the market. Their primary focus is their income, which affects the survival of their family.

Quality in the vegetable supply chain from Kapatagan must begin with raising the capacity of farmers to produce quality vegetables and helping them understand market requirements for quality. Their perceptions are based on their reality and their reality is the time of harvest and the physical attributes which they can control. Market intermediaries on the other hand, base their understanding of quality on their own reality which is the demand of the retailers and the reliability of their supply.

Helping both farmers and intermediaries see the entire supply chain rather than getting them to focus on only their side of the chain can synchronize their perceptions. The promotion of cooperation and partnership to sustain the entire chain will lead to improved supply chain efficiencies. This will mean a reorientation for all stakeholders and capacity building for farmers to increase their production skills and market orientation.

Further studies should include a survey of the market intermediaries directly linked with the Kapatagan farmers and the calculation of their transaction costs. Models of the various potential alternative chains are also currently being undertaken by the members of the project team.

Table 6
Comparisons Between Southern Mindanao Farmers
and
their Market Intermediaries

Attributes	Southern Mindanao Farmers (Including) Kapatagan	Preliminary findings: Market Intermediaries
Desired Shape	Ranked high in importance only in tomatoes and Chinese cabbage. Farmers call this “maanindot ang porma sa gulay” (vegetable has a good form).	For cabbages, market intermediaries in Manila want obloid cabbages. Mindanao intermediaries want flat cabbages.
Desired Size	<ul style="list-style-type: none"> • Ranked high in importance for tomatoes and potatoes • Tomatoes (large: 2.5 inches in diameter; medium: 1.5 inches in diameter; small: less than 1.5 in diameter) • Carrots (6 inches in length, 1.5 inches in diameter) • “Insakto/igo ang kadako” (exact/right size) 	Want basically similar sizes as Kapatagan farmers except for a few who want larger sizes or those who want vegetables which can be consumed in one meal.
Weight	Ranked high for potato, Chinese cabbage and Kentucky beans. Farmers believe that the produce should have accurate weights. “Insakto sa timbang”	Some Manila supermarkets prefer cabbages of 400 grams/head.
Right Maturity	Ranked as the most important quality attribute by farmers, for all vegetables grown at the time of survey.	No mention
Color	Ranked high only for tomatoes.	No mention
Freedom from Pests/diseases	Ranked high for cabbages, tomato and Chinese cabbage. Described by farmers as “dili uluron” (not worm-infested), “dili dau” (not damaged), “walay peste” (no pest), “walay sakit” (no diseases). Vegetables without insects may be unsafe for human consumption according to a few farmers.	Want no open holes
Freedom from physical damage and defects	Farmers gave this some importance for Chinese cabbage and potato. Described this attribute as “hamis” (smooth), “nindot ang gulay” (nice looking vegetables), “walay tatsa” (no stains)	Want no visible damage to the skin or outer leaves
Mechanical Injury	Not considered important by farmers. Described by a few as “walay bun-og (no bruises), dili dali mabun-og (not easily bruised), walay lata (not rotten)”	Want no visible damage to the skin or outer leaves

Table 6, continued...

Attributes	Southern Mindanao Farmers (Including) Kapatagan	Preliminary findings: Market Intermediaries
Cleanliness	Ranked high only for carrots and cabbage. Described as “limpyo” (clean). They think carrots should be washed.	Want washed carrots. Wholesalers wash carrots and potatoes.
Freshness	Ranked high only for cabbages. Farmers describe this as “kanang presko” (fresh), “bag-o” (new).	Assumed by market intermediaries as basic requisite for purchase
Firmness	Not considered as important by farmers. Described as “bus-ok” (compact).	No mention
Freedom from chemical residues	No mention of this except for a couple of farmers.	No concern over this
<i>Desired Variety</i>	Farmers did not give this much importance. Described as “mayong klase ug variety” (good class and variety)	Metro Manila intermediaries want Scorpio for cabbage and sweet variety of carrots
Well-graded	Farmers did not give much importance to this. Described as “naay grado” (with grading)	Supermarket are trying to make manual of standards
Taste good	Mentioned by only one or two farmers. Described as “lami” (delicious), tastes nice.	Intermediaries want sweet carrots. (imported Australian variety)
<i>Cooking characteristics</i>	Farmers did not give this much importance. One or two farmers say that vegetables must be consumed in 1-2 servings.	Intermediaries want vegetables which can be consumed in one serving. Cabbage should 400 gms
<i>Competitive price</i>	Farmers did not give this much importance but a few believe that consumers may want cheap vegetables. “Barato (cheap), ang basehan mao ang presyo” (price is the basis)	Intermediaries are concerned with price and want stable price from their supplier.
Assortment	Farmers did not mention this.	Intermediaries want the proper assortment and volume of vegetables from one or few suppliers to avoid dealing with too many people.
Delivery	Farmers did not mention this.	Intermediaries want punctuality and consistency of delivery
<i>Nutritional content</i>	One farmer said that vegetables should be “masustansya” (nutritious). The others did not concern themselves with this.	

Sources: Farmers and market intermediaries of vegetables in Mindanao and Metro Manila

References

- Agbayani, Amelia Luz P. , Robert J. Holmer, Wilfried H. Schnitzler “Purchasing Patterns of Institutional Users of Fresh Vegetables in Cagayan de Oro City, Philippines”.
<http://www.ruaf.org/no5/56Luz.pdf>. Funded by European Union Commission, Peri-Urban Vegetable Project, Xavier University.
- Burill, Claude W., Ledolter, Johannes, *Achieving Quality Through Continual Improvement*, John Wiley & Sons, Inc., 1999.
- Fredendall, Lawrence D., Hill, Ed, *Basic of Supply Chain Management*, The St. Lucie Press/APICS Series on Resource Management , U.S.A., 2001
- Lantican, Flordeliza A., “Vegetable Program Area Research Planning and Prioritization”, Discussion Paper Series No.2000-07, Philippine Institute of Development Studies, April 2000.
- Lizada, Ma. Concepcion, *Postharvest Handling: A Training Manual*, Postharvest Horticulture Training and Research Center, University of the Philippines Los Banos, 1993.
- Masajo-Manalili, Nerlita, “The Role of Quality Assurance in Pooled Marketing of Horticultural Produce from Smallholders”, *Quality Assurance in Agricultural Produce*, G.I. Johnson, Le Van To, Nguyen Duy Duc and M.C. Webb, ACIAR Proceedings No.100, Proceedings of the 19th ASEAN/1st APEC Seminar of Postharvest Technology, Ho Chi Minh City, Vietnam, 9-12 November 1999.
- Mercado, Jose Raphael, Edcelle Pagaran, Primavera Dequito, Merle Menegay, *Temperate Vegetables in Mindanao*, Growth with Equity in Mindanao Program, USAID, 2000.
- Saunders, Malcolm, *Strategic Purchasing and Supply Chain Management*, Second Edition. Financial Times, Pitman Publishing, Great Britain, 1997.