



International Food and Agribusiness Management Review
Volume 18 Issue 3, 2015

Capturing Consumer Preferences for Value Chain Improvements in the Mango Industry of Pakistan

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Abstract

This study seeks to capture the mango value preferences of consumers in Pakistan with a view to identifying potential improvements in value chain practices in the mango industry. Data were collected through five focus group discussions and an intercept survey of 450 consumers in four cities of Pakistan. Three consumer clusters were identified through cluster analysis. These clusters had significant differences in terms of their search, experience, safety and marketing attributes. Given the existing consumer value preferences and likely changes in consumer behavior, the study suggested that value chain actors can improve their practices so as to improve consumer value and achieve higher returns.

Keywords: consumer value, consumer segmentation, cluster analysis, mango industry, Pakistan

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Introduction

The mango (*Mangifera Indica L.*), popularly known as the 'King of Fruits' in Pakistan, holds a prominent position in the economy due to its strong domestic demand and export potential (Ghafoor et al. 2009, Mohy-ud-Din and Badar 2011). Pakistan is one of the leading mango producing and exporting countries of the world. During the summer season, domestic demand for mangoes is very high. They are popularly consumed both as fresh and in processed forms such as jams, juices, nectars, squashes, milk-shakes and jellies (CSF 2007). Many mango varieties with different harvesting times and quality attributes, such as sweetness, color and size, are grown and consumed in Pakistan (Sun et al. 2011). However, the two most popular varieties are Chaunsa and Sindhri (Collins and Iqbal 2011, Ghafoor et al. 2010).

Pakistan's mango industry is mainly located in two provinces, Punjab and Sindh. The structure of the industry is heterogeneous and the country's estimated 387,000 mango orchards range in size from less than two hectares to more than 400 hectares (PHDEB 2005, Collins et al. 2006, Government of Punjab 2006). The industry's main value chain actors are orchard owners/growers, pre-harvest contractors, commission agents, exporters, wholesalers and retailers (Khushk and Smith 1996). Production and marketing of mangoes for both domestic and export markets is handled by the private sector (Aujla et al. 2007). The role of the public sector is limited to facilitation through its various research and development, market promotion and extension institutions.

Although over time the area under cultivation, production and exports of mango have significantly increased, the performance of the Pakistani mango industry is suboptimal due to a range of production, postharvest and marketing related inefficiencies (UNIDO 2006, Collins and Iqbal 2011). More recently, a lack of knowledge of how consumers value mangoes has also been recognized as a contributing factor (Hanif, Khan, and Nauman 2004, SDPI 2004, Ghafoor et al. 2009). As a result, consumers in Pakistan rarely receive the value they desire in mangoes which in turns lead to low profitability, poor returns to farmers and poor performance of the mango industry in general (Collins and Iqbal 2011).

Indeed, strong domestic demand for any agri-food product such as mangoes in Pakistan implies an incentive for growers and middlemen to enhance their supplies in the market (Gunden and Thomas 2012), so long as they can align their supply with the requirements of consumers (Collins 2009). Some authors have claimed that agri-food industries can only be developed by adequately understanding and responding to consumer demands (Soosay, Fearn, and Dent 2012). Similarly, public sector policies and business practices should also be consistent with the needs of different consumer segments so as to ensure healthy consumer food choices (Pieniak et al. 2010, Alamanos, Bourlakis, and Tzimitra-Kalogianni 2013, Honkanen and Frewer 2009, Campbell-Gibbons 2011).

Thus, consumers are now being considered as the primary driving force in any agribusiness and greater emphasis is being placed on identification of consumer value (O'Keefe and Fearn 2009, Vermeulen et al. 2008, Soosay, Fearn, and Dent 2012). This necessitates that value chain actors in agri-food industries should not only be cognizant of overall consumer value preferences but also understand the characteristics and preferences of each consumer segment (Walters and

Lancaster 2000, Mowat and Collins 2000, Gao et al. 2011). It is argued that such an approach can inform the development of agri-food industries as a whole, particularly in developing countries (Macharia, Collins, and Sun 2013).

Given this scenario, a deeper understanding of consumers of mango could be important for the sustainable development of the Pakistani mango industry. There is dearth of published literature on assessing consumer value preferences of mango and addressing how such preferences can be met along value chains (Sabbe, Verbeke, and Damme 2008). Such a lack of knowledge of consumer value can hinder further development of the mango industry and may explain the low value generated for both consumers and value chain participants. Thus, this study was carried out to explore how an understanding of the value preferences of consumers of mango in Pakistan could help to identify improvements through aligning value chain practices with consumer value preferences. The specific objectives of the study were to:

1. Understand mango consumer value preferences in Pakistan and identify consumer segments based on these preferences, and
2. Determine the implications of these consumer preferences for value chain improvements in the mango industry of Pakistan.

Literature Review

Understanding consumer value preferences is considered important in agri-food industry development, both from private and public sector perspectives (Mora et al. 2011, Gao et al. 2011, Mowat and Collins 2000, Skreli and Imami 2012). Consumer value is generally defined as the net perceived benefits a consumer receives from the consumption of a product (Collins 2009, Walters and Lancaster 2000, Woodruff 1997). Over time, consumer value preferences have diversified and expanded due to globalization, income growth and lifestyle changes (Gooch 2005, Trienekens et al. 2012). In the case of fruits and vegetables, for example, consumers now consider as important not only the core product attributes, but also attributes such as food safety, ethical production, provenance and attributes related to marketing along the whole value chain (Trienekens et al. 2012, Akkerman, Farahani, and Grunow 2010, Ali, Kapoor, and Moorthy 2010, Larsen 2014).

As pointed out by Moser, Raffaelli, and Thilmany-McFadden (2011), these attributes can be broadly categorized into intrinsic and extrinsic quality attributes. Intrinsic attributes refer to the physical characteristics or composition of products and are difficult to alter without manipulating the nature of the products (Espejel, Fandos, and Flavián 2007, Jiménez-Guerrero et al. 2012, Alonso, Paquin, and Mangin 2002). These are further characterized as search attributes such as freshness, colour, size and variety that consumers inspect and examine before making a purchase (Mora et al. 2011, Moser, Raffaelli, and Thilmany-McFadden 2011) and experience attributes such as taste, aroma and ripeness that consumers identify or realize only after consuming the product (Poole, Martí'nez, and Giménez 2007, Mora et al. 2011).

On the other hand, while extrinsic attributes do not constitute a physical part of the product, consumers consider them important during the purchase process (Espejel, Fandos, and Flavián 2007, Jiménez-Guerrero et al. 2012, Alonso, Paquin, and Mangin 2002). They include safety and

attributes related to marketing. Safety attributes, also called credence attributes, are those that may have health implications and cannot be easily determined without incurring information costs (Wirth, Stanton, and Wiley 2011, Moser, Raffaelli, and Thilmany-McFadden 2011). Marketing attributes such as price, retailer strategies and certifications are mainly concerned with the circumstances of sale (Mora et al. 2011).

However, knowing what consumers precisely value in a product is complex given the heterogeneity in consumer behaviour influenced by individual socio-economic backgrounds, attitudes and behaviours (Schiffman and Kanuk 2009, Kotler et al. 2010, Ares and Gámbaro 2008). As different segments among consumers have different value preferences relating to consumption, purchase and quality attributes of products (Verbeke, Vermeir, and Brunsø 2007), the identification of different consumer segments is considered important in the sustainable development of agri-food industries (Gunden and Thomas 2012). According to Buckley and Cowan (2007) and Pieniak et al. (2010), this provides information about the needs and consumption patterns of different consumer segments so that value chain actors can align their products and services accordingly.

Some researchers have used choice experiments to explore consumer value preferences (Moser, Raffaelli, and Thilmany-McFadden 2011, Krishnakumar and Chan-Halbrecht 2010), but this technique seeks to capture consumer preferences about various attributes in an existing situation against an alternate hypothetical situation (Moser, Raffaelli, and Thilmany-McFadden 2011). Cluster analysis is a widely applied technique for identification of different segments with identical consumer preferences in agri-food marketing studies (Adhikari, Collins, and Sun 2012, Alamanos, Bournakis, and Tzimitra-Kalogianni 2013, Pieniak et al. 2010, Everitt et al. 2011). Using this technique, objects or individuals are classified into different meaningful groups on the basis of pre-defined characteristics (Hair et al. 2010, Gunden and Thomas 2012). These groups are internally homogeneous but externally heterogeneous with other groups (Hair et al. 2010, Everitt et al. 2011). Furthermore, this technique is widely used in consumer preference related studies because of the ease of interpreting the results (Schilling and Coggins 2007, Zhang et al. 2010).

Research Methodology

The study was conducted in two stages. In the first stage, five focus group discussions with consumers belonging to different social strata were held in the city of Faisalabad to explore consumer value attributes of mango. These focus group meetings identified key consumer concerns associated with the industry and provided input in developing the survey questionnaire that was used in the second stage (Krueger and Casey 2009, Chambers et al. 2007). In the second stage, an intercept survey was conducted in four major cities of Pakistan - Karachi, Lahore, Faisalabad and Multan. These cities are highly populated and hence most mango consumption takes place there (Sabbe, Verbeke, and Damme 2008).

The questionnaire used in this survey had three sections. The first section sought information on consumption preferences and the second examined the buying preferences of mango consumers. The third section was designed to gather data on mango attribute preferences. Twenty mango attributes were identified and measured on a five point Likert Scale where 5 = very important

and 1 = not at all important. These attributes included six search attributes (color, size, freshness, variety, damage free and blemish free), six experience attributes (firmness, taste, juiciness, ripeness, fiber free and aroma), three safety attributes (mango cleanliness, chemical free ripening and pesticide free production) and five marketing related attributes (price, retailer cleanliness, information provision, packaging and certifications) (Wirth, Stanton, and Wiley 2011, Poole, Marti'nez, and Giménez 2007, Mora et al. 2011).

Before proceeding with the survey, ethical approval was obtained from The University of Queensland, Australia. The questionnaire was pre-tested with 20 consumers in Faisalabad and modified in the light of consumer feedback. The services of trained enumerators were required due to the large sample size and time constraints to accomplish the consumer survey. Reliability issues that can emerge when using enumerators were dealt with by training and close supervision (Macharia, Collins, and Sun 2013).

Intercept surveys of 450 consumers were conducted in selected cities in 2012. Consumers buying mangoes from all types of retailers such as street vendors, temporary and permanent stall holders, supermarkets, super stores and specialty stores were randomly selected and interviewed face to face. Of the 450 consumers interviewed, 120 each were drawn from Karachi and Lahore and 110 each from Faisalabad and Multan. Questionnaires were examined and improperly completed or incomplete questionnaires were discarded, mostly on the same day.

Data were analyzed using IBM SPSS Statistics 22. Descriptive statistics such as percentages, frequency distributions and cross tabulations were used to explore basic facts about consumption and buying preferences of mango consumers. A hierarchical clustering technique using Ward's Method with Squared Euclidean Distance was employed to identify different consumer clusters (Pieniak et al. 2010, Kennedy et al. 2008, Bond, Thilmany, and Bond 2008, Ares and Gámbaro 2008). This technique is generally considered efficient because it examines the distances among clusters using an analysis of variance. The 20 mango attributes were subjected to cluster analysis. Cronbach's Alpha value of the 20 attributes was 0.7, suggesting that the scale used was internally reliable. The appropriate number of clusters was identified on the basis of an agglomeration schedule and dendrogram (Kennedy et al. 2008). Cluster comparisons were performed to identify significant differences across mango attribute preferences, consumption and buying preferences, and socio-economic characteristics of the respondents. For this purpose, cross tabulation, ANOVA, post-hoc tests with Fisher's Least Significance Difference (LSD), and the Kruskal-Wallis test were used (Macharia, Collins, and Sun 2013, Alamanos, Bourlakis, and Tzimitra-Kalogianni 2013).

Results and Discussion

In keeping with shopping habits in Pakistan, survey respondents predominantly comprised of males (93.3 percent) aged below 40 years (Table 1), representing all income groups. This is consistent with Channa and Channa (2013) and Badar (2008), who highlighted that fruit shopping is mainly done by male members of the family as females rarely go out to shop for fruit in several South Asian countries. Most respondents had large families comprising of five or more members. In terms of education, more than half were graduates or postgraduates. The higher

incidence of educated respondents can be attributed to relatively high general education levels in the surveyed cities.

The survey revealed that consumers like mangoes both fresh and processed (Sivakumar, Jiang, and Yahia 2011). However, fresh mango consumption was the most popular with nearly 80 percent of consumers indicating it as their first choice (Table 2). Major reasons for this preference included good taste, a liking for pure fruit, ease of consumption and less cost. This pattern was more or less the same across all cities. Mango milkshake was the most popular processed form due to its taste, nutritional value, children's preference for it and its cooling qualities during summer. Much lower preferences were cited for other processed forms such as pickles, juices, squashes, jams, ice-creams and chutneys. Whereas fresh mangoes can be consumed only in the season, consumer demand for processed items highlights a need for availability of value added processed mango products throughout the year.

Table 1. Socio-Economic Characteristics of the Sample (percentage)

Characteristic	Category	City				Overall
		Karachi	Lahore	Faisalabad	Multan	
Gender	Male	85.0	93.3	96.4	100	93.3
	Female	15.0	6.7	3.6	0	6.7
Age (years)	Up to 30	31.7	25.9	27.3	32.0	29.1
	31-40	33.3	27.5	29.1	41.0	32.4
	41-50	23.3	25.8	24.5	16.0	22.7
	51-60	10.8	13.3	13.6	10.0	12.0
	Above 60	0.8	7.5	5.5	1.0	3.8
Family size (no.)	1-2	1.7	1.7	4.5	1.0	2.2
	3-4	25.8	23.3	20.0	30.0	24.7
	5-6	38.3	37.5	48.2	38.0	40.4
	Above 6	34.2	37.5	27.3	31.0	32.7
Education	No education	10.0	7.5	1.8	7.0	6.7
	Primary ¹	1.7	8.3	4.5	16.0	7.3
	Secondary ²	10.0	23.3	14.5	24.0	17.8
	Intermediate ³	17.5	12.5	17.4	23.0	17.3
	Graduate	35.8	29.2	37.3	25.0	32.0
	Post-graduate	25.0	19.2	24.5	5.0	18.9
Family income (PKR4/month)	< 10,000	6.7	10.8	6.4	19.0	10.4
	10,001-20,000	17.5	20.0	20.9	25.0	20.7
	20,001-30,000	15.0	16.7	17.3	17.0	16.4
	30,001-40,000	21.7	16.7	13.6	24.0	18.9
	40,001-50,000	16.7	7.5	14.5	6.0	11.3
	> 50,000	22.5	28.3	27.3	9.0	22.2

Note. ¹Grade 5 equivalent, ²Grade 10 equivalent, ³Grade 12 equivalent, ⁴Pakistani Rupee (1USD = 100 PKR)

Although a number of mango varieties are available in Pakistan, Chaunsa was the most popular. Around 57 percent of consumers indicated that it had good taste, aroma, more flesh and was readily available. Anwar Ratol was ranked as the second most preferred variety with more than

17 percent consumers preferring it due to its unique taste and aroma. In Multan city, consumer preferences for this variety were comparatively high due to its availability at relatively lower prices. Sindhri and Dusehri were the third and fourth ranked mango varieties. Consumers liked Sindhri for its taste, large size, greater flesh and its association with Sindhi culture. Dusehri was preferred due to its taste, soft skin, normal size (not too large or too small) and good flesh color (Table 2).

Mango is consumed more frequently during the summer season in Pakistan. More than 50 percent of respondents consumed mangoes a few times a week and 32 percent consumed mangoes on daily basis. The level of consumption was measured by using the number of mango pieces consumed per person at one time. Three consumer groups were identified based on the consumption level i.e. light consumers (1-2 mangoes), medium consumers (3-4 mangoes) and heavy consumers (5 and above mangoes). The majority of consumers were identified as light consumers (71.5 percent) whereas medium and heavy consumers constituted 23.6 and 5 percent respectively (Table 2).

Table 2. Consumption Preferences – Percentage Distribution of Consumers

Consumption Preferences	Categories	City				Overall
		Karachi	Lahore	Faisalabad	Multan	
Preferred form of consumption	Fresh	75.0	83.3	78.2	80.0	79.1
	Milkshake	19.2	15.0	20.0	18.0	18.0
	Other processed forms	5.8	1.7	1.8	2.0	2.9
Preferred varieties	Chaunsa	40.0	63.3	60.0	66.0	56.9
	Anwar Ratol	11.7	15.8	16.4	27.0	17.3
	Sindhri	34.2	5.8	3.6	0.0	11.6
	Dusehri	8.3	14.0	16.4	7.0	11.6
	Langra	3.3	0.8	0.9	0	1.3
	Others	2.5	0.1	2.7	0	1.3
Consumption frequency	Daily	35.0	24.2	24.5	48.0	32.5
	Bi-weekly+	42.6	52.5	63.6	43.0	50.5
	Once a week	15.8	17.5	8.3	6.0	12.2
	Fortnightly	5.8	0.8	1.8	1.0	2.4
	Monthly	0.8	5.0	1.8	2.0	2.4
Consumption level	1-2 mangoes	86.7	63.4	64.6	71.0	71.5
	3-4 mangoes	11.7	31.6	29.1	22.0	23.6
	≥ 5 mangoes	1.6	5.0	6.3	7.0	4.9

The purchase pattern varied across the sample. A majority of respondents indicated that they purchased 1-2 kg or 3-4 kg of mangoes in one shopping. Most of the respondents (43.3 percent) spent PKR 201 to 500 (USD 2-5) in a week on purchasing mangoes. Around 21.1 percent reported their weekly expenditure on mangoes less than PKR 200 (USD 2) and 35.6 percent stated it was above PKR 500 (USD 5). Although mango prices vary from city to city, this pattern was similar in all surveyed cities except Lahore where the majority (51.7 percent) of respondents spent more than PKR 500 (USD 5) weekly on buying mangoes (Table 3).

In Pakistan, mangoes are sold by both traditional retailers such as street vendors, roadside sellers, wholesale markets and modern retailers like supermarkets, modern stores and specialty stores. However, more than 90 percent of respondents preferred to purchase from traditional retailers. Among them, nearly 80 percent preferred roadside sellers over others due to easy availability of good quality fresh mangoes at reasonable prices (Table 3). A similar purchase pattern was observed in India by Ali, Kapoor, and Moorthy (2010). Around 10 percent of respondents ranked modern retailers as their most preferred retail outlet due to good quality, convenience, fixed prices and freedom to pick fruit. The remainder of the respondents viewed these stores as meant only for richer classes where mostly prices were high and quality was not as good compared to traditional retailers. Although a lower percentage of consumers indicated their preference to shop at modern retailers, results show that as in other developing countries, the retail sector in Pakistan is experiencing a gradual transformation with the increasing presence of modern retailers such as supermarkets, superstores and specialty shops (Aman and Hopkinson 2010).

Table 3. Buying Preferences – Percentage Distribution of Consumers

Buying Preferences	Categories	City				Overall
		Karachi	Lahore	Faisalabad	Multan	
Purchase quantity	1-2 Kg	32.5	36.6	33.6	50.0	37.8
	3-4 Kg	42.5	38.4	35.4	32.0	37.3
	≥ 5 Kg	25.0	25.0	31.0	18.0	24.9
Weekly expenditure (PKR*)	≤ 200	38.3	17.5	14.5	12.0	21.1
	201-500	45.8	30.8	45.5	53.0	43.3
	≥ 500	15.8	51.7	40.0	35.0	35.6
Preferred retailers	Street vendors	5.8	3.3	3.6	0.0	3.3
	Roadside sellers	80.0	71.7	73.6	93.0	79.1
	Wholesale market	6.7	5.0	13.7	7.0	8.0
	Modern retailers	7.5	20.0	9.1	0.0	9.6

Note. *Pakistani Rupee (1USD = 100 PKR)

Hierarchical cluster analysis was performed to identify clusters of consumers based on their preferences for 20 mango attributes. The decision to select the appropriate number of clusters is difficult due to non-availability of any authentic technique and it is mostly based on the judgement of the researchers (Hair et al. 2010). However given the agglomeration schedule and dendrogram in this case, a three cluster solution appeared appropriate to represent different segments of mango consumers in Pakistan.

The results of ANOVA and post-hoc tests using Fisher's least significant difference (LSD) means separation test demonstrated that the three clusters significantly differed from each other across all quality attributes except price, which is not uncommon in the context of developing countries (Table 4). These findings concur with those of Alamanos, Bourlakis, and Tzimitra-Kalogianni (2013) who also found price non-significant while segmenting Greek tomato consumers.

The Kruskal-Wallis test further revealed statistically significant differences in consumption and buying preferences and socio-economic characteristics of the respondents belonging to the three clusters, which significantly differed in their mango consumption level, purchase quantities and

retailer preferences (Table 5). In terms of socio-economic characteristics, the three clusters significantly differed in education and income level. The age, gender and family size differences among clusters were insignificant (Table 6). This was obvious considering the liking of mangoes both by males and females of all groups regardless of family size. These findings are consistent with those of Sabbe, Verbeke, and Damme (2008) who also reported gender based non-significant differences in consumption behavior towards tropical fruit.

Table 4. Cluster Comparison Based on Mango Attributes – ANOVA

Category	Attribute Type	Attribute	Cluster 1	Cluster 2	Cluster 3	F-Value	p-Value
			Mango Lovers (n=155)	Value Seekers (n = 200)	Safety Conscious (n =95)		
Intrinsic	Search	Color	4.17 ^{ab}	4.05 ^b	4.32 ^a	2.93	0.05*
		Size	3.26 ^a	3.47 ^b	3.65 ^b	4.77	0.01*
		Freshness	4.30 ^a	4.77 ^c	4.47 ^b	27.20	0.00**
		Variety	4.06 ^a	4.44 ^b	4.37 ^b	8.70	0.00**
		Damage free	4.19 ^a	4.75 ^b	4.58 ^b	24.05	0.00**
		Blemish free	4.28 ^a	4.63 ^b	4.47 ^b	9.97	0.00**
	Experience	Firmness	3.74 ^a	4.01 ^b	4.07 ^b	5.96	0.00**
		Sweet taste	4.31 ^a	4.61 ^b	4.65 ^b	13.52	0.00**
		Juiciness	3.79 ^a	3.88 ^c	4.09 ^b	3.44	0.03*
		Ripeness	4.00 ^a	4.18 ^b	4.31 ^b	4.72	0.01*
		Fiber free	3.50 ^a	3.92 ^b	3.77 ^{ab}	5.68	0.00**
	Safety	Aroma	4.08 ^a	4.40 ^b	4.31 ^b	6.35	0.00**
		Mango cleanliness	3.81 ^a	4.22 ^c	4.44 ^b	15.58	0.00**
		Chemical free ripening	2.97 ^a	4.08 ^b	4.32 ^b	63.93	0.00**
Extrinsic	Marketing	Pesticide free production	2.94 ^a	4.08 ^b	4.31 ^b	71.86	0.00**
		Price	3.81 ^a	3.9 ^a	4.09 ^a	1.83	0.16 ^{NS}
		Retailer cleanliness	3.07 ^a	4.14 ^c	4.40 ^b	58.25	0.00**
		Information provision	2.32 ^a	3.27 ^c	3.73 ^b	57.38	0.00**
		Packaging	1.93 ^a	3.66 ^c	2.89 ^b	135.10	0.00**
		Certifications	1.43 ^a	3.95 ^c	1.23 ^b	733.79	0.00**

Note. Alphabets in superscript indicate results of Post-Hoc Tests (Fisher's least significance difference LSD test). The same letters in each column in a row indicate that clusters against that specific attribute are not significantly different at $\alpha=0.05$, Cronbach's Alpha= 0.7, **Highly significant ($\alpha \leq 0.01$), *Significant ($\alpha \leq 0.05$), ^{NS}Non-Significant

The three clusters were labelled “Mango lovers” (cluster one), “Value seekers” (cluster two) and “Safety conscious” (cluster three) on the basis of their preferences for 20 mango attributes. Related studies such as Adhikari, Collins, and Sun (2012), Gunden and Thomas (2012), Alamanos, Bourlakis, and Tzimitra-Kalogianni (2013) and Macharia, Collins, and Sun (2013) also adopted a similar approach to labelling clusters. Given the attribute preferences, consumption and buying preferences and socio-economic characteristics, the three clusters had the following profiles.

Mango Lovers (Cluster One)

Consumers in this cluster were merely concerned with consuming mangoes and hence considered few extrinsic and intrinsic attributes important while buying mangoes. Enjoyment of

mango taste regardless of other attributes appeared their main motive for consumption, thus this cluster was named “*Mango Lovers*”, comprising 34.45 percent of respondents.

Mango lovers had comparatively lower mean scores for all attributes, yet differed significantly from the other two clusters against all attributes. To this cluster all search attributes (freshness, damage free, blemish free, color and variety) were important except large mango size. The most valued experience attributes included taste, aroma and ripeness. This cluster was not very concerned about safety related attributes. This may be attributed to inadequate consumer understanding of health implications of food safety issues, common in preferences of some consumers in developing countries (Adhikari, Collins, and Sun 2012) (Table 4).

Although the majority in this cluster were light consumers, compared to other clusters the percentage of medium consumers (3-4 mangoes) was highest. Frequency of mango consumption was more or less the same as that of other clusters. This cluster mainly preferred to buy 1-2 Kg (38.7 percent) and 3-4 Kg (36.1 percent) of mangoes at once. The majority of members of this cluster (85.2 percent) liked to buy mangoes from traditional retailers and spend PKR 201-500 (USD 2-5) in a week on mangoes (Table 5). Consumers in this cluster comprised primarily of males across all age groups and mostly had relatively large family size. Educationally, this cluster was diverse and drew membership from all levels of education. Likewise, this cluster had representation from all income groups (Table 6).

Table 5. Cluster Comparison – Consumption and Buying Preferences

Preference	Category	Cluster 1	Cluster 2	Cluster 3	Mean Rank	Chi-Squared Value	p Value
		Mango Lovers	Value Seekers	Safety Conscious			
Mango consumption (no. of pieces)	1-2	67.7	73.0	74.8	233.84 ^a	6.25	0.04*
	3-4	27.1	23.5	17.9	220.28 ^b		
	≥ 5	5.2	3.5	7.4	221.52 ^c		
Consumption frequency	Daily	27.1	37.0	31.6		1.57	0.45 ^{NS}
	Bi-Weekly+	51.6	50.0	49.5	241.54 ^a		
	Once a week	16.1	10.0	10.5	231.06 ^b		
	Fortnightly	1.9	2.0	4.2	210.43 ^c		
	Monthly	3.2	1.0	4.2			
Mango purchased (Kg/shopping)	1-2	38.7	31.5	49.5	224.31 ^a	7.02	0.03*
	3-4	36.1	41.5	30.5	198.89 ^b		
	5 and above	25.2	27.0	20.0	239.07 ^c		
Weekly expenditure on mangoes (PKR)	≤ 200	22.6	21.0	18.9	218.66 ^a	2.41	0.30 ^{NS}
	201-500	44.5	38.0	52.6	215.97 ^b		
	≥ 500	32.9	41.0	28.4	235.33 ^c		
Retailer type	Traditional ¹	85.2	72.0	88.4	213.89 ^a	14.79	0.00**
	Modern ²	14.8	28.0	11.6	206.55 ^b 243.50 ^c		

¹Traditional retailers refers to street vendors and temporary and permanent stallholders. ²Modern retailers include specialty shops, modern stores and super markets with storage facilities. ^aMango Lovers, ^bSafety Conscious, ^cValue Seekers, **Highly significant ($\alpha \leq 0.01$), *Significant ($\alpha \leq 0.05$), ^{NS} Non-Significant.

Value Seekers (Cluster Two)

Cluster two was the largest cluster and comprised 44.44 percent of respondents. This cluster considered almost all attributes important in making mango purchase decisions and hence was named “*Value Seekers*”. This cluster significantly differed from mango lovers across almost all attributes. By and large, this cluster had similar preferences as those of the safety conscious group but it significantly differed in the case of marketing related attributes.

Among search attributes, this cluster looked for fresh mangoes free of damage and blemish. Taste, aroma and ripeness were highly important for this cluster. Being value seekers, consumers in this cluster considered safety attributes and marketing related attributes also important. This is why the mean importance of certification for this cluster was the highest (Table 4).

Table 6. Cluster Comparison – Socio-Economic Characteristics

Characteristic	Categories	Cluster 1	Cluster 2	Cluster 3	Mean Rank	Chi-Squared Value	p Value
		Mango Lovers	Value Seekers	Safety Conscious			
Gender	Male	95.5	91.0	94.7	220.66 ^a 222.34 ^b 230.75 ^c	3.20	0.20 ^{NS}
	Female	4.5	9.0	5.3			
Age (years)	Up to 30	30.3	28.5	28.5	224.21 ^a 231.34 ^b 223.73 ^c	0.262	0.87 ^{NS}
	31-40	31.0	35.5	28.4			
	41-50	22.6	20.0	28.4			
	51-60	11.6	12.0	12.6			
	Above 60	4.5	4.0	2.1			
Family size	1-2	0.6	3.0	3.2	231.61a 230.53b 218.37c	1.23	0.54 ^{NS}
	3-4	25.2	26.0	21.1			
	5-6	39.4	40.5	42.1			
	> 6	34.8	30.5	33.6			
Education	No education	7.1	6.5	6.3	200.64 ^a 199.51 ^b 257.11 ^c	22.42	0.00 ^{**}
	Primary ¹	9.0	4.5	10.5			
	Secondary ²	25.2	11.0	20.0			
	Intermediate ³	18.1	14.5	22.1			
	Graduate	25.8	37.5	30.5			
	Post-graduate	14.8	26.0	10.5			
Family income (PKR4/month)	<10,000	12.3	3.5	22.1	213.37 ^a 171.08 ^b 260.75 ^c	33.81	0.00 ^{**}
	10,001-20,000	23.9	15.0	27.4			
	20,001-30,000	16.8	18.5	11.6			
	30,001-40,000	16.8	19.0	22.1			
	40,001-50,000	8.4	16.0	6.3			
	> 50,000	21.9	28.0	10.5			

¹Grade 5 equivalent, ²Grade 10 equivalent, ³Grade 12 equivalent, ⁴Pakistani Rupee (1US \$ = 100 PKR)

^aMango Lovers, ^bSafety Conscious, ^cValue Seekers, ^{**}Highly significant ($\alpha \leq 0.01$), ^{*}Significant ($\alpha \leq 0.05$), ^{NS}Non-Significant.

This cluster mostly comprised of respondents who purchased small and medium quantities of mangoes. It had comparatively greater representation of medium and heavy buyers. Consumers who used to spend more than PKR 500 (USD 5) per week on mango purchases (41 percent) were more common (Table 5). Like other clusters, value seekers were predominantly male but comparatively it had a higher female membership (9.0 percent). This cluster primarily comprised of educated consumers belonging to medium and high income classes, explaining why the highest percentage of consumers who buy mangoes from modern stores were value seekers (Table 6).

Safety Conscious (Cluster Three)

Safety conscious consumers constituted the smallest cluster (21.11 percent). From their preferences in terms of higher mean attribute scores to safety related attributes, this cluster appeared to be highly health conscious. Macharia, Collins, and Sun (2013) also identified a relatively small cluster of consumers who were highly concerned about safety aspects when purchasing fresh vegetables in Kenya.

The main preferences of consumers in this cluster were for the search attributes of freshness, freedom from damage and blemish, and color. Important experience attributes were sweet taste, aroma, ripeness, firmness and juiciness. All safety related attributes were very important. Among marketing related attributes, higher importance was attached to price and retailer cleanliness. Among the three clusters, mean score for information provision was the highest for this cluster, which may be attributed to their desire to know more about food safety (Table 4).

Most of the safety conscious consumers (74.8 percent) were light consumers and the majority of these (88.4 percent) preferred to buy mangoes from traditional retail outlets. Those who bought 1-2 kg mangoes were common (49.5 percent) in this cluster. Weekly expenditure on mango purchases of more than half (52.6 percent) ranged from PKR 201 to 500 (USD 2-5) (Table 4). The members of this cluster had large family size and medium to high level education. Consumers in this cluster mostly belonged to low and medium income classes. Nearly half had low income (i.e. up to PKR 20,000) indicating their preference for food safety despite income constraints (Table 6).

Conclusions and Implications

Given the lack of empirical literature, the information generated in this study contributes to limited knowledge on consumer value preferences in Pakistan for fresh fruits in general and mango in particular. The study findings confirm the strong demand for mangoes in Pakistan and the importance of both intrinsic quality attributes (search and experience) and extrinsic attributes such as safety and marketing considerations. The results of cluster analysis revealed that consumers in the three clusters - mango lovers, value seekers and safety conscious, distinctively differed from each other in their product preferences, consumption and buying preferences and socio-economic characteristics. Mango lovers were merely concerned with consuming mangoes and hence considered fewer (primarily search and experience) quality attributes as important. This cluster was not so concerned about food safety issues. Safety conscious consumers appeared to be more health conscious and attached more importance to safety related attributes. Value

seekers considered not only search and experience attributes important, as other clusters also do, but were also concerned about safety and marketing related attributes.

It is interesting to note that the largest cluster was the value seekers. Relatively higher weekly expenditure on mangoes suggests a willingness of consumers in this cluster to pay more if their desired value is delivered to them. This provides an opportunity for value chain participants to develop and strengthen their chains by improving practices that deliver appropriate levels of quality and safety, and developing more collaborative relationships along the chain. A significant portion of this cluster preferred to buy from modern stores, indicating other opportunities for value chain participants to re-focus their efforts on satisfying modern retail standards.

Nevertheless, consumers in the focus group discussions expressed apprehensions relating to the quality and prices of fruits sold in modern stores and supermarkets. To attract more consumers from all three clusters, modern stores should address these apprehensions through quality improvement practices and more competitive pricing. Such an approach in collaboration with the whole of the value chain could have a marked and immediate improvement on consumer satisfaction, sales, profits and greater market share in the future.

Most of the consumers had knowledge of food safety related issues and the existence of a cluster which attached more importance to it, bears testimony to this fact. Consumers strongly disapproved of the use of Calcium carbide for ripening of mangoes. During the focus group discussions, they described it harmful, dangerous and problematic due to health hazards associated with this chemical. However, non-availability of mangoes ripened through safe means indicates the insensitivity of chain members towards consumer needs. This requires the immediate attention of public sector stakeholders to ensure the role of legislative and regulatory measures in supplying safe good quality mangoes to consumers. As suggested by Gunden and Thomas (2012), value chain actors, particularly growers, should improve quality attributes of their mangoes by aligning their practices with specific needs of different consumer segments. Consumers also expressed strong reservations about various retailing practices such as high prices, topping of cartons of poor quality fruit with better quality fruit and quality mixing. In this respect, training of retailers, particularly traditional retailers, on how to ensure consumers get clean safe and well graded fruit is essential (Chamhuri and Batt 2013).

Finally, it can be concluded that the value desired by consumers cannot be delivered profitably by mango suppliers without developing and strengthening value chains and adopting whole of chain approaches. In this regard, value chain actors need to play an active role by improving their practices and developing collaboration among themselves. Since value chains in Pakistan are not well organized and mostly fragmented in nature, relevant public sector institutions should support these chains through appropriate value chain improvements and enforcement of relevant rules and regulations.

Limitations and Future Research

This study focuses on urban consumers and its results may not be generalized to consumers living in rural areas, whose mango consumption patterns may differ. Future research could further examine the presence and relative size of the three identified consumer segments given

the current development stage of Pakistan. It would be interesting to explore possible changes in the size of these segments with improvement in the development stage of the country and examine how the mango industry in Pakistan should respond to these changes.

Acknowledgements

The authors acknowledge the financial support of School of Agriculture and Food Sciences, The University of Queensland, Australia and the Australian Centre for International Agricultural Research (ACIAR), Canberra, Australia in conducting this study.

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