

# Capturing consumer preferences for value chain improvements in the mango industry of Pakistan

By

**Hammad Badar, Anoma Ariyawardana, Ray Collins**

School of Agriculture and Food Sciences,  
The University of Queensland, Australia

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## Contact author

**Name:** Hammad Badar  
**Organisation:** School of Agriculture and Food Sciences, The University of Queensland, Australia  
**Mailing address:** Room 228, Building 8117A, Gatton Campus, School of Agriculture and Food Sciences, The University of Queensland, Australia  
**E-mail:** [hammad.badar@uqconnect.edu.au](mailto:hammad.badar@uqconnect.edu.au)  
**Phone:** +61 7 54601693

## Co-Author 1

**Name:** Anoma Ariyawardana  
**Organisation:** School of Agriculture and Food Sciences, The University of Queensland, Australia  
**Mailing address:** Room 233, Building 8117A, Gatton Campus, School of Agriculture and Food Sciences, The University of Queensland, Australia  
**E-mail:** [a.ariyawardana@uq.edu.au](mailto:a.ariyawardana@uq.edu.au)  
**Phone:** +61 7 54601106  
**Fax:** +61 7 54601342

## Contact author 2

**Name:** Ray Collins  
**Organisation:** School of Agriculture and Food Sciences, The University of Queensland, Australia  
**Mailing address:** Room 227, Building 8117A, Gatton Campus, School of Agriculture and Food Sciences, The University of Queensland, Australia  
**E-mail:** [ray.collins@uq.edu.au](mailto:ray.collins@uq.edu.au)  
**Phone:** +61 7 54601328  
**Fax:** +61 7 54601324

## **Abstract**

This study seeks to capture the mango value preferences of consumers in Pakistan with a view of 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 behaviour, the study suggested that value chain actors need to improve their practices with a view of improving consumer value and to retain a great return.

### **Key Words**

Consumer value, Consumer Segmentation, Cluster Analysis, Mango industry, Pakistan

## Introduction

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 & Badar 2011). Pakistan is one of the leading mango producing and exporting countries of the world. Although overtime 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 & Iqbal 2011). More recently, a lack of knowledge of how consumers value mangoes has also been recognised as a contributing factor (Hanif *et al.* 2004; SDPI 2004; Ghafoor *et al.* 2009). As a result, consumers in Pakistan rarely get 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 & 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 & Thomas 2012), so long as they can align their supply with the requirements of consumers. Some authors have claimed that agri-food industries can only be developed by adequately understanding and responding to consumer demands (Soosay *et al.* 2012). Public sector policies and interventions and business practices should also be consistent with needs of different consumer segments so as to ensure healthy consumer food choices (Honkanen & Frewer 2009; Pieniak *et al.* 2010; Campbell-Gibbons 2011; Alamanos *et al.* 2013). 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 (Vermeulen *et al.* 2008; O’Keefe & Fearn 2009; Soosay *et al.* 2012). It is argued that such an approach can inform the development of agri-food industries as a whole, particularly in the developing countries (Macharia *et al.* 2013).

Identification of consumer value is complex given the heterogeneity in consumer food choices that is influenced by individual socio-economic background, attitude and behaviour (Ares & Gámbaro 2008; Schiffman & Kanuk 2009; Kotler *et al.* 2010). Different segments among consumers have different value preferences. Overtime these value preferences have also considerably diversified and expanded due to globalisation, income growth and lifestyle changes (Gooch 2005; Trienekens *et al.* 2011). Particularly in case of fruits and vegetables, consumers are now more conscious about food quality, safety and hygiene issues along the whole value chain (Thompson *et al.* 2007; Collins 2009; Akkerman *et al.* 2010; Trienekens *et al.* 2011). These changes necessitates that the value chain actors in the agri-food industries should not only be cognizant of overall consumer value preferences but also understand characteristics and preferences of each consumer segment (Mowat & Collins 2000; Walters & Lancaster 2000; Gao *et al.* 2011).

Given this scenario, an understanding of consumers of mango is important for the sustainable development of Pakistani mango industry. There is great dearth of published literature on assessing consumer value preferences of mango and addressing how such preferences be met along the value chains (Sabbe *et al.* 2008). This lack of knowledge of consumer value hinders any further developments of the mango industry and continues to generate low value to both consumers and value chain participants. Thus this study was carried out to understand the mango value preferences of consumers in Pakistan as an approach to identifying improvements that could align value chain practices according to 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 value preferences, and
2. Determine the implications of these consumer preferences for value chain improvements in the mango industry of Pakistan.

## **Research Methodology**

The study was conducted in two stages in Pakistan. 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. The focus group meetings were instrumental in understanding the key consumer concerns associated with the industry and provided input in developing the survey questionnaire that was used in the next stage (Chambers *et al.* 2007; Krueger & Casey 2009). 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 major part of mango consumption takes place here (Sabbe *et al.* 2008).

The questionnaire used in this survey had three sections. The first section intended to seek information on consumption preference and second aimed at knowing 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 with 5= very important to 1= not at all important. These attributes included six search attributes (colour, size, freshness, variety, damage free and blemish free), six experience attributes (firmness, taste, juiciness, ripeness, fibre 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). Existing related studies also broadly group search and experience attributes as intrinsic attributes and safety and marketing related attributes as extrinsic attributes (Adhikari *et al.* 2012; Jiménez-Guerrero *et al.* 2012; L. Martínez-Carrasco 2012).

Before proceeding with the survey, ethical approval of the questionnaire was obtained from the School of Agriculture and Food Sciences, The University of Queensland, Australia. The questionnaire was pre-tested with 20 consumers in Faisalabad and required changes were made in the light of consumer feedback. The services of trained enumerators were hired, 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 of enumerators.

An intercept survey of 450 consumers were conducted in the selected cities in 2012. Consumers buying mangoes from all types of retailers such as street vendors, temporary and permanent stall holders, supermarket, super stores and speciality stores were randomly selected and interviewed face to face. Out of the 450 consumers interviewed, 120 each were drawn from Karachi and Lahore and 110 each from Faisalabad and Multan. The filled in questionnaires were examined and improperly filled or questionnaires with missing values were discarded mostly on the same day. Only duly completed questionnaire with all responses were retained for data analysis.

The data were analysed using IBM SPSS Statistics 21. Descriptive statistics such as percentages, frequency distributions and cross tabulations were used to explore basic facts about consumption and buying preferences of mango consumers. Hierarchical clustering technique using Ward's method with Squared Euclidean Distance was employed to identify different consumer clusters (Ares & Gámbaro 2008; Bond *et al.* 2008; Kennedy *et al.* 2008; Pieniak *et al.* 2010). The 20 mango

attributes were subjected to cluster analysis. Cronbach's Alpha value of the 20 attributes was 0.7 and it highlighted that the scale used was internally reliable. The appropriate number of clusters were identified on the basis of dendrogram. Cluster comparisons were performed to identify significant differences across mango attribute preferences, consumption and buying preferences, and socio-economic characteristics. For this purpose, cross tabulation, Mean ANOVA, Post-Hoc tests with Fisher's Least Significance Difference (LCD), and Kruskal-Wallis test were used (Alamanos *et al.* 2013; Macharia *et al.* 2013).

## Results and Discussion

The survey respondents predominantly comprised of male (93.3 percent) aged below 40 years (Table 1). The respondent had representation from all income groups. Most of the respondents had large families comprising of five and more members. In terms of education, more than half of the respondents were graduates and above. In the sample, lesser female percentage corresponds to societal norms in Pakistan where females are mostly housewives and rarely go out for fruit purchases. Greater presences of educated respondents can be attributed to relatively high general education level in the surveyed cities.

**Table 1: Socio-economic characteristics of the sample (percent consumers)**

Characteristic	Category	CITY				Overall
		Karachi	Lahore	Faisalabad	Multan	
Gender	Male	85.0	93.3	96.4	100	93.3
	Female	15.0	06.7	03.6	-	06.7
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	00.8	07.5	05.5	01.0	03.8
Family Size (No.)	1-2	01.7	01.7	04.5	01.0	02.2
	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	07.5	01.8	07.0	06.7
	Primary <sup>1</sup>	01.7	08.3	04.5	16.0	07.3
	Secondary <sup>2</sup>	10.0	23.3	14.5	24.0	17.8
	Intermediate <sup>3</sup>	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	05.0	18.9
Family Income (PKR <sup>4</sup> /month)	< 10,000	06.7	10.8	06.4	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	07.5	14.5	06.0	11.3
	> 50,000	22.5	28.3	27.3	09.0	22.2

Note: <sup>1</sup>Grade 5 equivalent, <sup>2</sup>Grade 10 equivalent, <sup>3</sup>Grade 12 equivalent, <sup>4</sup>Pakistani Rupee (1USD = 100 PKR)

The survey revealed that consumers like mango both as fresh and proceed. However, mango consumption in fresh form appeared as the most popular with nearly 80 percent consumers indicating it as their first choice (Table 2). Major reasons cited for this preference included good taste, liking for pure fruit, ease of consumption and less cost incurred. This pattern was more or less same across all cities. Mango milkshake was the most popular processed form due to its taste, nutritional value, children liking and cool impact during summer. A smaller consumer percentage also preferred other processed forms such as pickle, juices, squashes, jams, ice-creams and channies.

Although a number of mango varieties are available in Pakistan, Chaunsa was the most popular variety. Around 57 percent consumers indicated that it had good taste, aroma, greater flesh and 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 preference for this variety was comparatively high due to its availability at relatively lower prices. Sindhri and Dusehri stood third among consumer preferred mango varieties. Consumer liked Sindhri for its taste, large size, greater flesh and association with Sindhi culture. Dusehri was preferred due to its taste, normal size, soft skin and good inner colour.

Mango is consumed more frequently during the summer season in Pakistan. It was revealed that more than 50 percent respondents consumed mangoes 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 at one time. Three consumer groups were identified based on the consumption level i.e. light consumers (1-2 mangoes), medium consumer (2-4 mangoes) and heavy consumers (5 and above mangoes). Majority of the 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 – percent distribution of consumers**

Consumption Preferences	Categories	Cities				Overall
		Karachi	Lahore	Faisalabad	Multan	
Preferred consumption form	Fresh	75.0	83.3	78.2	80.0	79.1
	Milkshake	19.2	15.0	20.0	18.0	18.0
	Other processed	05.8	01.7	01.8	02.0	02.9
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	05.8	03.6	00.0	11.6
	Dusehri	08.3	14.0	16.4	07.0	11.6
	Langra	03.3	00.8	00.9	00.0	01.3
	Others	02.5	00.1	02.7	00.0	01.3
Consumption Frequency	Daily	35.0	24.2	24.5	48.0	32.5
	Few times a week	42.6	52.5	63.6	43.0	50.5
	Once a week	15.8	17.5	08.3	06.0	12.2
	Fortnightly	05.8	00.8	01.8	01.0	02.4
	Monthly	0.8	05.0	01.8	02.0	02.4
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	01.6	05.0	06.3	07.0	04.9

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

In Pakistan, mangoes are sold by both traditional retailers such as street vendors, roadside sellers, wholesale market and modern retailers like supermarket, modern stores and speciality stores. However, more than 90 percent respondents preferred traditional retailers for purchasing mangoes. Of them, nearly 80 percent respondents preferred roadside sellers over others due to easy availability of good quality fresh mangoes at reasonable prices. Similar purchase pattern was observed in India by Ali *et al.* (2010). Around 10 percent respondent ranked modern retailers as their most preferred retail outlet due to good quality, convenience, fixed prices and freedom to pick fruit. Those who did not prefer were of the view that these stores were meant only for rich class where mostly prices were high and quality was also not too good compared to traditional retailers. Although lesser percentage of consumers indicated their preference towards modern retailer, it shows that like other developing countries the retail sector in Pakistan is experiencing a gradual transformation process with rising presence of modern retailers in the form of supermarkets, superstores and speciality shops.

**Table 3: Buying preferences – percent distribution of consumers**

Buying Preferences	Categories	Cities				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

Hierarchical cluster analysis was performed to identify clusters consumers based on their preference for 20 mango attributes. The decision to select appropriate number of clusters is quite 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 shape of dendrogram, three cluster solution appeared appropriate to represent different segments of mango consumers in Pakistan.

The results of Mean ANOVA and post-hoc tests using Fishers least significant difference (LSD) mean 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). The findings concur with Alamanos *et al.* (2013) who also found price non-significant while segmenting Greek tomato consumers.

**Table 4: Cluster comparison based on mango attributes – ANOVA**

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

Note: Alphabets in superscripts indicates results of Post-Hoc Tests (Fisher' least significance difference LSD test). Same letters in each column in a row indicate clusters against that specific attribute are not significantly different at  $\alpha=0.05$ , Total Cronbasch's Alpha= 0.7, \*\*Highly significant ( $\alpha \leq 0.01$ ), \*Significant ( $\alpha \leq 0.05$ ), <sup>NS</sup> Non Significant

Kruskal-Walis test further revealed statistically significant differences in consumption and buying preferences and socio-economic characteristics of the respondents belonging to three clusters. The clusters 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 of consumers. In case of age, gender and family size differences among clusters were insignificant (Table 6). This was obvious considering the liking of mangoes both by male and female of all groups regardless of their family size. These findings are consistent with the finding of Sabbe et al. (2008) who also reported gender based non-significant differences in consumption behaviour towards tropical fruit.



**Table 5: Cluster comparison – consumption and buying Preferences**

Preference	Category	Cluster 1	Cluster 3	Cluster 2	Mean Rank	Kruskal Wallis Test	Asymp. Sig.
		Mango Lovers	Health Conscious	Value Seekers			
Mango Consumption (No. of pieces)	1-2	67.7	74.8	73.0	233.84 <sup>a</sup>	6.25	0.04*
	3-4	27.1	17.9	23.5	220.28 <sup>b</sup>		
	5 and above	5.2	7.4	3.5	221.52 <sup>c</sup>		
Consumption frequency	Daily	27.1	31.6	37.0	241.54 <sup>a</sup> 231.06 <sup>b</sup> 210.43 <sup>c</sup>	1.57	0.45 <sup>NS</sup>
	Few times a week	51.6	49.5	50.0			
	Once a week	16.1	10.5	10.0			
	Fortnightly	1.9	4.2	2.0			
	Monthly	3.2	4.2	1.0			
Mango Purchased (Kg/shopping)	1-2	38.7	49.5	31.5	224.31 <sup>a</sup>	7.02	0.03*
	3-4	36.1	30.5	41.5	198.89 <sup>b</sup>		
	5 and above	25.2	20.0	27.0	239.07 <sup>c</sup>		
Weekly Expenditure on Mangoes (PKR)	Less than 200	22.6	18.9	21.0	218.66 <sup>a</sup>	2.41	0.30 <sup>NS</sup>
	201-500	44.5	52.6	38.0	215.97 <sup>b</sup>		
	Above 500	32.9	28.4	41.0	235.33 <sup>c</sup>		
Retailer	Traditional <sup>1</sup>	85.2	88.4	72.0	213.89 <sup>a</sup> 206.55 <sup>b</sup>	14.79	0.00 <sup>**</sup>
	Modern <sup>2</sup>	14.8	11.6	28.0	243.50 <sup>c</sup>		

<sup>1</sup>Traditional retailers refers to street vendors and temporary and permanent stallholders

<sup>2</sup>Modern retailers include speciality shops, modern stores and super markets with storage facilities

<sup>a</sup>Mango Lovers, <sup>b</sup>Health Conscious, <sup>c</sup>Value Seekers, <sup>\*\*</sup>Highly significant ( $\alpha \leq 0.01$ ), <sup>\*</sup>Significant ( $\alpha \leq 0.05$ ), <sup>NS</sup> Non Significant,

Three clusters were labelled “Mango lovers” (cluster one), “Safety conscious” (cluster three) and “Value seekers” (cluster two) on the basis of their preferences for 20 mango attributes. Related studies such as Adhikari *et al.* (2012), Gunden and Thomas (2012), Alamanos *et al.* (2013), Macharia *et al.* (2013) also adopted similar type of labelling. 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 mango attributes important while buying mangoes. Enjoyment of mango taste regardless of other attributes appeared their main motive of mango consumption. Therefore, this cluster was named as “Mango Lovers” and comprised of 34.45 percent survey respondents.

Mango lovers had comparatively lower mean scores for all attributes, yet it differed significantly from the other two clusters against all attributes. To this cluster, all search attributes (freshness, damage free, blemish free, colour and variety) were important except large mango size. The most valued experience attributes included taste, aroma and ripeness. This cluster was not much concerned about safety related attributes. This may be attributed to inadequate consumer understanding of health implications of food safety issues due to which food safety aspects rank low in preferences of some consumers in developing countries (Adhikari *et al.* 2012). Since this cluster loved to consume mangoes, price was relatively less important when compared with other clusters (Table 4).

Although majority of this cluster were light consumers, compared to other clusters percentage of medium consumers (3-4 mangoes) was highest in this cluster. Frequency of mango consumption was more or less 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. Majority of members of this cluster (85.2 percent) liked to buy mangoes from traditional retailers and spend PKR 201-500 in a week on mangoes (Table 5). Consumers in this cluster comprised primarily of males who belonged to different age groups and mostly had relatively large family size. Educationally, this cluster was diverse and drew membership from different levels of education. Likewise, this cluster had representation from all income groups (Table 6).

**Table 6: Cluster comparison – socio-economic characteristics**

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

<sup>1</sup>Grade 5 equivalent, <sup>2</sup>Grade 10 equivalent, <sup>3</sup>Grade 12 equivalent, <sup>4</sup>Pakistani Rupee (1US \$ = 100 PKR)  
<sup>a</sup>Mango Lovers, <sup>b</sup>Health Conscious, <sup>c</sup>Value Seekers, <sup>\*\*</sup>Highly significant ( $\alpha \leq 0.01$ ), <sup>\*</sup>Significant ( $\alpha \leq 0.05$ ), <sup>NS</sup> Non Significant,

### **Value Seekers (Cluster two)**

The cluster two was the largest cluster and comprised of 44.44 percent respondents. This cluster considered almost all attributes important in making mango purchase decision. Since members of this cluster tried to seek true mango value, it was named “*Value Seekers*”. This cluster significantly differed from mango lovers in almost all the attributes. By and large, this cluster had similar preference as that of health conscious group but it significantly differed in case of marketing related attributes.

In search attributes, this cluster looked for fresh mangoes free of damages and blemishes. Taste, aroma and ripeness in experience attribute were highly important for this cluster. Being value seekers, consumers in this cluster considered safety attributes and marketing related attributes also important. That is why, mean importance score of certification for cluster was the highest (Table 4).

This cluster mostly comprised of small and medium consumers of mango. Comparatively, this cluster had greater membership of medium and heavy buyers. Consumers who used to spend more than PKR 500 per week on mango purchases (41 percent) were more common (Table 5). Like other clusters, predominately value seekers were male but comparatively it had higher female membership (9.0 percent). This cluster primarily comprised of educated consumers belonging to medium and high income classes. That is why, the highest percentage of consumers who used to 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 *et al.* (2013) also identified relatively small cluster of consumers who were highly concerned to safety aspects of vegetables in Kenya.

The main preference of consumers in this cluster in search attribute was freshness, damage free, blemish free and colour. Important experience attributes for this cluster were sweet taste, aroma, ripeness, firmness and juiciness of mangoes. To this cluster, all safety related attributes were very important which is quite evident from higher mean score of this cluster. In marketing related attributes, this attached importance to price and retailer cleanliness. Among three clusters, mean score marked for information provision of this cluster was the highest that may be attributed to their desire to know more about food safety aspect (Table 4).

Most of the safety conscious consumers (74.8 percent) were light consumers and majority of these (88.4 percent) preferred to buy mangoes from traditional retail outlets. Those who bought 1-2 kg mangoes common (49.5 percent) in this cluster. Weekly expenditure on mango purchase of more than half (52.6) ranged from PKR 201 to PKR 500 (Table 4). The members of this cluster had large family size and medium to high level education. Consumers mostly in this cluster belonged to low and medium income class. Nearly half of the consumers had low income (i.e. up to PKR 20000) indicating their preference towards 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. These findings can be helpful to both public policy makers and value chain stakeholders in framing effective interventions for the sustainable development of mango industry in Pakistan.

The study findings confirmed strong demand of mangoes in Pakistani market as consumers greatly liked to consume mangoes frequently both as fresh and processed. It can be concluded that mango consumers in Pakistan were not only concerned with mango intrinsic quality attributes (search and experience) but also attached importance to extrinsic attributes such as safety and marketing related attributes. Similar to other countries, consumer sensitivity to these attributes is expected to increase in the future, driven by rising awareness and health consciousness (SDPI 2004; Prowse & Moyer-Lee 2013).

The results of cluster analysis revealed the existence of three consumer clusters – mango lovers, value seekers and safety conscious. Consumer belonging to these clusters distinctively differed from each 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 much 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 indicates willingness of this consumer 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. 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 their apprehensions relating to the quality and prices of fruits sold in these 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. Modern stores and supermarkets possess the resources to practice value chain management (VCM) approach. This will not only raise their profit and market share but also contribute to capacity building and development of other chain participants. The VCM model thus adopted by these modern retailers can serve as an example for traditional retailers of mangoes and other agri-food sub-sectors.

Most of the consumers had knowledge of food safety related issues and existence of a cluster, which attached more importance to it, bears testimony to this fact. Following the global pattern and rising awareness, these concerns will further raise in future (Yousaf & Huaibin 2013). Consumers should also be informed about the health hazards associated with consumption of food being produced and marketed using chemicals by launching awareness campaigns. Since it is difficult for the consumers to assess and understand food safety risks, Kennedy *et al.* (2008)

suggest that the government should persuade and force value chain actors to follow safe handling practices to the benefit of consumer health. Government should also frame communication and education strategies to sensitise consumers on various food safety related health hazards (Kennedy *et al.* 2008). Consumers should be educated about relevance of quality attributes and healthy life.

The findings of the study has generated consumption and buying preferences of mango consumers in Pakistan both at aggregate and segment levels. These findings can be useful to policy makers as input for framing much awaited horticultural policy and designing interventions for improving nutrition of population. Existing practices appear to have negative impacts on value chain participants in terms of lowering sales and thus reducing profits. Particularly in this respect, consumers strongly disapproved 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 insensitivity of chains 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. Provincial extension departments should guide growers and handlers on how to ensure safely ripened, damage free and fresh mangoes in the markets. As suggested by Gunden and Thomas (2012), value chain actors particularly growers should also improve quality attributes of their mangoes by aligning their practices with specific needs of different consumer segments.

Consumers also expressed strong reservation about various retailing practices such as high prices, topping 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. The presence of modern stores is gradually increasing due to rising preference of consumers towards these stores. Given this changing scenario, the traditional retailers should upgrade their practices so that they can retain their customers and compete with modern stores (Chamhuri & 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 approach in holistic manner. 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 organised 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.

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