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Preference modeling of urban consumers towards organic vegetables at Kathmandu Metropolis, Nepal

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Introduction

Organic production and marketing in Nepal is relative a new venture. Some supermarkets have started selling organic vegetables and many restaurants are serving organic foods to the consumers (Bhatta *et al.*, 2010). Recently, there has been growing interest from different stakeholders at different levels for the promotion of organic production and marketing. Demand of organic vegetables is going up in the urban areas due to growing affluence and education, increasing awareness about health and quality of food products and transformation of food systems towards healthy and safe consumption (Bhatta *et al.*, 2009). However, the crucial questions to be addressed before making production and marketing decision are how consumers react with such newly introduced vegetables in the market and what factors of the commodity make consumption appealing to the consumers? Therefore, present study, conducted at densely populated Kathmandu valley, aims at contributing market information that permits implementing an efficient and effective strategy for the promotion of organic vegetables in the urban markets of Nepal.

Research Methodology

Sampling and the data

There are two types of markets in the Kathmandu Valley viz: local markets and specialized markets. The products are relatively cheaper in the local markets. Specialized market includes supermarkets, restaurants, hotels and organic home where organic vegetables are sold either regularly and or in the periodic basis. The prices of the products in the specialized market are relatively higher. The products sold at the specialized markets are supposed to be organically grown but not certified. Therefore, two types of the markets were penetrated to capture the preferential differences of the consumers to organic vegetables, in general, and attributes of tomatoes, in particular.

There was not the definite list of the consumers buying vegetables from both local and specialized markets. This had given the problem of application of probabilistic sampling procedure. Some of the supermarkets had an exhaustive list of the organic consumers mainly foreigners, civil servants, diplomats and affluent people and their tendency to buy organic vegetables was unpredictable and infrequent. Convenience sampling was done for selecting 50 consumers from the specialized market. Inorganic vegetable consumers (50) were randomly intercepted at the local market and asked for their participation in an interview. This procedure was applied due to the lack of an alternative (AbuShaban, 2007).

Data were collected using standard questionnaire hammered out after pilot study and administered through personal interview. A pilot study was done both at supermarkets and local market before hammering out the final questionnaire. The final questionnaire was based on conjoint analysis (CA).

Attribute selection for conjoint analysis

In conjoint analysis, the most important decision step is the design phase in which attributes and their levels are to be selected (Hanley *et al.*, 1998). With the help of a pilot study three attributes of tomatoes were selected viz., tomato types, quality and price. All the selected attributes and their levels and profiles

are presented in Table 1. Price and quality are most frequently used attributes in vegetable preference studies (Hanley *et al.*, 1998). Price has three levels: NRs 40, 60 and 80 per kilogram which were chosen to present realistic price situations prevalent in the market.

Table 1. Attributes and their levels used for evaluation

Attribute	Attribute levels
Tomato type	Organic tomato
	Inorganic tomato
Quality	Good quality
	Poor quality
Price ([1]NRs/kg)	40 (low price)
	60 (medium price)
	80 (high price)

Given that three attributes with their respective levels were chosen, a full factorial design would include 12 hypothetical profiles (2 x 2 x 3). Therefore, in order to reduce the number of profiles to a manageable number for the respondents, an orthogonal design was generated with eight profiles using SPSS Conjoint 16.0 version (Table 2).

Table 2. Eight profiles selected for evaluation using orthogonal design

Profile	Tomato type	Quality	Price (NRs/kg)	Profile representation
1	Organic (O)	Good (G)	80	OG80
2	Organic (O)	Good (G)	60	OG60
3	Organic (O)	Good (G)	40	OG40
4	Organic (O)	Poor (P)	80	OP80
5	Organic (O)	Poor (P)	60	OP60
6	Inorganic (I)	Good (G)	80	IG80
7	Inorganic (I)	Good (G)	60	IG60
8	Inorganic (I)	Poor (P)	40	IP40

Each respondent was asked to rate how much they liked the particular profile on a seven point scale in which one implied extremely not valued/preferred and seven implied extremely valued/preferred profile.

Binomial logistic regression

A set of factors were believed to affect consumer's decision on purchase of organic tomatoes from the market. The parameter estimates for the willingness to buy organic tomatoes were obtained through applying binomial logistic regression. This model finds the logistic coefficient which compares the probability of an event occurring with the probability of its not occurring (Joewono and Hisabi, 2007). The dependent variable is a dummy which represents the willingness to buy organic vegetables. The dummy willingness to buy was analyzed against other dummy and continuous variables. The relationship between the predictor variables is not linear function in logistic model; instead, it is the logit transformation of *?*: Following (Trexler and Travis, 1993), the logistic regression equation could be represented as:

$$Logit\ [?_i(x)] = log \frac{q_i(x)}{1-q_i(x)} = a + ß_1X_1 + ß_2X_2 + \ldots\ldots + ß_iX_i = Z_i \qquad (1)$$

The empirical model of the effect of explanatory variables on the willingness to buy organic vegetables from the market can be specified using following linear relationship:

$$Y = a + ß_1X_1 + ß_2X_2 + ß_3X_3 + ß_4X_4 + ß_5X_5 + ß_6X_6 + ß_7X_7 + e \qquad (2)$$

Where: Y = consumers' willingness to buy organic vegetables from the market

X_1 = sex of the respondent (*1 if male, 0 otherwise*), X_2 = age of the respondent (year)

X_3 = education status (*1 if more than 8th grade, 0 otherwise*), X_4 = personal income of the respondent (NRs/month), X_5= family size , X_6 = knowledge of health risk of inorganic vegetables consumption (*1 if yes, 0 otherwise*), X_7 = thinking quality while buying tomatoes from the market (*1 if yes, 0 otherwise*)

e = disturbance term; a is the constant and $ß_1$, $ß_2$….. $ß_7$ are the coefficients

Logistic regression measures model estimation fit using -2 log of the likelihood value (-2LL) in which 0 corresponds of a perfect fit (Hair *et al.*, 2006). Two additional descriptive measures of goodness-of-fit of the model are Cox and Snell R^2 and Nagelkerke R^2 (Field, 2005).

[1]1 USD ~ 73 NRs

Conjoint analysis (CA)

This study employed conjoint approach using part-worth model which is one of the most common preference models used in CA (Green and Srinavasan, 1978; Hanley *et al.*, 1998; Schaupp and Belanger, 2005). In this model, preference for a product is formed by a linear combination of the utilities of its parts (Huang and Fu, 1993).

Following (Cranfield *et al.*, 2009), the part worth function representing additive utility model can be written as:

$$Y_{it} = ß_{i1} + ß_{i2}\, tomato\ types + ß_{i3}\, quality + ß_{i4}\, price + e_{it} \ldots\ldots\ldots (3)$$

Where Y_{it} is the dependent variable representing i^{th} individual's preference for the t^{th} profile of tomatoes. The $ß_{in}$ are estimated coefficients for each of the specified levels of tomatoes (*1 if organic tomatoes, 0 otherwise; 1 if good quality, 0 otherwise*) which represent the utilities for the levels, and e_{it} is a random error term.

Ordinary least square (OLS) regression was used to determine the part worth utilities for different attribute levels. The part worth utilities so obtained are used to find the importance of the product attributes. Higher and significant value of the Pearson's correlation coefficient signifies the fit of the model (Cheng *et al.*, 1990) which means that original and predicted preferences are on a par.

Results and Discussion

Consumers willingness towards organic vegetables

Table 3 depicts the consumers' willingness and importance of price and certification on making decisions to buying organic vegetables. Almost 90% of the respondents would be extremely willing if they know that organic vegetables are good for health, they are easily available and they are not much expensive. Almost 47% respondents expressed that price is an important element for them to buy organic vegetables.

Table 3: Consumer willingness towards organic vegetables (% distribution for each question)

Alternatives			
Extremely (1)	**Somewhat (2)**	**Somewhat (3)**	**Don't know (4)**
How willing are you to buy organic vegetables from the market? (1,2: willing, 3: unwilling)			
60.0	37.8	2.2	0.0
How willing are you to consume organic vegetables if their prices are reduced? (1,2: willing, 3: unwilling)			
77.8	22.2	0.0	0.0
How important is the price factor when you decide whether or not to buy organic vegetables? (1,2: important, 3: unimportant)			
46.7	37.8	5.6	10.0
How willing would you be to purchase organic vegetables if you know they are safer to health? (1,2: willing, 3: unwilling)			
90.0	10.0	0.0	0.0
How safe or risky organic vegetables are to human health? (1, 2: safe, 3: unsafe)			
50.0	44.5	0.0	5.5
How important is it to certify and label the organic vegetables? (1,2: important, 3: unimportant)			
71.1	21.1	0.0	7.7

Almost 78% of the respondents would be extremely willing to buy organic vegetables if prevailing price of the organic vegetables were reduced by 20-30%. Currently organic vegetables are 50-100% more expensive than inorganic counterparts and costly vegetables mostly are out of the affordable limit of the poor consumers. Interestingly, those who were somewhat unwilling to buy organic vegetables would now be willing to buy if price were reduced. It reveals that price is the governing factor in making a decision in buying organic vegetables, which is in concordance to economic theory. The results pinpoint the necessity of large scale production so as to minimize price and the need to disseminate knowledge and create awareness among the consumers about the organic commodity.

Regarding certification and labeling, most of the consumers viewed that this is an essential activity for up scaling of the organic market and convincing the consumers. Various studies have demonstrated that the presence of an instrument or indicator that guarantees the quality of the product significantly affects consumers' preference structure (Padilla *et. al.*, 2007). Currently organic vegetables come to the market without certification. Therefore, consumer faith towards these products has been greeted in general with degree of doubt. It emphasizes the need for certification and labeling to attract the consumers.

Binomial regression model

The hypothesis that a certain socio-economic profiles of the consumer influence the extent of willingness to buy organic vegetables from the market can be accepted based on the estimated logistic regression model presented in Table 4. All variables incorporated in the model had expected direction of relationship. Family size, knowledge of health risk and education of the respondents had substantial effects on the identical variable as witnessed by the significant value of their coefficients. Consumer knowledge of health risk of inorganic vegetable consumption had the substantial influence on willingness to buy organic vegetables. This implies that health awareness related to food consumption was very important that motivate consumers to buy safe and healthy food items from the market. Family size was another significant variable affecting willingness but in negative direction which was as per expectation. Large family size means more expenditure on food and vegetables and hence higher size of the family, in order to curtail the expenditure on food items, has to opt for cheaper vegetables.

Table 4. Logistic regression results (dependent variable: willingness to buy)

Variables	Coefficients	SE	p-value	dy/dx
Intercept	-0.699	3.80	0.854	
Age (year)	0.064	0.053	0.226	0.006
Personal income (NRs/month)	0.116	0.123	0.345	0.011
Family size	-0.948	0.459	0.039	-0.092
Sex	-1.82	1.61	0.258	-0.238
Knowledge of health risk	3.66	1.80	0.048	0.491
Education	3.07	1.27	0.016	0.440
Quality consideration	1.16	1.228	0.367	0.092

-2LL = 20.28, Omnibus tests of model coefficients ($?^2$, df, sig.)= 91.09, 7, 0.00, Cox & Snell R^2= 0.60; Negelkerke R^2= 0.84; Percentage correct = 91

The model fits the data very well ($p<0.00$) as indicated by higher value of Omnibus test. Lower value of log likelihood also indicates the fit of the model. The model has high percentage of correctness (91%). Higher values of Cox and Snell R^2 and Negelkerke R^2 also support the goodness-of-fit of the model.

Conjoint analysis

Table 5 presents the average value of the part worth utilities of Equation (3) based on overall samples. In order for further highlighting the preferential differences towards several attributes of the tomatoes by the homogeneous group of consumers at different market segments, they were disaggregated to two groups: consumers generally buying tomatoes at the local and those buying at the specialized market and conjoint analysis was done accordingly.

Estimated coefficients in the aggregate conjoint model are significantly different from zero. It also shows that the good quality of tomatoes achieves the highest utility followed by tomatoes types whilst price has negative utility value. Utility score to the organic tomatoes at local market is negative and so is the price. This shows that organic tomatoes don't appeal the consumers at the local market. This also would mean that they have low level of awareness about the organic tomatoes, its existence, and health implication and have low purchasing power which makes them indifferent towards buying organic tomatoes. In addition, consumers at the local market are accustomed to buy inorganic tomatoes. During the data collection, it was also noticed that many of the consumers at local market have not had heard of organic vegetables and associated qualities.

Conversely, substantially higher utility has been given to the organic tomatoes by the shoppers at the specialized market. This is because they are accustomed to buy organic vegetables and they are relatively affluent.

The coefficient for the price is negative in all cases and the utility associated to low priced tomatoes (NRs 40/kg) is higher which is in concordance with economic theory (Padilla et al., 2007). Moving towards low priced tomatoes (NRs 40/kg) from high (NRs 80/kg) creates more value to the consumers in overall samples than moving towards organic from inorganic tomatoes and good quality from the poor. The movement of utility at different price levels is higher for the consumers at the local market than at the specialized market. This gives impression that consumers at the local market are price sensitive and that at the specialized market are production type sensitive (Bhatta, 2010). In contrast to both of them, aggregate model shows that consumers as a whole are quality sensitive.

Table 5. Conjoint model across all consumers and with market segmentation

Conjoint model over all consumers (n = 100)
$Y_i = 6.35^{**} + 0.81^{*}$ types $+ 1.51^{**}$ quality $- 0.05^{**}$ price, Pearson's $r = 0.967^{**}$
Conjoint model over consumers at the local market (n = 50)
$Y_i = 6.81^{**} - 0.69^{**}$ types $+ 1.28^{**}$ quality $- 0.07^{**}$ price, Pearson's $r = 0.986^{**}$
Conjoint model over consumers at the specialized market (n = 50)
$Y_i = 4.13^{**} + 2.30^{**}$ types $+ 1.74^{**}$ quality $- 0.03^{**}$ price, Pearson's $r = 0.971^{**}$

*, ** significant at 0.05 and 0.01 level of probability respectively

In order to corroborate how well the model fits the data and check the internal validity of the model, the Pearson's correlation coefficient was done and the higher and significant values obtained for this coefficient show that there is strong correlation between the observed preference and those estimated by conjoint models.

For illustrative purposes, Figure 1a depicts the estimated value of the utility scores for the eight product profiles. The organic tomatoes with good quality and low price (OG40) has the highest utility scores across all consumers and consumers at two different market segments followed by organic tomatoes with good quality and medium price (OG60) and the least preferred combination of attributes is organic tomatoes with poor quality and high price (OP80) for all consumers and consumers at the local market while that at the specialized market is the inorganic tomatoes with poor quality and low price (IP40). Conjoint models at two market segments and across all consumers infer that consumers would like to have good quality tomatoes which are organically produced and have relatively lower price.

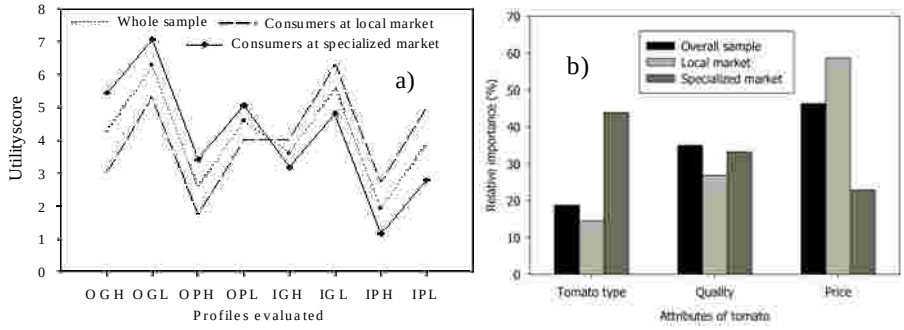

Figure 1. Average of the estimated utility scores for the eight product profiles (a) and relative importance of the tomato attributes (b)

The highest importance has been attached to the price followed by quality across all consumers and by the consumers at the local market whilst those at the specialized market it is the tomato types followed by quality (Figure 1b). This discerns that price still is a dominant factor for consumers, in general while for specific group of consumers who are used to organic tomatoes consumption it comes at the least priority. Moreover, because of narrow difference between relative importance attached to the price and quality across all consumers, it can also be said that the effect price captures could be decreased by imparting better quality of the produce. In other words, tomatoes producers could tap higher price by imparting better quality without fear of losing market share as a result of price increase.

Conclusions and Outlook

In general, consumers are willing to buy organic vegetables. However, the concern towards higher price and provision of certification should be reckoned. Because of lack of assured market for organic vegetables and relatively scattered consumers, most of the producers have to pay risk and hence they are not motivated to produce more. Certification adds another cost component. Cost of production at the present context plus cost a farmer has to incur for certification will eventually elevate the price of the organic commodities which might further deter the consumers to buy them. Therefore, attempt should be paid towards consolidation of small holders' organic farm and cooperative certification of small holder vegetable producers' farm through maintenance of internal quality control system, which will, to some extent, reduce the price of certification.

The estimation of the relative importance of factors suggests that consumer purchase decision for tomatoes is basically governed by the attribute price with discernible differences at different market segments. This envisages that preferences of the consumers differ according to the market segment. Therefore, the production and marketing of the agricultural produce should address this preferential difference. The finding also supports the future potentiality of the organic vegetables in the urban markets of Nepal as indicated by the willingness to buy and preferences towards organic vegetables.

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