What determines integrated and organic fruit and vegetable consumption in Slovenia?

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Abstract

A country-wide survey related to purchasing behaviour for organic and integrated fruit and vegetables has been prepared for Slovenia. An ordered probit model of consumer choice was developed on the basis of survey results to quantify various determinants of purchase frequency for organic and integrated fruit and vegetables. Results show that purchase of analysed categories is most significantly influenced by their availability in retail outlets. Other significant determinants are household income, health and environmental considerations, and perceived importance of produce visual attractiveness. Results of the study support implementation of effective distribution strategies, but also targeted knowledge and awareness raising activities.

Keywords: Integrated and organic fruit and vegetables; Purchase frequency; Ordered probit model; Slovenia

1. Introduction

Modern food consumer is highly concerned about the safety and quality of the food products purchased. This concern goes simultaneously with their awareness of the relation between the production practice and quality of food products which has altogether contributed towards growing demand for food from non-conventional production practices (SCHIFFERSTEIN and OUDE OPHUIS, 1998). This change has been especially significant in the demand for organic foods and, in particular, organically grown fruit and vegetable products

(HUANG, 1996). The pattern is related particularly to increased awareness of the importance of a healthy diet and positive perception of fruit and vegetables in this respect (CONNOR, 1994, LAMBERT, 2001).

There is a rather large amount of research work dedicated to the attitudes of consumers towards safe food, both in broad sense and with a particular accent on organic fruit and vegetables (for review see: THOMPSON, 1998). However, a rapid growth in demand and production of these food categories necessitates continuous research in order to document and understand the evolution of the markets.

This paper tries to contribute to a better acquaintance with consumers' attitudes and perception of organic and integrated fruit and vegetables in Slovenia. Survey results have been used to develop a consumer behaviour model of qualitative choice (PINDYCK and RUBINFELD, 1991).

This paper focuses on food consumers in Slovenia and aims to suggest marketing strategies and policy initiatives to boost demand of less intensively grown fruit and vegetables in markets where these types of produce have been introduced only recently.

2. Consumer choice theory - a brief insight

A seminal attempt to refine the neoclassical paradigm with assumed rational economic agents with no explicit attempts to explore in detail factors that maximise utility of consumers is given by LANCASTER (1966). He states that consumers purchase attributes which are embodied in goods and not goods themselves. Contemporary research literature on food choice considers product attributes as one of the perspectives to increase understanding of consumer or buyer choice (e.g. HAMMITT, 1990, ASSAEL, 1998). A product is therefore comprehended as an aggregation of several characteristics and components – referred to as product attributes. GRUNERT et al. (1996) divided them on intrinsic and extrinsic, whereas extended classification (GRUNERT et al., 2000) includes: search attributes (e.g. price, colour), experience attributes (e.g. taste and flavour) and credence attributes (e.g. health and safety). Notion of attributes itself, however, cannot explain all complexities of consumer choice since attributes are evaluative criteria. Individual socio-demographic and economic characteristics are commonly included as determinants of choice (e.g. MOWEN, 1993, ALVENSLEBEN, 1997).

Several papers have dealt with the attitudes of consumers towards safe food, both in broad sense and with a particular accent on organic and integrated fruit and vegetables. THOMPSON (1998) provides a detailed review of studies on consumer demand for organic produce. General preferences for organic produce have been analysed by HUANG (1996) and THOMPSON and KIDWELL (1998). A recent study concerning behaviour and attitudes of the organic fruit consumers has been prepared by WIER et al. (2003). They concluded that health hazards are the main motivation for purchase and, correspondingly, free-from-pesticides is the most important attribute of the produce. Comparable conclusion has been outlined from the study of SCHIFFERSTEIN et al. (1998). Apart from the health-related reasons, better taste, being like home-grown and other quality consideration are also important motivations for buying organic food (ALVENSLEBEN and ALTMANN, 1987, UNDERHILL and FIGUEROA, 1996, THOMPSON and KIDWELL, 1998). In addition, environmental considerations are also important stimulators of organic produce purchase (OWEN et al., 2000; SLOOF, et al., 2000, HAMM et al., 2002). Organic food is most frequently perceived as product without chemicals that is not intensively produced and is grown as natural (WILLIAMS and HAMMIT, 2001).

Main constraints to purchase organic foods are high price premiums, availability and, to a lesser extent, lack of information, lack of trust in organic certification schemes and quality (THOMPSON, 1998, WIER et al., 2003). The importance of price as a barrier to purchase organic fruit and vegetables is confirmed by an increasing amount of research that assesses the consumers' willingness to pay a premium for organic or safe products (e.g. GOVINDASAMY and ITALIA, 1999, LOUREIRO and HINE, 2002).

3. The survey objectives and methodology

The overall objective of this research is to gain a better insight into consumption of organic and integrated fruit and vegetables (from now on referred to as OIFV) in Slovenia and associated beliefs and attitudes of consumers. The source of data was a consumer survey conducted country-wide on a representative sample of 1,027 households in January 2004. The survey was conducted by a market research agency with field questionnaires. Beside the socio-demographic identification

of the respondents, the main part of the questionnaire can be divided into the following sections: general dietary patterns and lifestyle determination; overall fruit and vegetable purchasing behaviour; household's fruit and vegetable self-sufficiency level; acquaintance, believes and perception of OIFV and purchase frequency of OIFV.

On the basis of the acquired data, a consumer choice model has been developed. Focus of the empirical scrutiny was given to identify determinants that influence purchase frequency of the OIFV. Methodology selection was directed by the ability for adequate incorporation of the ordinal nature of data describing purchasing behaviour of OIFV. The model that satisfactorily fulfils the criterion falls within the group of models of qualitative choice - more specifically the ordinal probit model (PINDYCK et al., 1991).

Following GREENE (1997), the ordered probit model can be specified as built around a latent regression:

$$y_i^* = \beta' x_i + \varepsilon \tag{1};$$

where y_i^* is an unobserved frequency of quality fruit and vegetable purchase, β' is the vector of unknown parameters, x_i is a vector of explanatory variables (which may be continuous or discrete) denoting attributes influencing purchasing behaviour of respondent, and ε is the independently and identically normally distributed error term. The ordered probit model tests the null hypothesis *H0: β'k = 0* for every explanatory variable denoting that the independent variable k does not have an effect on explaining changes in the probability of y_i.

Results from our survey provide information on the respondents' purchase frequency of organic and integrated fruit and vegetables which is ordinal with five categories. While y_i^* is unobserved, respondents actually report their purchase decisions by selecting one of the five categories. Values for y_i are 0 through 4, where 0 represents no purchase of organic and integrated fruit and vegetables and 4 represents 2-3 weekly purchases of such produce.

The results of ordered probit models were interpreted by using the partial change or marginal effects on the probability of ordinal outcome. In doing so, the independent variables - other than the one being examined - were held constant at their mean values. The calculation of quasi-elasticities is based on the results of marginal effects, i.e. partial derivatives of the probability function *(Y)*. According

to the definition of elasticity, marginal effects are multiplied by the ratio between the average values of explanatory variables ($\bar{x}$) and endogenous variables ($\bar{Y}$):

$$\varepsilon_q = \frac{\partial Y}{\partial x} \frac{\bar{x}}{\bar{Y}} . \qquad\qquad (2)$$

Like 'standard' elasticity coefficients, quasi-elasticity coefficients can be interpreted as the percentage impact of a unit change of an explanatory variable on the probability of the observed outcome.

4. Results and conclusions

Before turning to the results of the consumer choice model, this section provides some general information about the perception of organic and integrated fruit and vegetables by Slovene consumers grasped from the literature review and survey results.

Market for organic fruit and vegetables in Slovenia started to develop in the late nineties, whereas the first attempts to promote integrated production were present a decade earlier (MAFF, 2003). Despite a rather short period of organic and integrated production presence in Slovenia and no explicit marketing activities, the survey results show that consumers' awareness is generally high. As expected, the highest rate of recall was achieved for the term "bio" that is an equivalent for "organic" in Slovene language. As much as 94.4 % of respondents associated these expressions with fruit and vegetables. More than two thirds relate the phrase "ecological" with food, whereas only 38% of the respondents were acquainted with the term "integrated".

An open end question was prepared to acquire basic associations of the respondents with the analysed categories of fruit and vegetables. Results show a rather high degree of responds homogeneity, since the three most frequent replies represent more than 80%. Associations are positive and generally indicate correct basic understanding. However, results show that the respondents do not distinguish among the categories and perceive them as synonyms. The highest frequency (37.1%) was attributed to association related to "healthy food". With 23.4% follows the category "free from harmful substances", where replies like: chemical free, pesticide free and alike were aggregated. Direct associations regarding the production practice rank third with

21.7% of replies. A surprisingly low share of replies was associated with "environment" (1.7%) and better quality (1.5%). The highest frequency among the wrong associations went to "low calories" (0.7%). Dependent variable in the consumer choice model was formed on the basis of the question where respondents were asked to evaluate (self reporting) purchase frequency of organic and integrated fruit and vegetables (OIFV). Slovene consumers assert a rather high purchase frequency for OIFV, since almost one third of them buy this category of produce at least once a week. Approximately the same share of respondents (28%) are non-buyers of OIFV and one quarter of them are sporadic buyers with purchasing less than once a month. About 17% of respondents buy this product a few times a month. Before elaborating the model, responses were coded in an ordinal scale.

Table 1 presents the parameter estimates from the ordered probit model of consumer choice for organic and integrated fruit and vegetables in Slovenia.

Based on the results of a likelihood ratio test (PINDYCK and RUBINFELD, 1991), the model is statistically significant at 99% or above. The results of the χ2 test reveal that the differences between the model coefficients are statistically significant. However, the value of the likelihood ratio index (LRI) goodness-of-fit coefficient (GREENE, 1997) is rather low (0.049), which implies that the model explains only a part of the variance within the dataset. Rather low LRI values were also expected due to the fact that the survey dataset comprised only rather general determinants influencing households' purchasing behaviour.

The most significant impact on purchase frequency is availability of organic and integrated fruit and vegetables in the shop where respondents make the major part of their shopping. Market for organic fruit and vegetables in Slovenia might still be considered as insufficiently developed; therefore availability was expected to play a significant role in purchasing behaviour. Model results clearly confirm these expectations and favour strong emphasis on distribution strategy, but also the emerging initiative of promoting local supply (farmers market) and short retail chain for fruit and vegetables. The level of self-sufficiency showed to be rather high for Slovene households; however, the result of the model does not confirm the expected inverse relations.

Table 1: Results of the consumer choice model

Explanatory variable	Ordered probit		Marginal effects			
	Coef-ficient	t-statistic	Prob (Y=0)	Prob (Y=1)	Prob (Y=2)	Prob (Y=3)
Constant	-4.29	-4.20	1.306	0.406	-0.181	-0.773
Household's income	0.30	3.84	-0.092	-0.029	0.013	0.054
Environmental concern	-0.08	-2.40	0.025	0.008	-0.003	-0.015
Health concern:	0.10	2.63	-0.030	-0.009	0.004	0.018
Price consciousness	-0.02	-0.67	0.006	0.002	-0.001	-0.003
Visual attractiveness	0.10	3.82	-0.031	-0.010	0.004	0.018
Taste of OIFV	0.09	2.88	-0.026	-0.008	0.004	0.015
Availability of OIFV	0.13	6.00	-0.038	-0.012	0.005	0.023
Origin and quality	-0.01	-0.05	0.001	0.000	-0.000	-0.000
Self-supply	0.14	1.67	-0.043	-0.013	0.006	0.025
Cooking habits	-0.09	-1.08	0.028	0.008	-0.004	-0.016
Residence in rural area	-0.18	-2.11	0.056	0.017	-0.008	-0.033
Log likelihood function	-1155.3	-	-	-	-	-
Restricted log likelihood	-1215.0	-	-	-	-	-
LR test χ2 (d. freedom.)	119.49 (11)	-	-	-	-	-
LRI	0.049	-	-	-	-	-

Source: the model

Model clearly confirms important inverse implication of disposable household income on purchase frequency, where beside the affordability effect (this category of produce is more expensive) also education might influence the result. Purchasing frequency significantly increases with higher disposable incomes and the estimated marginal effects reveal non-linear patterns for this variable. A high quasi-elasticity coefficient for non-buyers (Y=0) ranking to 0.66 suggests that low income level very likely determines no purchase. Marginal effects also clearly suggest that higher frequency of purchase is closely related to households' disposable incomes. The corresponding quasi-elasticity for a regular purchase (at least once a week) ranges to 0.39. The two elemental criteria of quality – taste and visual attractiveness - have both a significant effect on the frequency of

purchase. It is confirmed by the model that consumers consider the visual attractiveness (appeal) of fruits and vegetables when they make purchasing decision. Consumers who believe that visual appealing of OIFV is worse than conventional are less likely to buy categories of quality produce. Similarly, taste appears to significantly affect the consumer preferences to purchase. Consumers perceive these categories of produce as having superior taste compared to the conventional ones and these respondents are more likely to be among buyers. Quasi elasticity for Y=0 is estimated at 0.081. Nevertheless, descriptive results of the survey suggest that consumers claim they are often prepared to "sacrifice" superior visual attractiveness for the organic and integrated category, but the taste should be better. This might be a useful guideline for business strategies, but only after more refined further studies of the topic. Consumers' perception of organic and integrated fruit and vegetables being healthier than conventional products significantly increases the probability and frequency of actual purchase. On the contrary, persons not considering quality products as healthier are more likely to be among non-buyers (quasi elasticity 0.10). The model results show that consumers are rather indifferent to environmental aspects when selecting organic or integrated fruit and vegetables. The stated beliefs about "environmental soundness" of organic or integrated production practice and purchase frequency are in reverse relation. Rather inconclusive results regarding environmental concern might be further explained with low association between production practices and implications on environment by the Slovene consumers. It can be further examined that consumers do not relate quality of fruits and vegetables with their micro-origin. The coefficient estimating this determinant is insignificant. "Local supply" promotion strategy therefore turned to be inappropriate. According to the model results, price consciousness has no significant impact on purchase of quality fruits and vegetables. Interestingly, non significant coefficient suggests that the price of higher quality products is not a decisive element of purchasing behaviour. Buyers are likely to continue buying such products notwithstanding higher prices of such products. Surely, these results should not be considered a basis for an ultimate conclusion about low consumer price sensitivity for organic and integrated fruit and vegetables in Slovenia. Some additional and more sophisticated

measuring approaches should be employed to confirm these indications. Insignificant relation has been evaluated also for meal preparation patterns, however they are rather explanatory. Probability of being a frequent buyer of organic or integrated fruit and vegetables increases with the fact that a respondent only sporadically cooks meals at home. Reversely, marginal effects suggest that the probability for frequent purchase (outcome Y=3) decreases, however, with low quasi elasticity. Traditional eating patterns are not a characteristic of aware and affluent consumers. They do increase the share of food consumed away from home and are also disposed to modern food categories where organic and integrated produce surely can be classified.

The study presented in the paper tries to contribute to a better understanding of demand for organic and integrated fruit and vegetables in emerging markets. The ordered probit model was used to evaluate some of the factors that might affect the frequency of organic and integrated fruit and vegetables consumption in Slovenia. Among the interesting conclusions are low environmental association of consumers when selecting organic or integrated fruit and vegetables, low awareness regarding integrated production practices and low price sensitivity. However, additional research would be needed to sufficiently understand such a complex processes as the choice of environmentally identified foods. In this respect, it would be interesting to study attitudes for detailed product specification, different distribution channels and potential promotion activities for organic or integrated fruit and vegetables. This would help to prioritise specific business strategies and public activities to promote demand for organic and integrated produce.

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