IMPORTANCE OF QUALITY ATTRIBUTES AND PRICE FOR CONSUMER'S DECISION TO USE SAFFRON IN COOKERY AND AS HERBAL TEA

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Abstract

The aim of this paper is to analyse the importance of saffron quality attributes and price for consumer's decision to use saffron in cookery and as herbal tea. The saffron analysed attributes were "aroma", "taste", "colour", "being a natural product of vegetal origin", "providing health benefits", "being of a recent harvest", and "price". An experiment with 202 consumers was carried out for data collection in Aragon during 2016-2017. The sample was stratified by age, gender, education level and province of residence. After receiving general information about saffron, respondents were asked to fill in a questionnaire to indicate their choice of the most and the least important attribute from a set of three attributes within seven choice sets, together with their socio-demographic and personality traits. The Best-Worst scaling method was used to assess the attached importance to each saffron attribute. Attribute importance for consumers was assumed heterogeneous and a Random Parameters Logit (RPL) with correlated errors model was estimated. Results indicated that the most important saffron attribute for consumer's decision to use saffron in cookery and as herbal tea was "providing health benefits", followed by "taste", "aroma", "being of a recent harvest", "price", "being a natural product of vegetal origin", and "colour".

Keywords: Best-Worst method, *Crocus sativus*, Random Parameter Logit Model, Spain

1. Introduction and objectives

Saffron spice comes from the blossoms of a bulbous plant, *Crocus sativus* L., and is constituted by their dried stigmas. Saffron is traded all over the world, although a few countries, Iran being the most prominent, concentrates most of the production. It is highly valued for its multiple applications in cookery, food and pharmaceutical industries, and as dye. The main quality attributes of saffron for cookery and food industry are its alluring aroma, pleasant bitter taste, and colouring properties. These attributes are related to its main components: safranal, picrocrocin, and a group of water soluble carotenoids called crocetin esters or crocins, respectively. Being a dried product, saffron could be preserved for many years, however, the evolution of its components leads to changes in its quality. Saffron is one of the most expensive spices in the world. Saffron properties, small farms, highly labour intensive production process, and intermediaries in the marketing channels are determinant factors in saffron price. Europe has experienced a dramatic decrease in saffron production, which is little competitive in costs when compared to Iran or other emerging countries [Alonso et al. (2007)]. In Spain, saffron producers are looking for new value chains, marketing niches and strategies leading to increments in producers' price share and added value. Aragon is one of the Spanish production areas where saffron, as a sustainable high value agricultural product, could be an alternative for rural development and to arrest depopulation. The success of saffron activity depends on the consumer's decision to use it and requires effective actions based on consumer preferences. The aim of this paper is to analyse the importance of saffron quality attributes and price for consumer's decision to use saffron in cookery and as herbal tea.

2. Materials and methods

A Best-Worst (BW) scaling approach was used. BW scaling is a choice valuation method based on the random utility theory of decision making in which respondents are invited to choose the best (or most important) and the worst (or least important) item from a series of sets that contain different combinations of a larger master set of items [Lee et al. (2007)]. In this study, these items were attributes of saffron spice. The attributes under valuation were "AROMA", "TASTE", "COLOUR", "being a natural product of vegetal origin-NATURAL", "providing health benefits-HEALTH", "being of a recent harvest-RECENT", and "PRICE". Seven combinations of three of these attributes (seven choice sets), where each attribute

appears three times across all sets, were obtained by employing a balanced incomplete block design according to Louviere et al. (2010), and were presented consecutively to each participant in an experiment.

A maxdiff model was assumed. Each choice set was exploded into the all six implicit pair-wise choices, resulting in 42 "pseudo-observations" for each respondent.

According to the random utility theory, the probability that attribute i is preferred over attribute j can be formulated as:

$$P(i/i,j) = P(Ui) > P(Uj) = P(vi + \varepsilon i) > P(vj + \varepsilon j)$$

where U is the utility function, v is the observable, systematic utility component (importance), and ε is the stochastic error term.

U was specified in the following way:

$$U_{nkt} = \beta_{1n} AROMA_{nkt} + \beta_{2n} TASTE_{nkt} + \beta_{3n} NATURAL_{nkt} + \beta_{4n} HEALTH_{nkt} + \beta_{5n} PRICE_{nkt} + \beta_{6n} RECENT_{nkt} + \varepsilon_{nkt}$$

$n = 1, \ldots, 202$ is the respondent; $k = 1, \ldots, 6$ is the pair-wise choice within the choice set; $t = 1, \ldots, 7$ is the choice set; β_n is a random vector of individual attribute parameters; ε_{nkt} is the extreme value error term $N(0, \Omega)$, correlated across all binary choices of one BW choice set as well as for all the choices of one individual, and correlated across utilities. COLOUR was the attribute-variable used as reference.

A random parameter logit model with correlated errors (RPL-CE) was applied to account for heterogeneity in respondent preferences, correlation across attribute parameters, and correlation across utilities [Train (2003)]. The NLOGIT package was used to estimate the RPL-CE.

Data were obtained from an experiment with consumers in Aragon in 2016-2017. Population consisted of people living in Aragon older than 18 years. Recruitment was performed via consumer associations, universities, technological centres, and town hall centres. A total of 18 sessions of around 12 participants were carried out. The final sample of 202 participants was stratified by age, gender, education level, and province of residence. The experiment lasted approximately one hour and was carried out at different timing of the day. Upon arrival, participants received information on the main purpose of the experiment, a previously developed questionnaire, and signed an informed consent of participation. Anonymity was guaranteed. Then, participants were asked to answer questions on objective knowledge of saffron, intention to purchase and liking measures. After having received information on saffron, they responded a BW question with the 7 attributes mentioned above. Finally, they reported the socio-demographics and personal characteristics.

3. Results and conclusions

The socio-demographic characteristics of the sample with the population in terms of gender, age, education level and province of residence were not statistically different at 5% level.

Table 1 shows the estimation of the RPL-CE. The means of the estimated coefficients for the random parameters in the utility function were positive and statistically significant at 5% level indicating that the consumers' importance of the estimated attributes was statistically higher than the importance attached to the colour attribute (reference). The average consumer gives more importance to "providing health benefits", followed by "taste", "aroma", "being of a recent harvest", "price", "being a natural product of vegetal origin", and "colour" when deciding to use saffron in cookery and as herbal tea. Consequently, saffron marketing actions in Aragon considering the first attributes of this ranking according to consumer´s preferences are recommended.

Table 1. *Estimates for the random parameters logit with correlated errors model*

Attributes	Random parameters in utility function			Standard deviation of parameters distribution		
	Mean	Standard error	Z-ratio	Coefficient	Standard error	Z-ratio
HEALTH	2.3640***	0.2773	8.53	3.2019***	0.2885	11.10
TASTE	1.9992***	0.1694	11.80	1.6296***	0.1760	9.26
AROMA	0.9005***	0.1183	7.61	0.9270***	0.1627	5.70
RECENT	0.4033**	0.1899	2.12	2.0906***	0.3146	6.64
PRICE	0.3885**	0.1747	2.22	2.0111***	0.2092	9.61
NATURAL	0.3414**	0.1649	2.07	1.8298***	0.1743	10.50

Reference attribute: COLOUR
Number of observations: 1414; Number of participants: 202
Log likelihood at convergence: -52035.63; McFadden Pseudo R-square: 0.19
***, ** = significance at 1%, 5% level

Since the estimated coefficients for the standard deviation were also positive and statistically significant at 1% level, the importance of the attributes differed among consumers, and preferences for these attributes were heterogeneous. Further analysis is required to explain this preference heterogeneity and to detect consumers segments according to the importance attached to each attribute.

4. References

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