



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

## **Fresh-cut salad consumer and shelf life date extension: more or less information?**

Stranieri S.<sup>1</sup>, Baldi L.<sup>2</sup>, Manzoni V.<sup>3</sup>

<sup>1</sup> Department of Economics, Management and Quantitative Methods, University of Milan, Via Celoria 2, 20133 Milano, Italy; mailto: [stefanella.stranieri@unimi.it](mailto:stefanella.stranieri@unimi.it), phone: +390250316460, fax +390250316484

<sup>2</sup> Department of Economics, Management and Quantitative Methods, University of Milan, Via Celoria 2, 20133 Milano, Italy; mailto: [lucia.baldi@unimi.it](mailto:lucia.baldi@unimi.it); phone: +390250316492; fax : +390250316484

<sup>3</sup> Department of Economics, Management and Quantitative Methods, University of Milan



**Poster paper prepared for presentation at the EAAE 2014 Congress  
'Agri-Food and Rural Innovations for Healthier Societies'**

August 26 to 29, 2014  
Ljubljana, Slovenia

*Copyright 2014 by author1 and author2. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.*

## Abstract

Shelf-life estimation has become increasingly important due to the growing consumer interest in fresh and safe food products and the European policy indications to consider it as a key issue for the sustainable management of food waste within the supply chains. To date, no legislation on the shelf life date of the most of food products exists (Boxstael et al., 2014). Several studies demonstrate that the technology available in the fresh-cut sector would allow to extend the shelf life date of products without compromising their intrinsic quality attributes and to achieve a more sustainable production by a strong reduction of unsold stock. The aim of the study was to segment consumers on the basis of their attitude towards the extension of the shelf life date in the fresh-cut salad sector. On the basis of the clusters found, the paper discusses if the information concerning such technology is a useful tool to inform consumers on product characteristics or if it entails a risk of information overload.

## 1. Introduction

During the past decades various technological applications relating to prolonging the shelf life of food products has been introduced but not all of them were widely adopted in food processing. Pasteurisation, food irradiation, genetic modifications of food are only some examples of new food technologies with extensive effects on the shelf life of food. The reasons associated to the introduction of such technologies are related to several aspects. In addition to the improvement of food processing, the introduction of new technologies has often allowed an enhancing of safety attributes of food products, a reduction of production costs and positive effects on the environment, by a reduction of energy, water and chemicals used, and the production of less waste (Rollin et al., 2011). Despite the fact that the scientific community has recognized the safety of such processes, most of them have received significant consumer resistance. Recent studies on the acceptance of new technologies revealed that even new technologies with clear benefits may not be appealing to all consumers (Chen et al., 2013; de Barcellos et al., 2010). This negative effect on consumer can lead to a failure of product innovation. With regard to the food category of minimally processed vegetables research focuses mostly on the effects of the introduction of new technologies on microbiological safety, quality, packaging and processing characteristics of such products whereas consumer research on consumer perception towards such technologies is still at the core of the scientific debate. The present paper concentrates the attention on consumers acceptance of technologies related to the shelf life extension of fresh-cut salad. In specific, we used cluster analysis in order to identify different kind of consumers on the basis of their attitude towards the introduction of such technology.

## 2. Consumer and information

According to the quality perception literature, the product quality is the result of different attributes for consumers. Olson and Jacoby (1972) distinguish between two types of quality attributes of products: intrinsic and extrinsic. Intrinsic attributes refer to the physical characteristics of the product, whereas extrinsic attributes are related to everything that can be verified by the consumer before the purchase, as the product price, the brand, the product's certification, and so on. Extrinsic attributes are related to the product characteristics which are not physically part of it. When speaking about intrinsic attributes, consumers have not often the possibility to be informed about the product characteristics. On the other side, when

considering extrinsic attributes consumers have the possibility to be informed about the products characteristics. With regard to the amount of information related to the product characteristics, there are three different categories of product attributes: search, experience and credence. Search attributes refer to the product characteristics that the consumer can verify prior to purchase. Experience attributes are related to those characteristics that can be judged after the consumption. Credence attributes refer to the product characteristics that cannot be verified even after purchase. Search attributes make reference to extrinsic product attributes. Credence and experience attributes are related to intrinsic cues, mostly of which cannot be verified neither before, nor after the purchase by consumers. Consequently, a market failure connected to the information asymmetry between product's demand and supply is verified. Because of the market inefficiencies linked to the presence of different credence attributes in food products, considerable attention has been given by regulatory activities to the information labelling as mean to improve consumer knowledge on food products. Different credence cues has been transformed into extrinsic attributes by labelling regulation allowing consumers to know more about the intrinsic characteristics of a food product, like for example nutritional facts, origin of raw materials, information about processing, animal welfare, supply chain traceability and so on.

Within this framework, the introduction of a new technology concerning the extension of the shelf life of fresh salad within the Italian market can be analyzed as a credence attribute concerning the product processing which contribute to increase the information asymmetry between consumers and producers for ready to eat fresh salad. The obvious solution in this context is the provision of more information for consumers. However, an increase of information does not necessary bring to a reduction of market inefficiencies for different reasons.

First, the relations between consumers preferences and optimal food choices are influenced by food consumer bounded rationality, which influences the capacity of interpret and processing all the information available. Several studies found that many consumers often fail to read or process all the information available on products during food purchase, even though such information is free. This is because the opportunity costs of acquiring all the provided information would be too high (McCluskey and Swinnen, 2004; Verbeke, 2005). Second, purchasing decisions are often influenced by consumers risk perception towards certain quality and safety attributes of food products. The introduction of a food processed by a new technology may create concern among food consumers (Bieberstein et al., 2013; Onwezen and Bartels, 2011).

Interestingly, new technologies are of increasing importance to manage the safety and sustainable attributes of food production but not a lot of studies have concentrated the attention on the reaction of food consumers to these technologies (Rollin et al., 2011). Although some food technologies, such as food irradiation and genetic modification, have been or are still part of an extensive public debate, consumer acceptance and reactions towards the adoption of certain technologies is crucial for the food industry since process characteristics are often determining consumer preferences. According to the literature, European consumers prefer 'natural' practices and organic production methods. On the other hand they dislike genetic modification and excessive processing of food (de Barcellos et al., 2010).

### **3. The fresh-cut salad sector**

The fresh-cut salad in Italy has started from the mid-80s. During the last thirty years, this sector has become a successful example of innovation and development opportunities. The Italian industry of fresh-cut salad represents one of the leading industry in Europe with a production of 110,000 tonn. and a turnover of € 770million in 2012 (Nielsen, 2014).

In 2010 the 70% of the Italian cultivated area for fresh-cut salad refers to products grown in greenhouse. The supply chain for fresh-cut salad is composed by 600 agricultural farms and about 120 industry (AOP UnoLombardia, 2011). Most of these firms are concentrated in few Italian regions, namely Lombardy, Campania, Emilia Romagna and Piemonte.

The demand towards fresh-cut salad is increasing, in spite of the slump of the last years (Nielsen, 2013). The reasons are different. First, growing surfaces of the main dicounts have been dedicated to fresh fruits and vegetables. Second, also the increasing attention of the private labels towards fresh-cutfruits and vegetables has played an important role. Third, minimally processed food are gaining consumer interest and satisfy their preferences in terms of 'helthy eating' and convenience attributes. From 2001 to 2010 the consumption of fresh-cut salad increasd of 280%, with a market penetration of 74,4% (Ismea, 2010). The consumption of fresh-cut salad is concentrated in the North of Italy and the 63% of sales belongs to the 20% of Italian consumers (Nielsen, 2014). This means that the market of fresh-cut salad in Italy has still a good margin of growth.

#### **4. Methodology**

We carried out a survey among 350 consumers living in Lombardy, one of the Italian regions where the consumption of fresh-cut salad is high and evolved. Following literature we developed a questionnaire including socio-demographic variables, attitude towards information about shelf life extension and towards quality, economic variables, frequency of purchase, and so on. The sample is representative of italian population. It was obtained first stratifying consumer by different areas (large urban center, small urban center, mountain area), by age and by gender, according to the structure of the Italian population. Then for each stratum we used a random face to face contacts. Sample size was identify assuming an error of 5% considering a proportion of the consumers interested in fresh-cut salad not exceeding 75% (penetration rate).

Principal component factor analysis with varimax rotation was used to discover latent variables from the information of questionnaire. Six factors with eigenvalue  $> 1$  were emerged and accounted for a total of 65% of the variance. These factors were used in a two-step clustering to reveal consumers with similar attitude toward information about shelf life extension. This is an exploratory tool that has several desirable features that differentiate it from traditional clustering techniques, that is the ability to create clusters based on both categorical and continuous variables, the automatic selection of the number of clusters and the ability to analyze large data files efficiently. Two-steps cluster method is a scalable cluster analysis algorithm using a hierarchical clustering method. In a first step, the consumers are pre-clustered into many small sub-clusters; in a second step, these sub-clusters are clustered into the final number of cluster.

#### **5. Results and discussion**

By factor analysis we found six factors identified as follows: Factor 1 related to “positive response to the information about the shelf life extension”. Factor 2 related to socio-demographic variables. Factor 3 distinguished shopping frequency and reputation of freshness of salad fresh cut. Factor 4 represent economic variables, Factor 5 characterized geographic areas, and finally Factor 6 related to interest to expiration date and thrust in the brand.

Afterwards we identify 3 clusters characterized by our interpretation of which variables were more significant in each cluster. Only one of the three clusters is represented by consumers with a positive attitude towards the introduction of an extension of the shelf life date, whereas the other two clusters identifies consumers with a negative attitude towards such information. In this cluster consumers consider the fresh-cut salad to have a good degree of freshness and safety and they purchase it frequently. They are between 40 and 60 years old and with a medium level of education. Most of them live in big cities and pay attention to healthy eating. Price is not an important factor for them. The other two clusters identify consumers who give a negative connotation to the extension of the shelf life date of fresh-cut salad. The first one identifies consumers with low income level and who consider price to be an important search attribute. They perceive the fresh-cut salad with a low level of freshness and a low degree of safety and purchase it less than once a week. They are usually young and with high level of education. The last cluster represents consumers with high income level. Most of them live in big cities and they pay attention to healthy eating. They consider fresh-cut salad to have a high level of freshness, but they are worried about safety attributes of fresh cut salad.

Even if information is important to reduce market inefficiencies, not all consumers interpret the information provided correctly. Above all, that concerning the product processing is often misinterpreted. Firms producing fresh-cut salad have the possibility to introduce a technology with positive effects on the economic and environmental sustainability of supply chain. However, cluster results show that the 60% of interviewed have a negative attitude towards shelf life extension. Firms have two possibilities. The first one concerns the transformation of the shelf life extension in search attribute through a deep and clear communication strategy. The other consists in maintaining the technology as a credence attribute without informing consumers.

## References

- Bieberstein, A., Roosen J., Marette S., Blanchemanche, S., and Vandermoere F. (2013). Consumer choices for nano-food and nano-packaging in France and Germany. *European Review of Agricultural Economics* 40(1): 73-94.
- Boxstael S.Van, Devlieghere F., Berkvens D., Vermeulen A., Uyttendaele M. (2014). Understanding and attitude regarding the shelf life labels and dates on pre-packed food products by Belgian consumers. *Food Control* 37: 85-92.
- Chen Q., Anders S. and An H. (2013). Measuring consumer resistance to a new food technology: A choice experiment in meat packaging. *Food Quality and Preference* 28: 419–428.
- de Barcellos M.D., Kügler J.O., Grunert K.G., Van Wezemael L., Perez-Cueto F.J.A., Ueland Ø. and Verbeke W. (2010). European consumers’ acceptance of beef processing technologies: a focus group study. *Innovative Food Science and Emerging Technologies* 11: 721-732.

McCluskey J.J., Swinnen J.F.M. (2004). Political economy of the media and consumer perceptions of biotechnology. *American Journal of Agricultural Economics* 86: 1230-1237.

Olson J. C. and Jacoby J. (1972). Cue utilisation in the quality perception process. In Venkatesan M. (eds.), *Proceedings of the Third Annual Conference of the Association for Consumer Research*. Chicago: Association for Consumer Research, 167-179.

Onwezen M.C. and Bartels J. (2011). Which perceived characteristics make product innovations appealing to the consumer? A study on the acceptance of fruit innovations using cross-cultural consumer segmentation. *Appetite* 57: 50–58.

Rollin F., Kennedy J. and Wills J. (2011). Consumers and new food technologies. *Trends in Food Science & Technology* 22(2-3): 99-111.

Verbeke W. (2005). Agriculture and the food industry in the information age. *European Review of Agricultural Economics* 32(3): 347-368.