SAPIENZA
UNIVERSITÀ DI ROMA

FREIE UNIVERSITÄT BOZEN
LIBERA UNIVERSITÀ DI BOLZANO
FREE UNIVERSITY OF BOZEN · BOLZANO

# Evolution over time of satisfaction towards a tourist destination: A fuzzy approach


D'Urso P.[a], Disegna M.[b], Massari R.[a], Osti L.[b,c]

[a]La Sapienza, Roma, Italy
[b]Free University of Bozen-Bolzano, School of Economics and Management, Italy
[c]TOMTE, The Competence Centre in Tourism Management and Tourism Economics



*CBTS 2013 – Competitiveness, Innovation and Markets: The Multifaceted Tourists' Role*

4–7 December 2013, Brunico, Free University of Bolzano, Italy


# Introduction

Customer satisfaction is capable of stimulating **repeat visits, positive recommendations and consequently new customers, reputation enhancement, higher acceptance of price increases, and higher profitability** (Anderson et al. 1994; Baker and Crompton, 2000; Kozak and Rimmington, 2000; Homburg et al., 2005; Munier and Camelis; 2013).

Satisfaction has been studied in order to **improve the product/service and to effectively design management and marketing strategies** (Kozak and Rimmington, 2000; Munier and Camelis, 2013).

Satisfaction has been analysed in terms of **satisfaction with the single services/products within the destination, with the destination, and with the holiday/trip as a whole.**

Customer satisfaction has been seen as **an indicator of destination competitiveness and performance** (Enright and Newton, 2004; Alegre and Garau, 2010; Munier and Camelis, 2013).

# Research objectives

The development and maintenance of competitive advantage is largely dependent upon the understanding of visitors' needs, behaviours and **satisfaction**.

**Purpose**

This study aims to analyse **temporal differences in the satisfaction level** of international visitors to South–Tyrol.

In fact, the temporal analysis offers relevant information on the evolution of the destination facilitating a review of the efficacy of the strategies implemented over the years.

**Methodology**

**Fuzzy clustering algorithm to fuzzy data** was adopted in order to find homogeneous groups of visitors according to their satisfaction level per each period under observation.
The results of the two clustering analysis are been compared.

# The empirical study

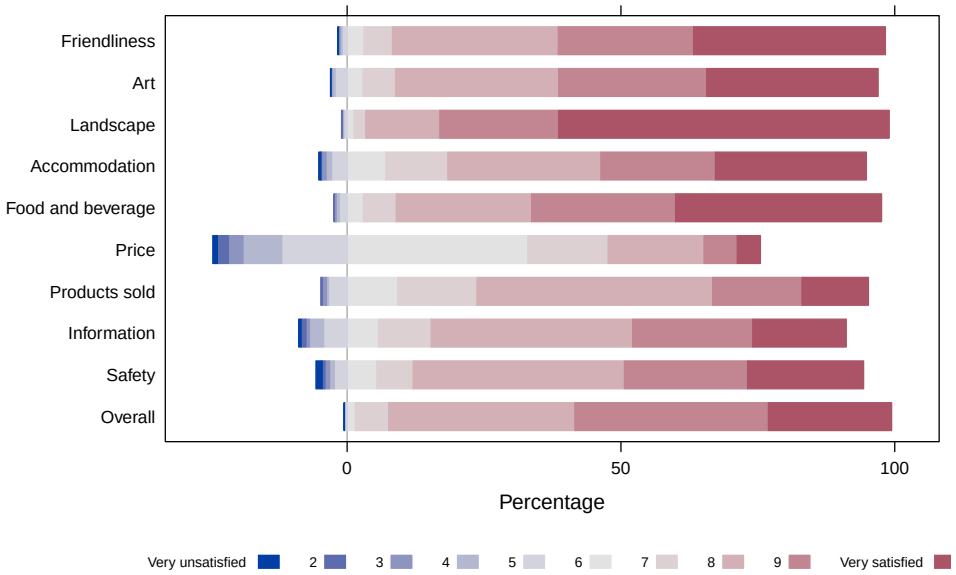
**Dataset:** annual inbound survey "International Tourism in Italy" of the Banca d'Italia.

**Observations:** international visitors who spent their trips in South–Tyrol (Northern Italy)

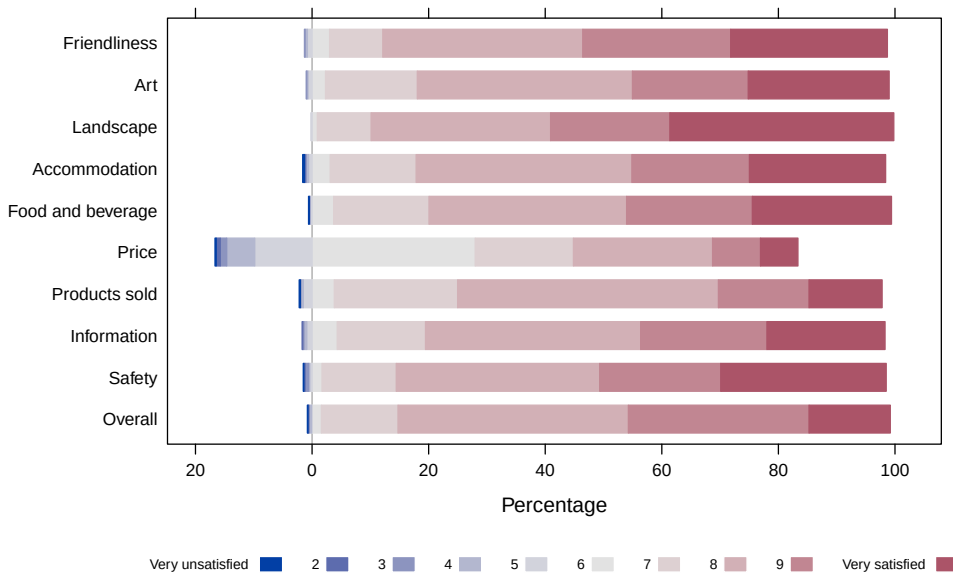
**Period:** 2000-01 (1,582 obs.), and 2010-11 (997 ons.)

**Level of satisfaction:**

**2000-01**




**2010-11**




▸ Level of satisfaction

▸ Other variables

# The sample: percentage composition

| Variables | 2000-2001 | 2010-2011 | $p$-value |
|---|---|---|---|
| **Socio–demographic characteristics** | | | |
| Male | 64.79 | 68.91 | ** |
| *Age* | | | |
| **Less than 35 years old** | 30.03 | 21.16 | *** |
| 35-44 years old | 24.15 | 28.59 | *** |
| 45-64 years old | 38.50 | 36.41 | |
| **More than 64 years old** | 7.08 | 13.84 | *** |
| *Employment status* | | | |
| **Self-employed** | 21.18 | 11.53 | *** |
| **Employee** | 53.92 | 69.71 | *** |
| Retired | 14.35 | 12.44 | * |
| Other | 10.56 | 6.32 | *** |
| *Country of origin* | | | |
| **Austria** | 9.42 | 21.06 | *** |
| **Germany** | 68.77 | 50.85 | *** |
| **Other EU countries** | 15.49 | 21.46 | *** |
| Outside EU | 6.32 | 6.62 | |
| **Trip characteristics** | | | |
| **Alone** | 19.97 | 23.97 | *** |
| Only one cities visited | 85.90 | 84.05 | * |
| *Main purpose of travel* | | | |
| Tourism, leisure, vacation | 79.84 | 76.03 | ** |
| Job | 12.07 | 10.53 | |
| **Other personal motivations** | 8.09 | 13.44 | *** |

*Notes*: Percentage composition is reported. Significance of the $z$-test was reported. $^{***}p \leq 0.01$, $^{**}p \leq 0.05$, $^{*}p \leq 0.1$.

▶ Arrivals

# The segmentation approach

**Method: Fuzzy clustering to fuzzy data**

It is not reasonable to assume that an observation is grouped into only one single cluster (Kotler, 1988) since an observation might belong to **more than one cluster** (Li et al., 2013; Russell & Lodwick, 1999).

$\rightsquigarrow$ Among the wide number of segmentation methods usually adopted in the literature, **fuzzy methods** (Bezdek, 1981) are preferred in order to overcome this problem.

Human feeling or attitudes are always fuzzy (Chan et al., 2012; Sun and Wu, 2007).
Oftentimes, Likert-type scales are used in order to capture information regarding opinions, satisfaction, and emotions but Likert-type scales entails two kinds of **vagueness and uncertainty**:

1. Individual judgments/evaluations depend on **prior expectations, beliefs, preferences** of the respondents (Benítez et al., 2007; Coppi & D'Urso, 2002; Engel et al., 1995).
2. Respondents must convert their opinion on a scale and this **conversion can distort the original opinion** that had to be captured (Hsu and Lin, 2006).

$\rightsquigarrow$ Since it is difficult to manage with uncertain and/or vague data through traditional methods, **fuzzy sets and fuzzy numbers** are commonly used (Chou et al., 2008)

# Fuzzy numbers

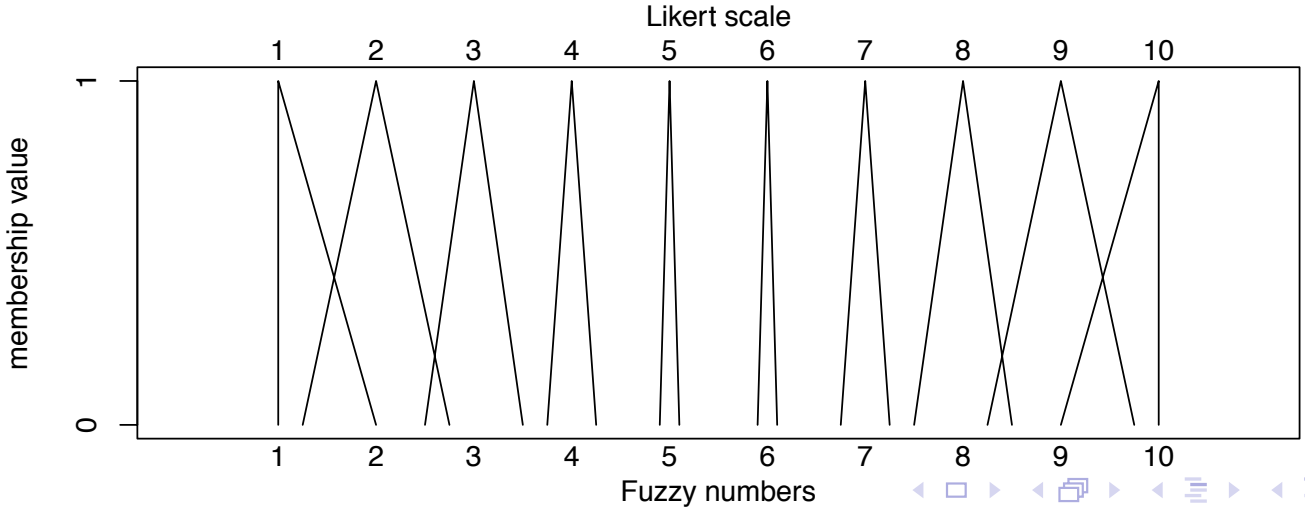
A general class of fuzzy data, called LR fuzzy data, can be defined in a metric form following Dubois and Prade (1988):

$$\widetilde{\mathbf{X}} \equiv \{\tilde{x}_{ik} = (m_{ik}, l_{ik}, r_{ik})_{LR} : i = 1, \ldots, N; k = 1, \ldots, K\}, \quad (1)$$

where:

- $\tilde{x}_{ik} = (m_{ik}, l_{ik}, r_{ik})_{LR}$ denotes the $LR$ fuzzy variable $k$ observed on the $i$th unit;
- $m_{ik}$ indicates center, i.e. the "core" of the fuzzy number;
- $l_{ik}$ and $r_{ik}$ represent the left and right spread, i.e. the vagueness of the observation.

The fuzzy recoding from the Likert scale to the fuzzy numbers used in this study is displayed in the following figure:



# Distance for fuzzy data

Since fuzzy segmentation variables are used, the following distance measure for fuzzy data proposed by Coppi et al. (2012) is adopted:

$$d_F^2(\tilde{\mathbf{x}}_i, \tilde{\mathbf{x}}_{i'}) = \left[ w_M^2 \left( \|\mathbf{m}_i - \mathbf{m}_{i'}\|^2 \right) + w_S^2 \left( \|\mathbf{l}_i - \mathbf{l}_{i'}\|^2 + \|\mathbf{r}_i - \mathbf{r}_{i'}\|^2 \right) \right], \quad (2)$$

where:

- $\tilde{\mathbf{x}}_i \equiv \{\tilde{x}_{ik} = (m_{ik}, l_{ik}, r_{ik})_{LR} : k = 1, \ldots, K\}$ denote the fuzzy data vector for the $i$th unit;
- $\mathbf{m}_i$, $\mathbf{l}_i$ and $\mathbf{r}_i$ are the vectors of the centers and of the left and right spreads, respectively;
- $\|\mathbf{m}_i - \mathbf{m}_{i'}\|^2$ is the squared Euclidean distances between the centers;
- $\|\mathbf{l}_i - \mathbf{l}_{i'}\|^2$ and $\|\mathbf{r}_i - \mathbf{r}_{i'}\|^2$ are the squared Euclidean distances between the left and right spread, respectively;
- $w_M$, $w_S \geq 0$ are suitable weights for the center component and the spread component of (2), constrained by the following conditions:

  $w_M + w_S = 1$ (*normalization condition*) and

  $w_M \geq w_S \geq 0$ (*coherence condition*) (Coppi et al., 2012).

# Fuzzy clustering for fuzzy data

Fuzzy $C$-Means (FCM) clustering algorithm (Bezdek, 1981) was adopted. Using the distance measure proposed by Coppi et al. (2012), the FCM algorithm for fuzzy data becomes:

$$\begin{cases} \min : \sum_{i=1}^{N} \sum_{c=1}^{C} u_{ic}^{p} d_F^2(\tilde{\mathbf{x}}_i, \tilde{\mathbf{h}}_c) \\ \sum_{c=1}^{C} u_{ic} = 1, \qquad u_{ic} \geq 0, \\ w_M \geq w_S \geq 0;\ w_M + w_S = 1 \end{cases} \tag{3}$$

where:

- $u_{ic}$ indicates the membership degree of the $i$th unit in the $c$th cluster;
- $d_F^2(\tilde{\mathbf{x}}_i, \tilde{\mathbf{h}}_c)$ represents the suggested dissimilarity measure between the $i$th unit and the prototype of the $c$th cluster;
- $p > 1$ is a weighting exponent that controls the fuzziness of the obtained partition;
- the fuzzy vector $\tilde{\mathbf{h}}_c \equiv \{\tilde{h}_{ck} = (h_{ck}^M, h_{ck}^L, h_{ck}^R)\}$ represents the fuzzy prototype of the $c$th cluster.

Note that the prototypes obtained with the FCM algorithm for fuzzy data are of LR fuzzy type, inheriting their typology by the observed data (Coppi et al., 2012).

▶ Algorithm

# Measurement of cluster validity

In regards to the identification of the optimal number of clusters, the following compactness and separation validity index ($S$) proposed by Xie and Beni (1991) was adopted:

$$S = \frac{\sum_{i=1}^{N} \sum_{c=1}^{C} u_{ic}^{p} d_F^2(\tilde{\mathbf{x}}_i, \tilde{\mathbf{h}}_c)}{N \cdot (d_{min})^2} \tag{4}$$

where:

- $N$ is the total number of data;
- $(d_{min})^2$ is called the separation of the fuzzy $c$-partition.
  $d_{min}$ is the minimum distance between fuzzy prototypes: $d_{min} = \min_{c,i} d_F^2(\tilde{\mathbf{h}}_c, \tilde{\mathbf{h}}_i)$

A smaller $S$ indicates that all the clusters are overall compact and separate to each other $\Longrightarrow$ **The goal is to find the partition with the smallest $S$.**

# Profiling

In order to profile the identified clusters the matrix of other information ($\mathbf{Y} = \{(y_{i1}, \ldots, y_{ik}, \ldots, y_{iK}) : i = 1, \ldots, N; k = 1, \ldots, K\}$), such as the socio–demographic and traveling characteristics, collected through the survey can be used.

When the profiling variables are **categorical**, the weighted percentage frequency ($\tilde{f}_{kjc}$), referring to the $j$th ($j = 1, \ldots, J$) modality of the $k$th original variable ($\mathbf{y}_k$) for the $c$th ($c = 1, \ldots, C$) cluster, was calculated as follows:

$$\tilde{f}_{kjc} = \frac{\sum_{i=1}^{N} y_{ikj} u_{ic}}{\sum_{c=1}^{C} \sum_{i=1}^{N} y_{ikj} u_{ic}} \cdot 100 \tag{5}$$

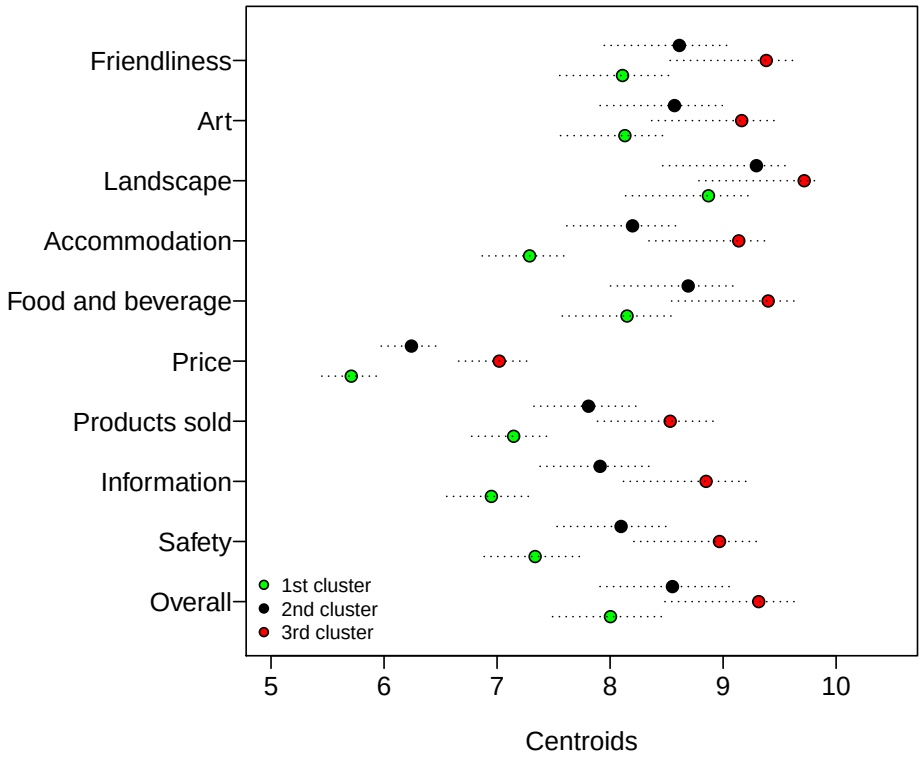
When the profiling variables are **quantitative**, the usual weighted mean ($\tilde{y}_{kc}$) was calculated as follows:

$$\tilde{y}_{kc} = \frac{\sum_{i=1}^{N} y_{ik} u_{ic}}{\sum_{i=1}^{N} u_{ic}} \tag{6}$$

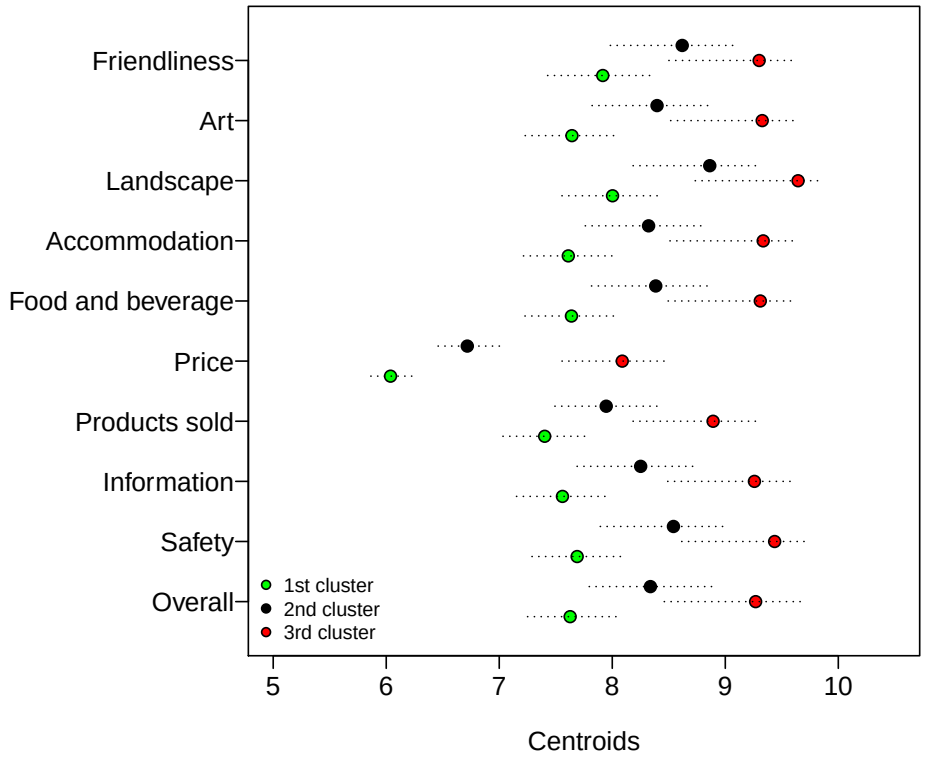
where $u_{ic}$ is the membership degree of unit $i$ to each final cluster $c$.

# The three clusters solution

**2000-01**




**2010-11**



# Rank of the centroids: comparison among clusters

**2000-01**

| Satisfaction | Cluster 1 "Unfulfilled" | Cluster 2 "With reservations" | Cluster 3 "Enthusiasts" |
|---|---|---|---|
| Friendliness | 8.110 (7) | 8.613 (8) | 9.382 (8) |
| **Art** | 8.131 **(8)** | 8.57 **(7)** | 9.165 **(6)** |
| Landascape | 8.87 (10) | 9.295 (10) | 9.718 (10) |
| Accommodation | 7.288 (4) | 8.199 (5) | 9.139 (5) |
| Food & beverage | 8.15 (9) | 8.691 (9) | 9.399 (9) |
| Price | 5.71 (1) | 6.242 (1) | 7.019 (1) |
| Products sold | 7.147 (3) | 7.809 (2) | 8.532 (2) |
| Information | 6.95 (2) | 7.911 (3) | 8.849 (3) |
| Safety | 7.337 (5) | 8.097 (4) | 8.968 (4) |
| Overall | 8.003 (6) | 8.552 (6) | 9.315 (7) |

**2010-11**

| Satisfaction | Cluster 1 "Unfulfilled" | Cluster 2 "With reservations" | Cluster 3 "Enthusiasts" |
|---|---|---|---|
| **Friendliness** | 7.916 **(9)** | 8.619 **(9)** | 9.300 **(5)** |
| Art | 7.643 (7) | 8.396 (7) | 9.327 (7) |
| Landscape | 8.002 (10) | 8.863 (10) | 9.644 (10) |
| **Accommodation** | 7.611 **(4)** | 8.321 **(4)** | 9.335 **(8)** |
| Food & beverage | 7.639 (6) | 8.385 (6) | 9.310 (6) |
| Price | 6.038 (1) | 6.717 (1) | 8.088 (1) |
| Products sold | 7.402 (2) | 7.946 (2) | 8.892 (2) |
| Information | 7.559 (3) | 8.251 (3) | 9.258 (3) |
| Safety | 7.689 (8) | 8.541 (8) | 9.437 (9) |
| Overall | 7.627 (5) | 8.338 (5) | 9.269 (4) |

# Rank of the centroids: comparison between periods

| | Cluster 1 "Unfulfilled" | | Cluster 2 "With reservations" | |
|---|---|---|---|---|
| | 2000-2001 | 2010-11 | 2000-2001 | 2010-11 |
| **Friendliness** | 8.110 **(7)** | 7.916 **(9)** | 8.613 (8) | 8.619 (9) |
| Art | 8.131 (8) | 7.643 (7) | 8.570 (7) | 8.396 (7) |
| Landascape | 8.870 (10) | 8.002 (10) | 9.295 (10) | 8.863 (10) |
| Accommodation | 7.288 (4) | 7.611 (4) | 8.199 (5) | 8.321 (4) |
| **Food & beverage** | 8.150 **(9)** | 7.639 **(6)** | 8.691 **(9)** | 8.385 **(6)** |
| Price | 5.710 (1) | 6.038 (1) | 6.242 (1) | 6.717 (1) |
| Products sold | 7.147 (3) | 7.402 (2) | 7.809 (2) | 7.946 (2) |
| Information | 6.95 (2) | 7.559 (3) | 7.911 (3) | 8.251 (3) |
| **Safety** | 7.337 **(5)** | 7.689 **(8)** | 8.097 **(4)** | 8.541 **(8)** |
| **Overall** | 8.003 (6) | 7.627 (5) | 8.552 (6) | 8.338 (5) |

| | Cluster 3 "Enthusiasts" | |
|---|---|---|
| | 2000-2001 | 2010-11 |
| **Friendliness** | 9.382 **(8)** | 9.300 **(5)** |
| Art | 9.165 (6) | 9.327 (7) |
| Landascape | 9.718 (10) | 9.644 (10) |
| **Accommodation** | 9.139 **(5)** | 9.335 **(8)** |
| **Food & beverage** | 9.399 **(9)** | 9.310 **(6)** |
| Price | 7.019 (1) | 8.088 (1) |
| Products sold | 8.532 (2) | 8.892 (2) |
| Information | 8.849 (3) | 9.258 (3) |
| **Safety** | 8.968 **(4)** | 9.437 **(9)** |
| **Overall** | 9.315 **(7)** | 9.269 **(4)** |

# Profiling: comparison among clusters

| Variables | 2000-2001 | | | | 2010-2011 | | | |
|---|---|---|---|---|---|---|---|---|
| | Unfulfilled | With reservations | Enthusiasts | $p$-value | Unfulfilled | With reservations | Enthusiasts | $p$-value |
| **Socio–demographic characteristics** | | | | | | | | |
| Male | **67.97** | 66.32 | 61.14 | * | 70.74 | 69.60 | 66.13 | |
| *Age* | | | | ** | | | | |
| Less than 35 years old | **35.54** | 29.04 | 27.39 | | 22.39 | 21.25 | 19.74 | |
| 35-44 years old | 25.49 | 25.57 | 22.02 | | 26.57 | 28.33 | 31.07 | |
| 45-64 years old | 33.58 | 38.09 | **42.52** | | 35.52 | 36.54 | 37.22 | |
| More than 64 years old | 5.39 | 7.30 | **8.07** | | 15.52 | 13.88 | 11.97 | |
| *Employment status* | | | | | | | | |
| Self-employed | 23.23 | 20.87 | 20.1 | | 11.38 | 11.68 | 11.65 | |
| Employee | 54.03 | 54.61 | 53.27 | | 68.56 | 70.94 | 70.22 | |
| Retired | 11.00 | 14.43 | 16.42 | | 14.07 | 11.97 | 11.33 | |
| Other | 11.74 | 10.09 | 10.22 | | 5.99 | 5.41 | 6.80 | |
| *Country of origin* | | | | | | | | *** |
| Austria | 10.02 | 9.19 | 9.21 | | **29.85** | 18.13 | 14.84 | |
| Germany | 66.75 | 69.50 | 69.35 | | 42.99 | 53.26 | **56.45** | |
| Other EU countries | 16.63 | 15.08 | 15.08 | | 20.59 | 21.25 | 22.58 | |
| Outside EU | 6.60 | 6.24 | 6.37 | | 6.57 | **7.36** | 6.13 | |
| **Trip characteristics** | | | | | | | | |
| Alone | **24.45** | 19.62 | 17.25 | ** | **31.14** | 21.81 | 18.71 | *** |
| Only one cities visited | 82.64 | 86.63 | **87.44** | * | 86.97 | 83.57 | 81.61 | |
| *Main purpose of travel* | | | | * | | | | *** |
| Tourism, leisure, vacation | 74.88 | 80.94 | **82.08** | | 68.65 | 77.21 | **82.63** | |
| Job | **14.88** | 11.61 | 10.55 | | **13.43** | 10.54 | 7.40 | |
| Other personal motivations | **10.24** | 7.45 | 7.37 | | **17.92** | 12.25 | 9.97 | |

*Notes*: Percentage composition is reported. Significance of the Chi-square test was reported. $^{***}p \leq 0.01$, $^{**}p \leq 0.05$, $^{*}p \leq 0.1$.

# Profiling: comparison between periods

| Variables | Unfulfilled | | | With Reservation | | | Enthusiasts | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2000-2001 | 2010-2011 | $p$-value | 2000-2001 | 2010-2011 | $p$-value | 2000-2001 | 2010-2011 | $p$-value |
| **Socio–demographic characteristics** | | | | | | | | | |
| Male | 67.97 | 70.75 | * | 66.32 | 69.60 | ** | 61.14 | 66.13 | *** |
| *Age* | | | | | | | | | |
| Less than 35 years old | **35.54** | 22.39 | *** | **29.04** | 21.25 | *** | **27.39** | 19.74 | *** |
| 35-44 years old | 25.49 | 26.57 | | 25.57 | 28.33 | * | 22.02 | 31.07 | *** |
| 45-64 years old | 33.58 | 35.52 | | 38.09 | 36.54 | | 42.52 | 37.22 | *** |
| More than 64 years old | 5.39 | **15.52** | *** | 7.30 | **13.88** | *** | 8.07 | **11.97** | *** |
| *Employment status* | | | | | | | | | |
| Self-employed | **23.23** | 11.38 | *** | **20.87** | 11.68 | *** | **20.10** | 11.61 | *** |
| Employee | 54.03 | **68.56** | *** | 54.61 | **70.94** | *** | 53.27 | **70.32** | *** |
| Retired | 11.00 | **14.07** | ** | **14.43** | 11.97 | ** | **16.42** | 11.29 | *** |
| Other | 11.74 | 5.99 | *** | 10.09 | 5.41 | *** | 10.22 | 6.77 | *** |
| *Country of origin* | | | | | | | | | |
| Austria | 10.02 | **29.85** | *** | 9.19 | **18.13** | *** | 9.21 | **14.84** | *** |
| Germany | **66.75** | 42.99 | *** | **69.50** | 53.26 | *** | **69.35** | 56.45 | *** |
| Other EU countries | 16.63 | **20.60** | *** | 15.08 | **21.25** | *** | 15.08 | **22.58** | *** |
| Outside EU | 6.60 | 6.57 | | 6.24 | 7.37 | | 6.37 | 6.13 | |
| **Trip characteristics** | | | | | | | | | |
| Alone | 24.45 | 31.14 | *** | 19.62 | 21.81 | * | 17.25 | 18.71 | |
| Only one cities visited | 82.64 | 86.87 | *** | 86.63 | 83.57 | ** | 87.44 | 81.61 | *** |
| *Main purpose of travel* | | | | | | | | | |
| Tourism, leisure, vacation | **74.88** | 68.66 | *** | **80.94** | 77.21 | ** | 82.08 | 82.64 | |
| Job | 14.88 | 13.43 | | 11.61 | 10.54 | | **10.55** | 7.40 | *** |
| Other personal motivations | 10.24 | **17.91** | *** | 7.45 | **12.25** | *** | 7.37 | **9.97** | ** |

*Notes*: Percentage composition is reported. Significance of the $z$-test was reported. $^{***}p \leq 0.01$, $^{**}p \leq 0.05$, $^{*}p \leq 0.1$.

# Some points to be considered on "Landscape"

**Landscape** has resulted to be **the most satisfying factor** for the three clusters and across the years.

Since the late 1980s several strategies have been implemented in order to **keep farmers (and not only) on the mountains**.

As stated by Luis Durnwalder (president of the Province of Bolzano from 1989 to 20013) the maintenance of nature and agricultural landscape has an added value for the province and for that reason **public funds are given to mountain farmers in order to allow them economic survival on the mountains**.

In exchange, **farmers maintain both the natural and cultural landscape**, so important for the comparative advantage of South Tyrol as a tourism destination.

# Some points to be considered on "Accommodation"

Satisfaction with **Accommodation** has increased over the years for the "Enthusiasts".

**Four main factors:**

1. **Decentralisation** of the regulation in favour of regional autonomies $\rightsquigarrow$ This give the opportunity to Bolzano province to focus on quality, setting high standards in the local hotel rating system, which are in fact higher than in nearby and competing Italian destinations.
2. Since 2001, the 4-star and 3-star Superior have been introduced in the local rating system $\rightsquigarrow$ Several hotel entrepreneurs upgraded their infrastructures to the **Superior category**.
3. Within the public policy of stimulating farming and private enterprises in rural mountain areas, incentives have been given to farmers and hotel owners for the **renovations** of existing buildings $\rightsquigarrow$ Many hotels have been renovated leading to a change in category by some hotels
4. The average satisfaction increase but the highly satisfied and dissatisfied customers decrease $\rightsquigarrow$ Repeat visitors have **higher expectations** before the holiday and **the surprise effect decreases** influencing satisfaction.

# Some points to be considered on "Friendliness"

Satisfaction with **Friendliness** has decreased over the years for the "Enthusiasts" and it has increased for the "Unfulfilled".

**Three main factors:**

1. South-Tyrol counts for around 75% German speaking inhabitants and 25% Italian speaking inhabitants. The main historic international market of this area is Germany, with a much lower proportion of Austrian and Swiss tourists $\rightsquigarrow$ Communication and cultural understanding between tourists and hosts has been always smooth but the opening to new markets from Eastern Europe has lead to a certain **degree of dissatisfaction**.

2. Although South-Tyrol is part of Italy, most of the population lives according to German/Austrian traditions $\rightsquigarrow$ The Eastern European tourists coming in South-Tyrol thinking to find the typical Italian lifestyle of a Mediterranean country are **disappointed**.

3. In general **locals tend to speak only German and Italian**, making any interaction with new markets even harder.

# Some points to be considered on "Food & Beverages"

Satisfaction with **Food & Beverages** has generally decreased over the years.

**This level of dissatisfaction is definitely worth of further studies and analysis**.

**Three possible factors:**

1. Eastern European tourists expect typical Italian food and drinks, which is not typically served in this area.
2. Many studies have pointed out that satisfaction is the result of the trade-off between quality and price and tourists are generally dissatisfied with prices and cost of living.
3. Perhaps customers come to South Tyrol with high expectations that cannot be met?

# Conclusions

The policies undertaken by the local government to keep populated and add value to mountain and peripheral areas **have been successful** both in terms of landscape and quality standard of the infrastructures outside the main towns of the province.

The decrease in satisfaction with Food & Beverages **should be further studies to determine what has caused such a change** in one of the main niche markets of the destination.

**The market is changing** so it is important to:

1. inform customers of the **history and location of South-Tyrol** so that tourists are coming with expectations that can be met.
2. inform tourism enterprises and hosts of **cross-cultural differences**. Tourism is an intangible product where employees-customer relations, host-tourists relations and finally customer-to-customer relations play a significant role in the satisfaction with the holiday experience. Cross-cultural studies and understanding and compatibility management in hotels should be implemented.

# Thank you for your attention!


- Pierpaolo D'Urso: Pierpaolo.Durso@uniroma1.it
- Marta Disegna: marta.disegna@unibz.it
- Riccardo Massari: riccardo.massari@uniroma1.it
- Linda Osti: Linda.Osti@unbz.it



*Acknowledgements: STTOBS*

A research project by the Free University of Bolzano, Banca di Trento e Bolzano, and Intesa Sanpaolo



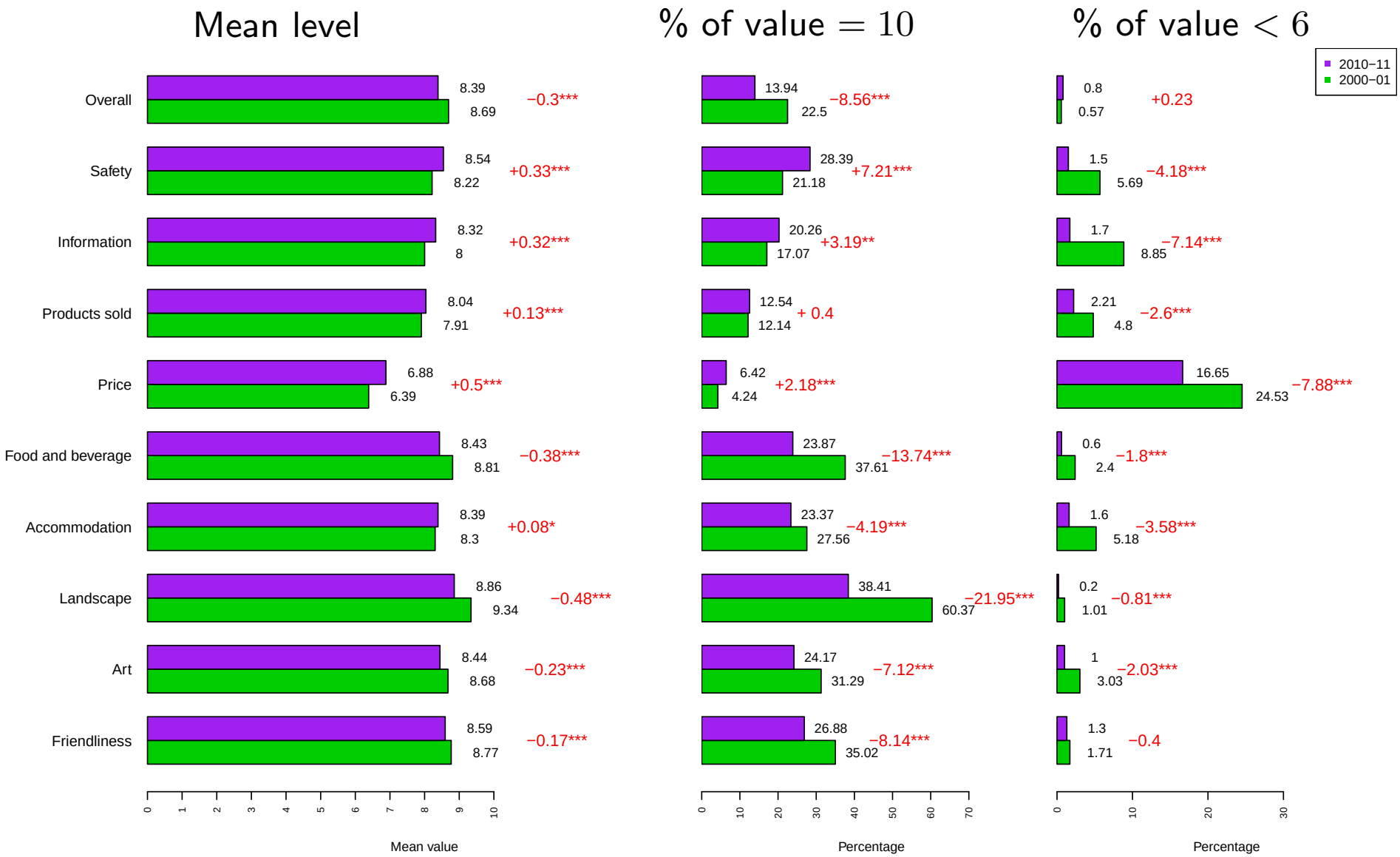
**STTOBS - South Tyrolean Tourism OBServatory**

**Turismo in Alto Adige:**
**un'esperienza olistica per il benessere di corpo, mente e spirito!**

# Some references

– Benítez, J.M., Martín, J.C., Román, C. (2007). Using Fuzzy number for measuring quality of service in the hotel industry. *Tourism management*, 28:544–555.
– Bezdek, J. (1981). *Pattern Recognition with Fuzzy Objective Function Algorithms*. Kluwer Academic Publishers, Norwell, MA, USA.
– Coppi, R., & D'Urso, P. (2002). Fuzzy k–mean clustering models for triangular fuzzy time trajectories. *Statistical Methods and Applications*, 11: 21–24.
– Coppi, R., DUrso, P., and Giordani, P. (2012). Fuzzy and possibilistic clustering for fuzzy data. *Computational Statistics & Data Analysis*, 56(4):915–927.
– Chiang, W.–Y. (2011). Establishment and Application of Fuzzy Decision Rules: an Empirical Case of the Air Passenger Market in Taiwan. *International Journal of Tourism Research*, 13: 447–456.
– Kim, Y., Suh, B., and Eves, A. (2010). The relationships between foodrelated personality traits, satisfaction, and loyalty among visitors attending food events and festivals. *International Journal of Hospitality Management*, 29:216–226.
– Koc, E. and Altinay, G. (2007). An analysis of seasonality in monthly per per- son tourist spending in Turkish inbound tourism from a market segmentation perspective. *Tourism Management*, 28(1):227–237.
– Kotler P. (1988). *Marketing Management*. 6th edn. Prentice-Hall: Englewood Cliffs, NJ.
– Kozak, M. and Rimmington, M. (2000). Tourist satisfaction with Mallorca, Spain, as an off-season holiday destination. *Journal of Travel Research*, 38(3):260–269.
– Lee, J. and Beeler, C. (2009). An investigation of predictors of satisfaction and future intention: Links to motivation, involvement, and service quality in a local festival. *Event Management*, 13(1):17–29.
– Likert, R. (1932). A technique for the measure of attitudes. *Archives of Psychology*, 140: 5–55.
– Russell S, Lodwick W. (1999). *Fuzzy clustering in data mining for telco database marketing campaigns*. 18th International Conference of the North American in Fuzzy Information Processing Society, Fuzzy Information Processing Society: New York, NY (720726).
– Xie, X. and Beni, G. (1991). A validity measure for fuzzy clustering. *IEEE Trans. Pattern Analysis and Machine Intelligence (PAMI)*, 13(8):841–847.
– Zhang, L., Qu, H., and Ma, J. (2010). Examining the relationship of exhibition attendees satisfaction and expenditure: The case of two major exhibitions in China. *Journal of Convention & Event Tourism*, 11(2):100–1189.

# Level of satisfaction




Significance of the $t$-test was reported.

*** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$.

Significance of the $z$-test was reported.

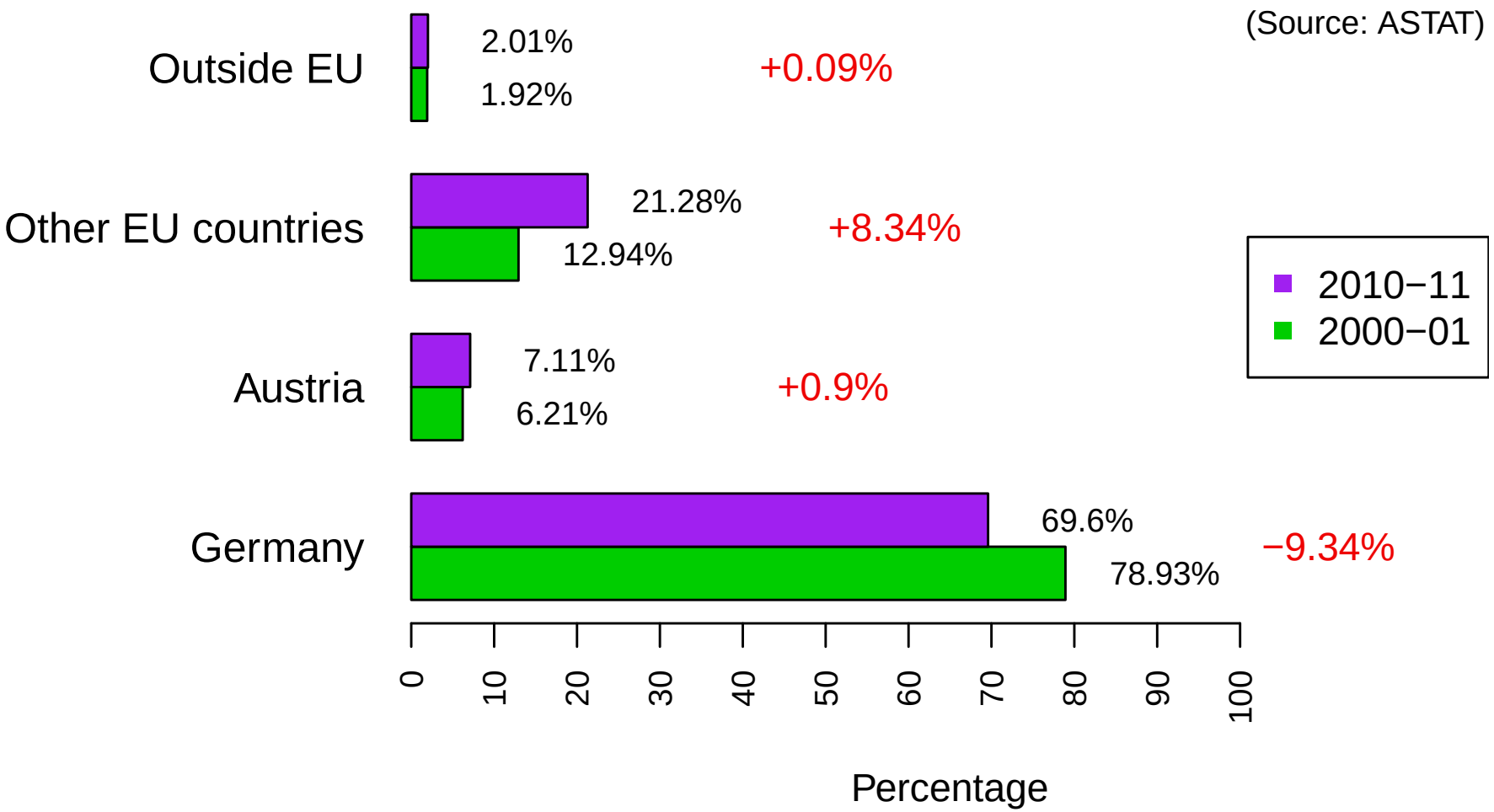
# Description of the segmentation variables

| Segmentation variables | Descriptions |
|---|---|
| *Level of satisfaction with the different aspects of the destination* | |
| Friendliness | 1= very satisfied in hospitality and friendliness of the people; 0=otherwise |
| Art | 1= very satisfied in cities and works of art; 0=otherwise |
| Landscape | 1= very satisfied in landscape and natural environment; 0=otherwise |
| Accommodation | 1= very satisfied in hotels and other accommodation; 0=otherwise |
| Food & beverage | 1= very satisfied in food and beverage; 0=otherwise |
| Price | 1= very satisfied in price and cost of living; 0=otherwise |
| Products sold | 1= very satisfied in quality and variety of products offered in stores; 0=otherwise |
| Safety | 1= very satisfied in safety of tourists; 0=otherwise |
| Overall satisfaction | 1= very satisfied in overall satisfaction; 0=otherwise |

# Description of the profiling variables

| Profiling variables | Descriptions |
|---|---|
| *Socio–demographic and economic characteristics* | |
| Male | 1= Male; 0= Female |
| *Age* | |
| Less than 35 years old | 1 = Less than 35 years old; 0 = otherwise |
| 35-44 years old | 1 = 35-44 years old; 0 = otherwise |
| 45-64 years old | 1 = 45-64 years old; 0 = otherwise |
| More than 65 years old | 1 = 65 years old and over; 0 = otherwise |
| *Employment status* | |
| Self-employed | 1 = The respondent is self-employed; 0 = otherwise |
| Office worker | 1 = The respondent is office worker; 0 = otherwise |
| Employee | 1 = The respondent is employee; 0 = otherwise |
| Retired | 1 = The respondent is retired; 0 = otherwise |
| Other employment status | 1 = The respondent is in other occupation; 0 = otherwise |
| *Country of origin* | |
| Austria | 1 = The respondent comes from Austria; 0 = otherwise |
| Germany | 1 = The respondent comes from Germany; 0 = otherwise |
| Other EU countries | 1 = The respondent comes from other European countries; 0 = otherwise |
| Outside EU | 1 = The respondent comes from a country outside Europe; 0 = otherwise |
| *Trip characteristics* | |
| Visit alone | 1 = The respondent makes the trip alone; 0 = otherwise |
| Only one cities visited | 1 = Only one city visited in South-Tyrol during the trip; 0 = otherwise |
| *Main purpose of travel* | |
| Tourism, leisure, vacation | 1 = The respondent makes the trip for holiday purposes; 0 = otherwise |
| Job | 1 = Business trip; 0 = otherwise |
| Other personal motivations | 1 = The respondent makes the trip for a personal motivations (visiting friends & relatives, study, shopping, etc.); 0 = otherwise |

# International tourists arrivals in South-Tyrol



# FCM for fuzzy data algorithm

1: Fix $C$ and $max.iter$;
2: Set $iter = 0$;
3: Generate the initial membership degree matrix $\mathbf{U}^{(0)}$, subject to:
$$\sum_{c=1}^{C} u_{ic} = 1, \qquad u_{ic} \geq 0$$
4: Compute the prototypes $\tilde{\mathbf{h}}_c^{(0)} \equiv \{\tilde{h}_{ck}^{(0)} = (h_{ck}^{M(0)}, h_{ck}^{L(0)}, h_{ck}^{R(0)})\}$, $c = 1, \ldots, C$ using $\mathbf{U}^{(0)}$;
5: **repeat**
6: Update the weights $w_M^{(t)}$ and $w_S^{(t)}$, keeping fixed $\mathbf{U}^{(t-1)}$ and $\tilde{\mathbf{h}}_c^{(t-1)}$, $c = 1, \ldots, C$, where $t \geq 1$ denotes the iteration number, and set $w_M^{(t)} = w_S^{(t)} = 0.5$ if $w_S^{(t)} > 0.5$;
7: Update the prototypes $\tilde{\mathbf{h}}_c^{(t)}$, $c = 1, \ldots, C$, keeping fixed $\mathbf{U}^{(t-1)}$;
8: Update the membership degree matrix $\mathbf{U}^{(t)}$ keeping fixed $\tilde{\mathbf{h}}_c^{(t)}$, $c = 1, \ldots, C$ and $w_M^{(t)}$ and $w_S^{(t)}$.
9: $iter \leftarrow iter + 1$;
10: **until** $\|\mathbf{U}^{(t)} - \mathbf{U}^{(t-1)}\| < \varepsilon$, $\varepsilon > 0$, or $iter = max.iter$