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Abstract: Tourism shows to be one of the most affected activities by the novel coronavirus SARS-CoV-2 (responsible for COVID-19) outbreak. This situation is not only because of the cancelled flights but also of the fear of being infected with the virus. In this regard, a study was carried out intending to define and analyse the consequences of SARS-CoV-2 over the tourism intentions of Azores residents in 2020 by studying their perceptions. Throughout the research, it was possible to verify that the Azores Archipelago residents' tourism intentions were considerably modified due to SARS-CoV-2, with approximately 70% of the Azores Region residents saying that they will be spending their 2020 vacations in the region. Moreover, this article also provides insights into the enhancement of tourism safety models in regional tourism activities and consequently, in regional sustainable development and growth.

Keywords: Azores Region; COVID-19 pandemic; regional studies; socio-economy; sustainable development; sustainable tourism.

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1 Introduction

All over history, moments of crisis have always been preceded by periods of change. The actual time of health, social, and economic crisis that we are feeling seems to be no exception (Abud, 2020; Castanho, 2020).

Following the outbreak in China in 2019, the SARS-CoV-2 (usually known as the novel coronavirus), responsible for the infectious disease named COVID-19, has extended to 196 of the 198 countries on the planet (Mora Aliseda, 2020; Gössling et al., 2020). Through person-to-person contagion typology, the virus needed only three months to reach this tremendous level of contagion. Nevertheless, in the last few years, many studies and research have warned us of the critical role of air travel in propagating infectious diseases like the coronavirus disease (Tatem et al., 2006; Wilson, 2010; Brown et al., 2016).

Hence, until the world has a vaccine, the most effective strategies to face the disease are massive lockdowns and social distancing. Still, these quarantine measures are not always easy to implement. Such measures present even more challenges to be implemented in economies very attached to the production, selling of goods, and tourism. Here we have examples of African or Latin American and South American countries as South Africa, Brazil, México, or Colombia.

CEPAL (Economic Commission for Latin America and the Caribbean), declares that the pandemic's economic entanglements may cause the region to lose around 2% of GDP by 2020, given that expected drop in the economic activity by the partners (CEPAL, 2020; Espinoza, 2020). Nevertheless, we have been watching this economic decline worldwide since the outbreak of SARS-CoV-2 (Castanho, 2020; Maliszewska et al., 2020; Mckibbin and Roshen, 2020).

In this sense, academicians as Abud (2020), in a recent publication about SARS-CoV-2 repercussions on tourism and economy of Latin American region, says that: "If people do not have revenue, do not demand products or services. In this scenario, importation is not required; however, production when everything is limited to 'stay at home', and what is produced and mostly exported the region are perishable products without markets currently or under a free zone regime. Thus, it does not reflect any kind of push in the trade balance in this region of the world".

In this respect, it becomes clear that Tourism has not been the most affected activity by this sanitary crisis. The cancelled flights associated with the fear of being infected with the virus seem to the most relevant factors. Since March 2020, almost every country has declared strict social distance measures and the suspension of all non-essential activities. Such a measure has affected all society sectors, but it has had the most notable consequence in tourism because it has been interrupted completely (Ramírez-Silva, 2020).

Past similar recent sanitary crises as severe acute respiratory syndrome (SARS) in 2003, or the Middle East respiratory syndrome (MERS) in 2015, also have significant impacts in the tourism sector. Yet, on a much more modest scale than SARS-CoV-2 (Gössling et al., 2020). Authors as Gössling et al. (2020), through their investigations, show that: "(…) tourism as a system has been resilient to external shocks". However, the SARS-CoV-2 outbreak will have unprecedented impacts (FAO, 2020; Maliszewska et al., 2020; OECD, 2020; Ozili and Arun, 2020).

Multiple researchers have advised of the probability of a massive pandemic crisis transform society and tourism on a wide-scale (see: Gossling, 2002; Hall, 2006, Page and Yeoman, 2007; Fauci and Morens, 2012; Scott and Gossling, 2015; Qureshi, 2016; Abukhalifeh et al., 2017; Rosselló et al., 2017; Qiu et al., 2018; Bloom and Cadarette, 2019; are just some examples). It is also known that the relationships between pandemics and travel are pivotal to understanding health safety and global transformation (Burkle, 2006).

Contextually, in ultra-peripheral territories where their socioeconomic basis is usually indissociable from tourism, the impacts of SARS-CoV-2 could be even more relevant – as is the Azores Region case.

Thereby, the present investigation intends to answer the following research question:

- How SARS-CoV-2 crisis could influence the tourism intentions of Azores Archipelago residents?

Hence, this study aims to define and analyse the consequences of SARS-CoV-2 over the tourism intentions of Azores residents in 2020 by studying their perceptions.

2 Material and methods

Considering the scope of this research, the authors needed to use different methods and techniques throughout the research, including direct and indirect analysis tools. Consequently, the methodological approach was divided into four main phases asz

1 data collection, questionnaires design and case study analysis

2 analysis of the results

3 discussion and conclusion – focusing on the influence of the SARS-CoV-2 Crisis over the Tourism Intentions of the Azores Archipelago Residents.

Thereby, the Azores region was used as a case study. Besides, the previous authors' knowledge about this regional actuality enabled us to collect an ample amount of data. Therefore, the authors obtained a clear perception of the central problems concerning how this pandemic crisis affects the tourism intentions of the Azores Region residents. Furthermore, it was also allowed to understand how this situation will affect regional sustainable development.

2.1 Used methodology for advanced statistics

According to Bacelar-Nicolau et al. (2014, p.435), "cluster analysis or classification usually concerns exploratory multivariate data analysis methods and techniques for grouping either a set of statistical data units (individuals, cases, …) or an associated set of descriptive variables, into clusters of similar elements, hopefully, homogenous and well separated". In the present research, the Ascendant Hierarchical Cluster Analysis (AHCA) of the set of 12 items (A1 to A6; B1 to B6) defined on an ordinal scale was based on the affinity coefficient from the classical cluster analysis (e.g., Bacelar-Nicolau, 1987) to obtain a typology of these items. The affinity coefficient was introduced by Matusita in 1951 to measure the proximity between two distribution functions (Matusita, 1951). Bacelar-Nicolau studied the asymptotic distribution of the affinity coefficient between variables under different reference assumptions (e.g., Bacelar-Nicolau, 1988). Later on, the affinity coefficient was extended to the clustering of statistical data units, inclusively in a three-way approach (e.g., Bacelar-Nicolau, 1988, 2000; Bacelar-Nicolau et al., 2009). In this empirical study, the measure of comparison between elements was combined with two classical aggregation criteria [single linkage (SL) and complete linkage (CL)] (Anderberg, 1973), and three probabilistic ones [aggregation validity link (AVL), AV1, and aggregation validity B-link (AVB)] (Bacelar-Nicolau, 1988; Nicolau

and Bacelar-Nicolau, 1998). On what validation of results is concerned, in this article, we used the global statistics of levels (STAT) (Bacelar-Nicolau, 1987; Lerman, 1981) to determine the appropriate number of clusters.

The ordinary principal component analysis (PCA) "assumes that data are quantitative and thus it is not directly applicable to qualitative data such as nominal and ordinal data" (e.g., Mori et al., 2016). In the present work, we are dealing with 12 items measured on an ordinal scale. Therefore, we carried out a categorical principal component analysis (CATPCA), also known as nonlinear PCA, because the qualitative data of nominal and ordinal variables are nonlinearly transformed into quantitative data using procedure optimal scaling. Both methods reduce observed variables to several uncorrelated latent variables (principal components). The CATPCA does not assume that the relationships between variables are linear and allows incorporating nominal and ordinal variables. Therefore, CATPCA is a useful method to analyse mixed measurement levels of data. It should also be noted that the CATPCA can reveal nonlinear relationships among variables (e.g., Mori et al., 2016; Linting et al., 2007). Moreover, as is referred to in Linting et al. (2007, p.336), "(…) nonlinear PCA can deal with variables at their appropriate measurement level; for example, it can treat Likert-type scales ordinally instead of numerically". Thus, in the present work, CATPCA was applied to the 12 referred items considering the varimax rotation with Kaiser normalisation and the variable principal normalisation method.

Table 1 Sample characteristics

Variables	*%*	*Variables*	*%*
Gender		*Professional Situation*	
Female	**66.9%**	Unemployed	4.1%
Male	33.1%	Manager	8.1%
Age group		Student/trainee	5.7%
18–34	24.0%	Freelancer	14.0%
35–54	**53.9%**	Intermediate staff	30.8%
55+	22.1%	Superior staff	**31.7%**
Marital status		Retired	5.6%
Married or common-law	**64.2%**	*Academic degree*	
Divorced	10.3%	Basic education	5.1%
Single	23.4%	High school	36.75
Widowed	2.1%	University education	**58.1%**
Gross annual household income		*Island of residence*	
15,000 to 29,999 EUR	**43.0%**	Eastern group	**54.5%**
30,000 to 44,999 EUR	21.3%	Central group	43.7%
45,000 to 59,999 EUR	6.4%	Western group	1.9%
More than 60,000 EUR	5.3%		
Less than 15,000 EUR	24.0%		

Note: The highest values found are in bold.

2.2 Surveys and sample characteristics

The surveys were developed considering web interviews. This typology of the interview was selected due to the requirement for social distancing in the current sanitary crisis scenario.

The target population consisted of the Azores Region residents. The authors believed that those individuals are the most valuable sources of information for this research. The sample was constituted of approximately seven hundred individuals. The sample characteristics are presented in Table 1. The online surveys were carried out between May and June of 2020.

After collected, the data from the surveys were statistically analysed. Firstly, using the first spreadsheets to prepare the assembled data and then improved by statistical analysis applying Statistical Package for the Social Sciences (SPSS), actually designed by IBM SPSS STATISTICS.

3 Outcomes

Regarding the changes made by respondents to their vacation plan, due to the Covid-19 pandemic, it should be noted that of the 603 respondents who selected at least one of the four possible response options (Table 2), about 40.5% cancelled the holiday travel, 37.8% gave up traveling abroad, 20.9% changed the holiday destination, and 35.8% changed the holiday period. Besides, when a similar question has made, but as semi-open short question typology, it was verified that most of the participants (57.5%) answered: "I will protect myself and spend the holidays at my usual residence"; 14.3% said they would choose a less usual destination, 11.5% said they would not take a vacation this 2020, and the remaining participants specified other vacation plans.

Table 2 Vacations plans for 2020 – multiple response analysis

Options (1–4)		*%*
1	Cancelled	**40.5**
2	Gave up travelling abroad	37.8
3	Changed the holiday destination	20.9
4	Changed the holiday period.	35.8

Note: The highest values found are in bold.

Table 3 Vacations destination for Azores residents in 2020 – grouped options

Options (1–6)		*%*
1	One of the other Azores Island(s).	**33.3**
2	In my island of residence	4.5
3	Portugal mainland and Madeira	20.7
4	Foreign country	9.1
5	I am not decided yet or I will not go on holidays in 2020	5.3
6	In Azores Region (without specifying)	27.1

Note: The highest value found is in bold.

Furthermore, the participants were asked regarding their vacation destinations in 2020. Considering that these questions were also open short question typology, six options were created due to the considerable number of answers (Table 3). In this regard, approximately 70% of the respondents will take vacations or stay in the region. From this 70%, 33.3% said that they would choose one of the other island(s) of Azores Archipelago to spend holidays (different from those where they have residence). 27.1% will also state that they will stay in the Azores Region, however, without specifying if they are in their residence island or another, and 4.5% will stay in their residence island. Regarding the Azores residents that have intentions to go on vacations outside the region in 2020, 20.7% said that they would go on holiday to Portugal mainland or to Madeira Islands, and 9.1% state that they will go to a foreign country. Finally, 5.3% have not decided on a destination for vacations yet and/or will not go on holidays in 2020.

Also, the questionnaires considered a section with two parts (A and B) concerning the participants' agreement levels. Therefore, through a five-point Likert-scale assessment method, the respondents were asked to state their agreement with six sentences (A1 to A6), where 1 represents total disagreement and 5 total agreement.

The values presented in Table 4 show that the most frequent answer (mode) about the degree of agreement with the statements associated with items A.1, A.2, A.3, and A.4 was 4 (I agree). In the case of items A.5 and A.6, the mode values are lower, respectively, 3 (I neither agree nor disagree) and 2 (disagree). It should be highlighted, that the values of the 25, 50, and 75 percentiles (P25, P50, and P75) indicate that the statement underlying item A.1 was the one with the highest level of agreement by respondents, so betting on a 'Covid-19 Free' or '' Clean and Safe '' seal, attributed by Portuguese Health Authorities, to tourist accommodation is an added value. On the other hand, the lowest level of agreement was related to statement A.6. The most frequent answer concerning this item was 2 (disagree), which reflects some optimism on the part of the respondents regarding the current situation of COVID-19.

Table 4 Quartile values, regarding the degree of agreement with each of the statements A.1 to A.6

	A.1	*A.2*	*A.3*	*A.4*	*A.5*	*A.6*
Mode	4	4	4	4	3	2
P25	3	2	3	2	2	1
P50	4	3	4	3	3	2
P75	5	4	5	4	4	3

Notes: A.1 – I will trust and choose a tourist accommodation that has a health and hygiene seal as 'Covid-19 Free' or 'Clean and Safe' assigned by a national institution (Turismo de Portugal) and health authorities; A.2 – I will travel relaxed if the use of masks and other individual protections is widespread at the destination; A.3 – COVID-19 shows that we must avoid popular tourist destinations; A.4 – COVID-19 shows that we should avoid taking vacations during periods of the year with high demand; A.5 – COVID-19 shows that it is best to take a vacation in the countryside; A.6 – in the future, I will avoid air travel.

Using Spearman's correlation coefficient (Table 5), some positive correlations were found, statistically significant ($p < 0.01$), between pairs of items, among which the following stand out, as they are higher than 0.3: A.1 and A.2 ($r_s = 0.475$; $p = 0.000$); A.3 and A.4 ($r_s = 0.797$; $p = 0.000$); A.3 and A.5 ($r_s = 0.588$; $p = 0.000$); A.3 and A. 6

(r_s = 0.400; p = 0.000); A.4 and A.5 (r_s = 0.653; p = 0.000); A.4 and A.6 (r_s = 0.396; p = 0.000); A.5 and A.6 (r_s = 0.395; p = 0.000).

Table 5 Values of the Spearman correlation coefficient between pairs of items (A.1 to A.6)

	A.1	*A.2*	*A.3*	*A.4*	*A.5*	*A.6*
A.1	1	0.475**	0.153**	0.124**	0.130**	–0.020
A.2		1	0.112**	0.126**	0.167**	–0.014
A.3			1	0.797**	0.588**	0.400**
A.4				1	0.653**	0.396**
A.5					1	0.395**
A.6						1

Note: **Correlation is significant at the 0.01 level (2-tailed).

Focusing on part B of the agreement levels section (Table 6), the most frequent answers regarding the degree of agreement with statements associated with item B.3 was 5 (I totally agree), this being the item that was the subject of the most agreement by the respondents. In the case of items B.5 and B.6, the most frequent responses were in both cases 4 (I agree). Concerning item B.1, the most frequent answer was 1 (I totally disagree), clearly showing the forecast of lower spending on the 2020 vacation, compared to 2019, and in the case of item B.2, the most frequent answer (fashion) was 2 (disagree).

Table 6 Quartile values, regarding the degree of agreement with each of the statements B.1 to B.6

	B.1	*B.2*	*B.3*	*B.4*	*B.5*	*B.6*
Mode	1	2	5	3	4	4
P25	1	2	4	2	3	3
P50	2	3	4	3	4	4
P75	3	4	5	4	4	5

Notes: B.1 – will you spend more on the 2020 vacation than on the 2019 vacation?; B.2 – will the 2020 vacation be shorter than the 2019 vacation?; B.3 – will you travel less abroad in 2020 than in 2019?; B.4 – do you usually choose the cheapest holiday destinations?; B.5 – do you usually use cheaper flights to save?; B.6 – will you avoid long-term air travel?

Table 7 Values of the Spearman correlation coefficient between pairs of items (B.1 to B.6)

	B.1	*B.2*	*B.3*	*B.4*	*B.5*	*B.6*
B.1	1	0.074	–0.176**	0.027	–0.035	–0.011
B.2		1	0.282**	0.066	0.092*	0.132**
B.3			1	0.146**	0.233**	0.405**
B.4				1	0.405**	0.250**
B.5					1	0.290**
B.6						1

Notes: **Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

Table 7 highlights the positive and statistically significant correlations between B.3 and B.6, and between items B.4 and B.5.

Moreover, CATPCA, AVL, and AV1 methods have been used (Table 8 and Figure 1).

Thereby, CATPCA allowed the extraction of three principal components which eigenvalues are higher than 1, and the values of the Cronbach's alpha coefficient indicate an acceptable internal consistency, although only the first two components have a satisfactory internal consistency (values of this coefficient above 0.7). The retained components explain around 62.1% of the variance observed. The first component accounted for approximately 24.48% of the variance in the original variables, the second for approximately 21.95%, and the third for approximately 15.68% (Table 8).

The first component comprises items A3, A4, A5, and A6 (*practical lessons of Covid-19*). Its eigenvalue is 2.937 (>1) and the value of Cronbach's alpha is 0.743 (acceptable internal consistency).

In the case of the second component (*frequency, duration, and trip costs*), the most important items are B3, B4, B5, and B6. The eigenvalue is 2.634 (>1) and the value of Cronbach's alpha is 0.700 (acceptable internal consistency).

Finally, in the case of the third component (*vacation-related constraints*), the most relevant items are A1, A2, B1, and B2. The eigenvalue is 1.882 (>1) and the value of Cronbach's alpha is 0.587 (poor internal consistency).

Table 8 Results of CATPCA: matrix of rotating components.

Item	*Factor loading*	*Variance (%)*
Practical lessons of Covid-19	-	**24.48**
A3	**0.909**	
A4	0.890	
A5	0.863	
A6	0.649	
Frequency, duration, and trips costs	-	**21.95**
B3	**0.734**	
B4	0.772	
B5	0.805	
B6	0.754	
Vacation-related constraints	-	**15.68**
A1	**0.790**	
A2	**0.790**	
B1	0.534	
B2	0.468	

Note: The highest values found are in bold.

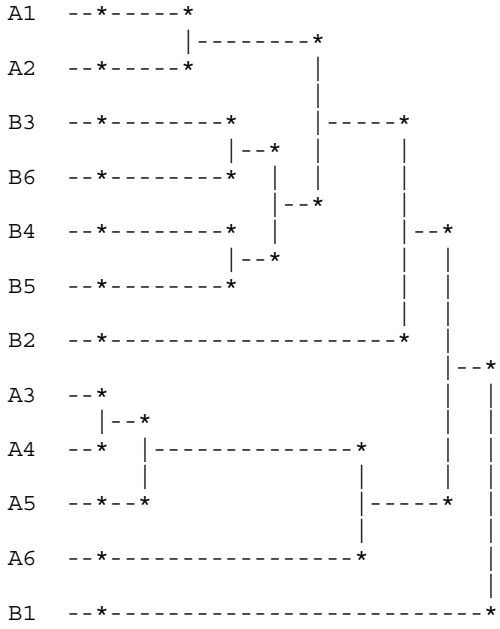
According to the STAT, the best partition is the following partition into three clusters (STAT = 5.2934) provided by AVL and AV1 methods (Figure 1): cluster 1: {A1, A2, B3, B6, B4, B5, B2}, which generally refer to protection measures against Covid-19; cluster 2: {A3, A4, A5, A6}. Here, we recognise the first principal component (practical lessons of Covid-19); cluster 3: {B1} (amount of spending on vacation 2020 in comparison to 2019).

Cluster 1 contains three subclasses. The first one consists of items A1 and A2, both linked to the implementation of measures to prevent contagion by Covid-19, by some entities (governmental, Turismo de Portugal and health authorities); other encompassing items B3, B6, B4 and B5 (corresponding to the second principal component), which relate to decisions regarding the frequency, duration and price of trips; and the last one consisting of item B2, which concerns the duration of holidays.

Cluster 2 contains two subclasses, one consisting of items A3, A4, and A5, all referring to the respondents' perceptions of what Covid-19 came to show (teachings/reflections/lessons); and another subclass made up of item A6 that relates to decision making regarding the frequency of future trips.

Finally, cluster 3 contains only item B1, which refers to the volume of spending planned for holidays in 2020, compared to holidays in 2019. AVL and AV1 methods propose the same classification into three clusters.

Figure 1 Dendrogram provided by AVL and AV1 methods



4 Discussions and conclusions

During the research, it becomes evident that the Azores Archipelago residents' tourism intentions were considerably affected by the SARS-CoV-2 outbreak. Approximately 40.5% cancelled the holiday travel, 37.8% gave up travelling abroad, 20.9% changed the holiday destination, and 35.8% changed the holiday period.

A large percentage of the Azores Residents said they would protect themselves and spend the holidays at their usual residence, becoming clear about the pandemic's impact on their tourism intentions. Furthermore, approximately 70% of the Azores Region residents saying that they will spend their 2020 vacations in the region.

Based on these results, it becomes evident an opportunity to invest new models of slow tourism activities in the Azores Archipelago. As many authors declare (see: Silva and Almeida, 2013; Vieira et al., 2014; Couto et al., 2017; Castanho et al., 2020a, 2020b), there is significant potential for the development and growth of rural and slow tourism in the Azores Region. Besides, this typology of tourism is recognised by multiple academicians (see: Mahony and Zyl, 2002; Labrianidis and Thanassis, 2003; Reeder and Brown, 2005; Buckley, 2007; Morais et al., 2018, 2019; Santos et al., 2019, 2020; Ulucak et al., 2019) as a way to obtain regional sustainable development. Whereby the decision makers and main regional actors should handle this chance to project a more sustainable prospect for the archipelago.

The Azores presents a vast potential for the development of this typology of tourism. Once the region has a strategic location, it has been recognised as a sustainable nature-based destination (Castanho et al., 2020a). Due to its remoteness and astounding nature, it has been recognised several times, with adventure tourism by international references as Departures, BBC, Bloomberg, Forbes, GeekyExplorer, or Lonely Planet. Additionally, the Azores' natural and cultural heritage, associated with the generalised rural environment, makes the archipelago has an excellent location for slow tourism adventures (Ponte et al., 2018). Here should be highlighted the 2015 partial liberalisation of air transportation in the region, which influenced the origin of low-cost airline operations. This has contributed to the increasing of tourist number and promoting a significant variation in the local business (Couto et al., 2017).

In the Azores, tourism is seen as a sector of strategic importance, once it can participate in a compelling way to the growth and development of the archipelago (Vieira et al., 2014). Furthermore, adventure and nature tourism are frontline merchandise of this model in the region (Couto et al., 2017). As a consequence of the new tourism sector dynamics, more tourism activities and companies were created, increasing, and diversifying the supply for tourist experiences. Thereby, it seems that the Azores has already many practical and administrative decisions that could facilitate the investment in this typology of tourism. Therefore, the present window of opportunity could be the catalyst for the region to boost this type of sustainable tourism. To encourage the holidays and travels within the Azores, the regional government designed an incentive to take a vacation in the archipelago. The incentive is dedicated solely to residents and covers air transport services, accommodation, food, tourist activities, car rental, and booking expenses in 50% of the amount paid (to the maximum limit of €150.00 per person).

Additionally, the study results corroborate the authors' point of view. Once 33.3% of the participants said that they would choose one of the other Island(s) of Azores Archipelago to spend holidays (different from those where they have residence). 27.1% will also declare that they will stay in the Azores Region, and 4.5% clearly say that they will stay in their residence island. Besides, it was verified that the participants are considering non-popular tourist destinations as countryside – showing, once more, the relevance of rural tourism in this period.

Nevertheless, local and regional tourism companies should change some of their approaches. In this regard, the study shows that the Azores Residents feel safer when the accommodation as a label of 'Covid-19 Free' or 'Clean and Safe' attributed by Portuguese Health Authorities. Also, the investigation shows that travellers feel more interested in destinations where the use of masks and other individual protections is widespread.

Thereby, it is possible to prove that the SARS-CoV-2 crisis has considerably transformed the paradigm of residents' postures in determining the time and typology of the holiday. Hence, this study results should be considered by the regional authorities (main-actors and decision makers) to accurately produce and execute regional policies to face the SARS-CoV-2 outbreak. Moreover, the investigation outcomes should be interpreted to enhance tourism safety models in regional tourism activities. In this regard, it is expected a significant stimulus on the regional economy and development

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