Impact of Covid-19 in the VAIC™ in the Hospitality Industry: the Portuguese Case

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Abstract: This work aims to identify the efficiency of intellectual capital in companies in the hospitality sector and to analyse the impact that the Covid pandemic has on the efficiency of intellectual capital in Portuguese regions. This study applies the Value Added Intellectual Coefficient (VAICTM) method according to Pulic (1998). The economic and financial data come from the Iberian Balance sheet Analysis System (SABI). The study was conducted with a selection of active companies with turnover in the years 2019 and 2020, resulting in a sample of 4.383 hotels in Portugal in the pre-pandemic period (the year 2019) and in the pandemic period (the year 2020). This study identifies the value added that contributes to value creation in organizations and analyses this value between Portuguese tourism regions because of the impact of the Pandemic Crisis in the sector. The average results for the total sample show that tourism businesses had a significant decrease in VAICTM from 2019 to 2020. The results show that the Lisboa e Vale do Tejo, Açores, and Algarve regions have the largest decrease in the value of VAICTM in the year 2020. The Alentejo region was the region that felt the least the impact of the pandemic crisis. These results reveal that the more mature tourist areas lost the most intellectual added value.

Keywords: intellectual capital, coefficient of intellectual value added (VAICTM), tourism sector, Portuguese tourism regions, Covid-19 crisis

1. Introduction

The world has been experiencing an unprecedented health crisis since the beginning of 2020. Coronavirus Disease 2019 (COVID-19) emerged in China in late 2019 and quickly spread around the world. The ease of movement of people was a determining factor in the rapid spread of the disease. The most severe measures to contain this spread were the limitation of contacts between people and, with this, the cancellation of flights, the closure of hotel spaces, and almost all economic activity. Tourism almost came to a standstill, causing irreparable losses. According to the National Statistics Institute (2020), tourist accommodation establishments in Portugal recorded losses of around 95% in some months of 2020, compared to the same period in 2019.

The physical distancing measures had an immediate impact on demand in the tourism sector. It was estimated that uncertainty, fear, and lack of confidence could lead to a prolonged crisis in the sector, constituting a major concern for a country where tourism-related activities represent a good share of Gross Value Added (Mamede, Pereira & Simões, 2020). According to the authors, the crisis in the tourism sector, of uncertain duration, is a challenge and simultaneously an opportunity for a country like Portugal. The search for solutions to the limited tourism demand invites consideration of a stronger positioning of the sector in niche markets, focusing on sustainability and security.

The model VAIC™ by Pulic (1998) focused the research on the perspective of intellectual capital to explicitly focus on the relationship between Intellectual capital and economic performance. The model VAIC™ based its analyses only on the company's financial data. For the design of this model, Pulic (1998) part of the goal to find a way of measuring the knowledge-based economy that can indicate the amount of value created and how productive is at all levels of business activity, business processes, or into segments of society (Flores, García & Adame, 2017).

This paper seeks to analyse the impact of the COVID-19 pandemic crisis on the added value of intellectual capital in the years 2019 and 2020 in the tourism sector in Portugal, considering the tourism regions of this country. In this way, the work is structured as follows: initially, an analysis is made of the impact of COVID-19 on tourism,

followed by an explanation of the main fundamentals of the VAIC™ model combined with the presentation of the study results. The paper ends with the main conclusions, limitations, and suggestions for future work.

2. The impact of Covid-19 on tourism

Disease outbreaks and pandemics have long played a significant role in social and economic changes. However, the nature of such change is selective, is sometimes minimal, and at other times can be unexpected, enhancing its effects and even altering contemporary paradigms (Hall, Scott & Gössling, 2020). Coronavirus 2019 (COVID-19) disease is a challenging global problem (Gössling, Scott & Hall, 2020; Liang, Leng, Yuang & Yuang, 2021), has led to profound changes worldwide. The health crisis emerged and developed so suddenly and unexpectedly that it has affected the lives of all citizens, and the consensus is that nothing will ever be the same again (Romagosa, 2020; Niewiadomski, 2020). The level of economic and social unrest is unprecedented (Romagosa, 2020), with global travel restrictions and stay-at-home orders being the cause of the most serious disruption to the global economy since World War II (Gössling et al. 2020).

Indeed, the emergence of COVID-19 has shaken the global tourism industry (hospitality, travel, catering) is among the most sensitive and vulnerable to natural hazards, and therefore this sector may have changed forever because of COVID-19 (Luković & Stojković, 2020; Dube, Nhamo & Chikodzi, 2021; van der Merwe, Saayman & Jacobs, 2021). The democratisation of travel and the continued increase in international connectivity has succeeded in raising living standards in many cities and destinations around the world, but these rights were immediately suspended as a strategy to combat a global pandemic (Sanabria-Díaz, Aguiar-Quintana & Araujo-Cabrera, 2021). With this attempt to contain the spread of the virus, the tourism industry experienced calamitous effects and suffered unprecedented financial and job losses (van der Merwe et al. 2021; Dube et al., 2021).

Globalisation has become one of the determinants of the spread of the disease (Sheresheva, 2020) and therefore social behaviour has changed significantly with the limitations in mobility, changing work, consumption, and leisure patterns, among others (Romagosa, 2020). Tourism is especially susceptible to the consequences of the health crisis due to imposed restrictions, limited mobility, and social distancing (Gössling et al. 2020). The persistent public health crisis has led to interdictions or constraints to travel outside one's own country and has simultaneously promoted recovery marketing strategies in national tourism markets, through measures to implement and develop proximity tourism and domestic tourism, especially in outdoor spaces less prone to the spread of the virus (Lebrun, Su & Bouchet, 2021; Romagosa, 2020; Volgger, Taplin & Aebli, 2021).

Tourism is recognized as having a great capacity to recover from crises, which leads one to think that the same will happen with the current pandemic crisis (Hall et al. 2020). Thus, the future of travel and tourism, in a world where outbreaks of diseases and pandemics will become increasingly frequent, due to increased travel and ease of access to destinations around the world, should be the subject of reflection.

In the 21st century, two immense drivers of change for the tourism industry are climate change and global health emergencies (Jamal & Budke, 2020).

Despite the unprecedented impacts that the health crisis brought to tourism worldwide, it may translate into an opportunity to rethink tourism (Ioannides & Gyimóthy, 2020; Higgins-Desbiolles, 2020; Soliku, Kyiire, Mahama & Kubio, 2021), although the emergence or worsening of tourism phobia cannot be ruled out (Yu, Yu, He & Zhou, 2021).

One of the post-COVID challenges may be a greater concern for environmental sustainability (Cabello, Navarro-Jurado, Thiel-Ellul, Rodríguez-Díaz & Ruiz, 2021), not from the point of view of ecological recovery, but of minimising the impacts on global climate change that the proliferation of tourism has caused (Higgins-Desbiolles, 2020).

Several studies refer to government intervention as the main solution to recover from the crisis (Bouarar, Mouloudj & Mouloudj, 2020; Rogerson & Baum, 2020; Ioannides & Gyimóthy, 2020; Elgin, Basbug and Yalaman, 2020; Fotiadis, Polyzos & Huan, 2020; Anderson, Heesterbeek, Klinkenberg & Hollingsworth, 2020, Santos & Moreira, 2021; Volgger et al., 2021; Soliku et al., 2021; Touat & Tebani, 2020; Sheresheva, 2020). However, there are still few studies on the impact of the crisis in the financial and economic sphere. Touat and Tebani (2020)

assessed heavy losses in revenues in the aviation sector in Algeria. Van der Merwe et al. (2021) analysed the impact of the pandemic on actual and potential losses in the wildlife tourism industry in South Africa.

In Portugal, Marques, Guedes, and Bento (2021) analysed the impact of the easing of traffic restrictions, in the summer of 2020, according to the regions that offer more rural tourism and those that present mass tourism. They found that tourism in rural areas increased in the period of tourism relief, more than in mass tourism regions. Also in Portugal, Santos and Moreira (2021) state that Portugal has established itself as one of the most competitive tourist destinations in the world, which comprises the continental territory and two archipelagos. The study sought to analyse the impact of the pandemic crisis by region. The results of the tourist accommodation show that after the first phase of the pandemic there was a slight recovery of some indicators of tourist activity, mainly in more consolidated destinations such as the Algarve and Madeira. The territories more focused on nature tourism (Alentejo and Centro) suffered a less severe impact on tourism demand, with domestic tourism managing to mitigate some negative effects.

3. Method

For the research objectives that are consistent with the methodology, a quantitative study was conducted using secondary data. The dataset is based on the Portuguese hospitality and tourism industry; therefore, this study relies on Portuguese companies collected from the database by SABI. Therefore, the economic and financial information was collected from balance sheets and financial reports of 4.383 hotels in Portugal in the pre-pandemic period (the year 2019) and in the pandemic period (the year 2020). Statistical Package for the Social Sciences (SPSS statistical software) was used to perform this analysis.

The VAIC^{TM} method aims to measure the efficiency of intellectual capital, in this sense, to evaluate the information about the efficiency of processes and people related to value creation by measuring the efficiency coefficients in the use of financial and intellectual capital (Martins, Morais & Isidro, 2012).

Viewed in this way, the VAIC^{TM} method is intended to measure the efficiency of resources in value creation, i.e., measure resource efficiency for any company despite the region and/or county (Pulic, 2000). This method aims to determine the extent to which a company produces value based on the use of tangible and intangible assets of the company, as measured by the sum of the metrics that incorporate the components of the model. Based on these definitions and assumptions, the VAIC^{TM} is calculated as the direct sum of the main indices of efficiency, calculated as the ratio of the capital employed efficiency coefficient (CEE) and the intellectual capital efficiency coefficient (ICE).

Several studies evaluate the level of value creation efficiency of intellectual capital, capital employed efficiency, and VAIC^{TM} (Muhammad & Ismail, 2009; Laing, Dunn & Hughes-Lucas, 2010; Chang & Hsieh, 2011; Paknezhad & Ahmadkhani, 2012; Shaban & Kavida, 2013; FitzPatrick, Davey, Muller & Davey, 2013; Sumedrea, 2013; Bontis, Janoševic & Dženopoljac, 2015; Maji & Goswami, 2016; Flores et al., 2017; Kamath, 2017; Pradana, Nidar & Aripin, 2018; Yilmaz & Acar, 2018). Based on that framework, this study identifies the value added that contributes to value creation in organizations and analyses this value between Portuguese tourism regions because of the impact of the Pandemic Crisis in the sector.

4. Results

The sample considered in this study were the companies in the tourism sector in Portugal, specifically a sample of 4.383 hotels in Portugal in the years 2019 and 2020, analyzed by tourism regions. Portugal has five regional tourism areas in Mainland Portugal, which reflect the areas covered by the territorial units used for statistical purposes NUTS II – Norte, Centro, Lisboa e Vale do Tejo, Alentejo, and Algarve (Law No. 33/2013). We add the autonomous regions of the Açores and Madeira.

Table 1 shows the number of companies in the tourism sector by region in 2020.

The analysis of the data in Table 1 allows us to verify that it is in the region of Lisboa e Vale do Tejo that is concentrated the largest number of tourism companies, with about 32.1% of the companies in the sample, followed by the Norte region, with 25.4% of the companies.

Table 1: Number of companies by region 2020

Region	Frequency	Percentage	Cumulative Percentage
Alentejo	307	7.0%	7.0%
Algarve	640	14.6%	21.6%
Centro	519	11.8%	33.5%
Lisboa e Vale do Tejo	1.407	32.1%	65.6%
Norte	1.113	25.4%	90.9%
Madeira	192	4.4%	95.3%
Açores	205	4.7%	100.0%
Total	4.385	100	

Source: Own elaboration

Table 2 shows the number of employees in tourism enterprises in Portuguese tourism regions in 2019 and 2020.

Table 2: Several employees in tourism businesses by region and change between 2019 and 2020

	Alentejo	Algarve	Centro	Lisboa e Vale do Tejo	Norte	Madeira	Açores	Total
Year	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
2019	2.459	12.199	4.177	21.270	10.780	7.176	2.601	60.662
2020	2.190	9.986	3.747	18.340	9.728	6.525	2.519	53.035
Δ	-10,94%	-18,14%	-10,29%	-13,78%	-9,76%	-9,07%	-3,15%	-12,57%

Source: Own elaboration

Between 2019 and 2020 the Portuguese hotel sector lost 7.627 workers (12.57%). The Algarve was the region with the largest loss in proportional terms (-18.14%), followed by the Lisbon e Vale do Tejo region (-13.78%), Alentejo (-10.94%), and Centro region (-10.29%). The table below shows the percentage of employees in tourism enterprises in Portuguese tourist regions. Based on this information we can conclude that the Lisboa e Vale do Tejo region concentrates, in all the years analysed, the highest proportion of employment in this sector in Portugal, followed by the Algarve region and, in third place, the Norte region (table 4).

Table 3: Percentage of employees in tourism companies by region

	Alentejo	Algarve	Centro	Lisboa e Vale do Tejo	Norte	Madeira	Açores	Total
Year	Row Sum %	Row Sum %	Row Sum %	Row Sum %	Row Sum %	Row Sum %	Row Sum %	Row Sum %
2019	4,10%	20,10%	6,90%	35,10%	17,80%	11,80%	4,30%	100,00%
2020	4,10%	18,80%	7,10%	34,60%	18,30%	12,30%	4,70%	100,00%
Δ	-	-1,30pp	0,20pp	-0,50pp	0,50pp	0,50pp	0,40pp	

Source: Own elaboration

Table 4: Wage expenditures in the tourism sector by region

	Alentejo	Algarve	Centro	Lisboa e Vale do Tejo	Norte	Madeira	Açores	Total	
Year	Row Sum %	Row Sum %	Row Sum %	Row Sum %	Row Sum %	Row Sum %	Row Sum %	Row Sum %	Sum (M€)
2019	3,49%	21,68%	5,43%	36,80%	16,36%	12,81%	3,44%	100,00%	1 052,51 M€
2020	3,89%	20,91%	6,04%	35,78%	17,34%	12,20%	3,85%	100,00%	821,79 M€

Source: Own elaboration

From the analysis to the results presented in tables 3 and 4 it is possible to validate that it is the region of Lisboa e Vale do Tejo that concentrates the chief percentage of employment in the tourism sector in all years analysed (with percentages around 35%), and the one with the highest levels of spending on employees (around 36%). The Norte region, with about 18.3% employment in the tourism sector in 2020 (the second largest in the country), concentrates only about 17.34% of wage costs. This could mean that tourism companies in the Norte pay lower wages when compared to tourism companies in other regions. It is in the Norte that there is the greatest difference between the percentage of employment in tourism and the percentage representing the value of staff costs.

We analysed in detail the indicators VAIC™, the intellectual capital efficiency coefficient (ICE), the capital employed efficiency coefficient (CEE), in the years under study (2019 and 2020), for each of the seven regions considered.

Table 5: Average of VAIC™ and its components in the tourism industry in Portugal

	CEE	**ICE**	**VAIC™**
2019	.3771	16.7953	17.3312
2020	.1644	.2096	.7402

Source: Own elaboration

The capital employed efficiency coefficient (CEE) demonstrates that the average used between 2019 (.3771) and 2020 (.1644) reflects a decrease. The intellectual capital efficiency coefficient (ICE) was around the average value of 16.7953 in 2019 and .2096 in 2020 decreasing dramatically. Finally, analysing the VAIC™, it reaches a value of 17.3312 in 2019 and decreases to .7402 in 2020. In 2019, the tourism sector created €17.3312 for every €1.00 used. In 2020, the tourism sector created €.7402 for every €1.00 invested.

The sharp decrease in the intellectual capital efficiency coefficient is due to the variable salary expenses that are considered in the calculation of the value of human capital (intellectual capital component). Therefore, the large drop in wage costs is a consequence of dismissals and lay-offs caused by the stoppage of tourism. This fact led to a sharp drop in the value of human capital and contributed to a decrease in the intellectual capital efficiency coefficient from 16.7953 (year 2019) to .2096 (year 2020). This decrease was expected given the number of employees in the tourism sector, presented in table 2. It is also confirmed that the decrease in employee costs, verified in the year 2020, is more incident in the regions with the largest number of tourism companies and in the regions where personnel costs are higher (Lisbon e Vale do Tejo and the Algarve), as presented in tables 3 and 4.

Table 6 shows the results of VAIC™ and its components for the regions of Alentejo, Algarve, Centro, and Lisboa e Vale do Tejo.

Table 6: Indicators by Alentejo, Algarve, Centro and Lisboa e Vale do Tejo regions in the years 2019 and 2020

	Region											
	Alentejo			Algarve			Centro			Lisboa e Vale do Tejo		
	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation	Mean	Maximum	Standard Deviation	Mean	Median	Standard Deviation
VAIC™2019	2.46	2.34	5.02	**91.46**	2.64	2189.27	7.27	2.39	73.56	**4.00**	2.57	17.29
VAIC™2020	2.50	1.92	10.17	**0.58**	1.40	13.54	**4.40**	1.66	37.29	**-1.52**	1.38	173.06
ICE2019	2.23	1.91	5.88	90.91	2.00	2189.12	6.87	1.91	73.57	3.48	1.98	17.17
ICE2020	2.10	1.58	10.11	0.28	1.12	13.43	2.22	1.29	15.61	-1.70	1.09	173.01
CEE2019	0.35	0.20	0.85	0.43	0.28	0.94	0.31	0.18	0.39	0.41	0.25	1.13
CEE2020	0.22	0.15	0.29	0.18	0.10	0.35	0.17	0.11	0.44	0.14	0.06	0.87

Source: Own elaboration

The table below shows data for the Norte, Madeira, and the Açores regions.

Table 7: Indicators by Norte, Madeira, and Açores regions in the years 2019 and 2020

	Region											
	Norte			Madeira			Açores			Total		
	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation
VAIC™2019	3.89	2.65	11.84	2.35	2.46	7.18	**10.88**	2.83	83.59	3.89	2.65	11.84
VAIC™2020	1.35	1.48	24.65	1.13	0.94	14.47	**1.19**	1.39	7.92	1.35	1.48	24.65
ICE2019	3.12	2.04	10.27	1.98	1.96	7.14	10.52	2.51	83.39	3.12	2.04	10.27
ICE2020	0.93	1.17	24.28	0.93	0.64	14.46	0.57	1.14	5.62	0.93	1.17	24.28
CEE2019	0.37	0.23	0.61	0.32	0.19	0.39	0.26	0.18	0.31	0.37	0.23	0.61
CEE2020	0.18	0.07	1.37	0.12	0.06	0.22	0.11	0.07	0.18	0.18	0.07	1.37

Source: Own elaboration

The results presented in tables 6 and 7 show that the VAIC™ indicates a decrease in all regions in 2020 compared to 2019 (except for the Alentejo region). The value of the VAIC™ in the Alentejo region remained stable in 2020 compared to 2019 because rural regions and where there is less mass tourism, were the most sought after when the restrictions were eased in the summer of 2020 (Marques et al., 2021, Santos and Moreira, 2021).

The Algarve region was the one that felt the impact of the crisis the most on the VAIC™, followed by the Açores and Lisboa e Vale do Tejo.

A detailed analysis of the averages of each of the variables studied in each tourism region allows us to verify that the VAIC™ is higher in the Centro region in the year 2020.

The results presented allow confirming that the hotel sector suffered a sharp decline in 2020, and it is expected that the impacts of this crisis in the sector will have prolonged effects (van der Merwe et al. 2021; Dube et al., 2021). However, as confirmed by Santos and Moreira (2021), it can be expected that the more consolidated tourism regions, such as the Algarve and Madeira, will show a strong recovery once the restrictions are eased or eliminated.

We now try to statistically confirm the values presented. To this end, we proceeded to statistical inference to compare the means of VAIC™ and its components in the period from 2019 to 2020, depending on the Portuguese tourism region. To go ahead with the choice of the test to be applied, we started by testing the normality of the variables (Kolmogorov-Smirnov test), which revealed, for all variables, a p-value > 0.05, which led us to reject the hypothesis of normality of the results. Thus, the non-normality of the data leads to the application of the Kruskal-Wallis test to analyse the existence of significant changes between the values of the VAIC™ indicator in the different tourism regions.

Table 8: Kruskal Wallis Test - Group teste Region in the tourism industry in Portugal

		2019	2020
VAIC™	Chi-Square	.481	.433
	Sig	.000	.000
ICE	Chi-Square	.482	.435
	Sig	.000	.000
CEE	Chi-Square	.270	.288
	Sig	.000	.000

Source: Own elaboration

The results allow us to verify that there are statistically significant differences in the value of the variable VAIC™, depending on the region of tourism. Besides, the components of the VAIC™ coefficient (intellectual capital efficiency coefficient and capital employed efficiency coefficient) follow the same trend. We also compared the values of the capital employed efficiency coefficient between pairs of regions in 2019 and 2020 (Figure 1 and 2).

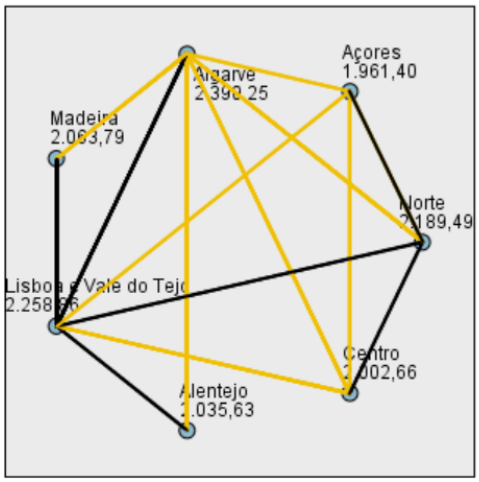

Figure 1: Capital employed efficiency coefficient-CEE, by pairs of regions, in 2019

Source: Own elaboration

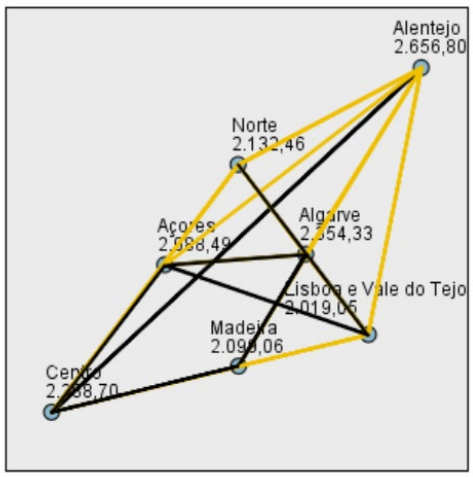

Figure 2: Capital employed efficiency coefficient-CEE, by pairs of regions, in 2020

Source: Own Elaboration

It is verified that, in general, there are differences between the different regions. In 2019, the regions that did not present statistically significant differences between them, concerning the capital employed efficiency coefficient, were the regions of Lisboa e Vale do Tejo-Madeira, Lisboa e Vale do Tejo-Alentejo, Lisboa e Vale do Tejo-Norte, Lisboa e Vale do Tejo-Algarve, Açores-Norte, and Norte-Centro. This means that in terms of capital employed efficiency coefficient there are, among most regions, statistically significant differences, except those indicated. In 2020, the regions that do not register statistically significant differences among themselves are Centro-Madeira, Centro-Açores, Centro-Alentejo, Açores-Alentejo, Açores-Lisboa e Vale do Tejo, Açores-Algarve, and Algarve-Madeira. Thus, we can see that the capital employed efficiency coefficient shows fewer differences between the regions of Portugal, confirming that the pandemic had, in general, impacts across all regions (with less impact in the Alentejo), resembling the regions in what concerns the component of VAIC™, which represents the physical and financial capital of tourism sector companies in Portugal. The results of the change between regions in the intellectual capital efficiency coefficient are presented in figures 3 and 4.

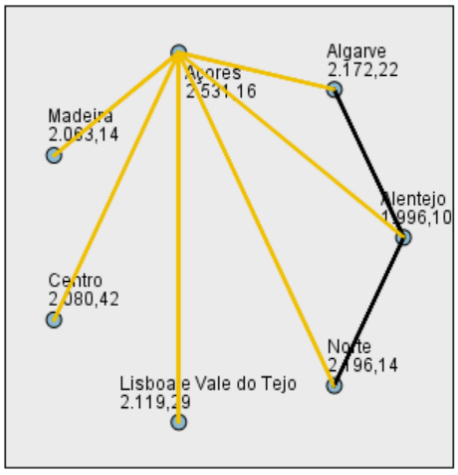

Figure 3: Intellectual capital efficiency coefficient-ICE, by pairs of regions, in 2019

Source: Own elaboration

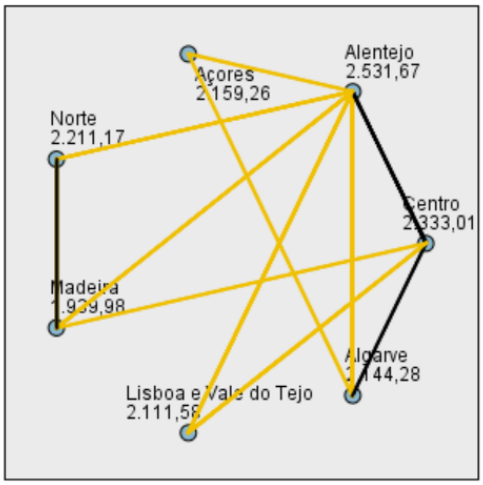

Figure 4: Intellectual capital efficiency coefficient-ICE, by pairs of regions, in 2020

Source: Own elaboration

As regards the intellectual capital efficiency coefficient, there are differences between regions than in the capital employed efficiency coefficient (figures 3 and 4). Thus, it is not so evident a difference between the mean ranks, in 2019, between the regions of Norte-Alentejo and the regions of the Algarve-Alentejo. Among all other regions there is a difference concerning the intellectual capital efficiency coefficient, confirming that in 2019, in the hospitality sector in Portugal, the intellectual capital efficiency coefficient differs significantly among the regions.

In 2020 there are no changes in this coefficient mainly from the Norte-Madeira regions, Alentejo-Centro and Algarve-Centro. We conclude, therefore, that there is a greater variation in 2019 and 2020 between regions when we regard the intellectual capital efficiency coefficient. This result confirms the large difference, not only between the number of tourism enterprises (Table 1) and employees in this sector by regions in Portugal (tables 2 and 3) but also the large difference between the wage expenditures that are practiced between the different tourism regions in Portugal (Table 4). From 2019 to 2020 the regions that showed large differences between each other in the values of the intellectual capital efficiency coefficient changed because of the impact they suffered from the pandemic crisis.

We also compared the values of the VAIC™ between groups of regions in 2019 and 2020 (Figure 5 and 6).

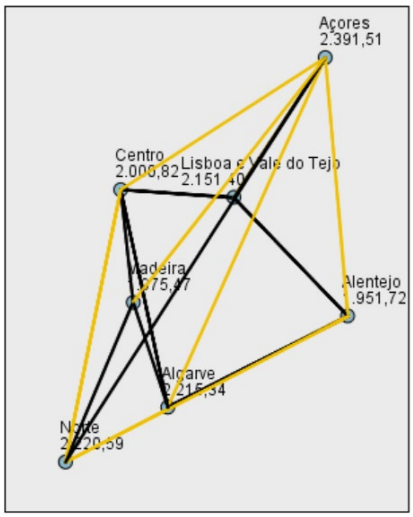

Figure 5: VAIC™, by pairs of regions, in 2019

Source: Own elaboration

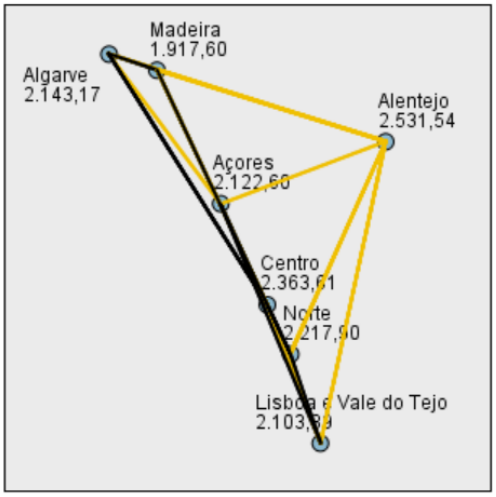

Figure 6: VAIC™, by pairs of regions, in 2020

Source: Own elaboration

Thus, it is not so evident a difference between the mean ranks, in 2019, between the regions of Norte-Algarve, Norte-Madeira, Norte-Açores, Centro-Lisboa e Vale do Tejo, Centro-Madeira and Centro-Algarve. As the VAIC™ is the sum of the capital employed efficiency coefficient (CEE) and the intellectual capital efficiency coefficient (ICE), the VAIC™ reflects the differences between its components.

In 2020 it is confirmed that the Alentejo is farther away from the other regions, being the only region where the VAIC™ did not decrease because of the COVID-19 pandemic.

5. Conclusion

In Portugal, the tourism sector, after almost doubling its weight in the economy between 2014 and 2019, continued to break records with revenues in hotels growing 9.9 percent year-on-year in the first two months of 2020 (Mamede et al., 2020). However, the pandemic crisis caused by Coronavirus has made the collapse of the tourism sector eminent.

Pulic (1998) sought, through the VAIC™ model, to measure business performance in the knowledge-based economy through the quantification of the intellectual efficiency in the value creation context.

It was found pertinent to study the VAIC™ in a context of crisis and in a sector in which the crisis has been more severe. To this purpose, the financial data of tourism companies in 2019 and 2020 were collected and based on

Pulic's model (1998) analysis was made of whether the added value of intellectual capital was altered by the context of the health crisis that affected the tourism regions.

The results show a significant decrease in VAIC™ from 2019 to 2020 for all tourism regions. In turn, Lisboa e Vale do Tejo, Açores, and Algarve regions had the largest decrease in the value of VAIC™ in the period considered. The Alentejo was the region that felt the least the impact of the pandemic crisis, having maintained the approximate average values because of its greater rurality, in line with the conclusions of Marques et al. (2021). These results reveal that the more mature tourist areas lost the most intellectual added value and the more rural or isolated regions managed to maintain the same levels of VAIC™, due to the high demand, essentially in the summer of 2020, for less populated tourism areas.

This paper has contributed to understanding the impact of the COVID-19 pandemic crise on efficiency and value addition in the tourism sector. Is current with a very recent study topic and with results of extreme importance for strategic planning of the tourism sector at a national and regional level and represents a pioneering attempt to evaluate and compare intellectual capital efficiency within the Portuguese tourism sector in a Pandemic crisis context, by applying the VAIC™ method (Pulic, 1998).

The few studies on the subject did not allow for the comparison and confrontation of results, which made the literature review and data analysis exercise less rich. In the future, it would be interesting to study the medium and long-term impact of the COVID-19 pandemic on the value creation of intellectual capital, as well as on the reconversion of some strategic choices of tourism regions in Portugal that seemed to be underway but that may be accelerated by the pandemic crisis.

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