

Vicky Katsoni · George Cassar
Editors


Recent Advancements in Tourism Business, Technology and Social Sciences

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Editorial

Recent Advancements in Tourism Business, Technology and Social Sciences

Even without directed actions, the process of globalization continues, and the direction in which it is heading strengthens the belief that methods and tools should be adapted to the new realities (Stiglitz, 2017). Tourism, trade, and technology can amplify the prospects of economic growth, job creation, and increased productivity. Economic welfare and social development are in a mutual relationship (DaSilva et al., 2019; Zhang & Zhang, 2004). Therefore, new ways of using traditional factors of production emerge, along with new rules for organizing activities to address the emerging realities in the various social sciences (Şerban, A.C., Jianu, I., Katsoni, V., 2023).

Tourism is a multifaceted reality in today's world and offers scope for global development and diversification while its resilience is now a proven quality. Indeed, it has become one of the principal pillars of the world's economy with 10% of global GDP directly or indirectly derived from the presence and exigencies of the tourism industry (Cassar, G., 2020). The thousands of destinations that exist and the many more that emerge from time to time, look at advancements in the tourism business, technology and the social sciences for direction, guidance, and support. Academia is one of the most powerful and enlightening sources that these destinations bank upon for their future. The professionals in the tourism sector, of course, also offer their expertise through years of hands-on activity and a strong dose of experience and good practice. Yet, many of the tourism operators look to researchers, academics, and associate professionals to propose novel and tested remedies for a changing world scenario challenged by environmental catastrophes, health and safety challenges, technological inventions, economic pressures, social exigencies, and myriad other difficulties and permutations. Tourism, as it has now been shown, is as fragile as it can be strong. Its strength is tested every day. Its fragility is experienced each time a crisis—global or local—crops up. Policies are introduced by world bodies, regulations and laws are enacted by national governments, while further rules are

sometimes forced upon operators, sectorial stakeholders, tourism operators, destination management entities, and dependent sectors. At times (most times) this creates tension and confusion as to how one should proceed.

IACuDIT's mission is to contribute to the paradigm changes needed, which closely relates to the 2023 conference theme: *Recent Advancements in Tourism Business, Technology and Social Sciences*. The aim of this conference is to promote constructive, critical, and interdisciplinary conversations on the challenges emerging in the various sectors of the tourism industry by bringing together researchers, communities, industry, and government stakeholders. This is hereby fully achieved.

A list comprising of 36 interdisciplinary conference topics was included in the call for papers. The numerous papers submitted through virtual and poster presentations were considered for publication. All those accepted for the conference were double-blind peer reviewed in two phases. Thus, all the abstracts submitted were in the first stage peer-reviewed by two experts in the field to ascertain their relevance to the conference theme and for their contribution to the academic debate. A total of 182 abstracts were reviewed of which 124 were found relevant. All accepted proposals were offered the opportunity to submit full papers for the conference proceeding, utilizing the comments from the first phase of double-blind peer review. This resulted in 105 papers being submitted for inclusion in the Springer proceedings in Business and Economics. These full paper submissions were once again double-blind peer-reviewed by two experts in the field, as well as by the editorial team. During this second cycle each submission was reviewed for: (a) relevance to the conference theme, (b) quality of the paper in terms of theoretical relevance and significance of the topic, and, (c) contribution to the academic debate. The contributions were thematically selected and are arranged in the present proceedings according to the order of their presentation. The subthemes covered by the conference were further categorized into five distinctive parts, which were distributed in two volumes.

Volume 1 consists of 3 parts:

- Part One** *Tourism and Technology: Current approaches and Applications in Marketing, Destination Management and Planning*—24 chapters
- Part Two** *Tourism Development and Sustainability*—23 chapters
- Part Three** *Cultural and Heritage Tourism*—17 chapters

Volume 2 consists of 2 parts:

- Part Four** *Tourism Perspectives in a Social and Business Environment—Current Developments and Experiences*—31 chapters
- Part Five** *Sports and Wellness Tourism*—10 chapters

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Classical Versus Wellness Thermalism: The Case of Portuguese Thermal Establishments Before and After the COVID-19 Pandemic



Alcina Nunes, Jéssica Alves, Estelle Gonçalves, Ana Margarida Pereira,
and Maria José Alves

Abstract Thermal/mineral springs are one of the fastest-growing subcategories of wellness tourism. Indeed, it is an activity that has steadily increased in all of Europe's developed economies over the last few decades. The pandemic has raised awareness of the importance of healthy lifestyles and has subsequently led to a surge in consumption of experiences and travel, somehow motivated by wellness. This study analyses the evolution of thermal users' alternation between wellness and classical thermalism in Portugal. The objective is achieved by applying exploratory and cluster data analysis to a Portuguese administrative database containing the number of user registers and revenues generated from 2012 to 2022. During this period, the wellness registers increased in most thermal establishments compared to the classic records, even if service diversification may be found in most thermal establishments. Still, the financial value added by wellness consumers does not seem to follow the previously observed shift. The establishments with more classical registers are still the ones that are able to generate the highest income per person.

Keywords Wellness · Thermal establishment · Wellness thermalism · Classic thermalism · Wellness tourism · Portugal

JEL Classification I10 · I30 · Z30

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1 Introduction

In the twenty-first century, functional and chronic diseases derived from the rhythm and stress of everyday life are increasingly common. Depression and problems related to stress and anxiety are becoming increasingly recurrent (Moreno-González et al., 2020) and are considered by the World Health Organization (WHO) to be one of the priority diseases covered by the Mental Health Gaps Action Programme (World Health Organization, 2023).

As early as 1959, when the concept of well-being was not yet commonly known and recognised, Halbert Dunn observed that choosing a less healthy lifestyle does not only cause illness, it can also bring other problems that reduce our quality of life. Well-being is not just about the absence of disease but about the optimal level of health (Dunn, 1959; Myers et al., 2000). Ardell (1985), another foremost pioneer of the well-being movement, emphasises that achieving such a level requires a continuum of decisions. Physical health care, beauty care, food care, intellectual development, and relaxation, among others, can help achieve well-being (Mueller & Kaufmann, 2001). According to the Global Wellness Institute, the Wellness Economy has grown effectively. It implies that society is increasingly emphasising the promotion of its well-being. In 2020, the Wellness Economy generated about USD 4.4 trillion, an increase of 19% since 2015 (Yeung & Johnston, 2018, 2022). According to these authors, wellness tourism only accounts for approximately 10% of the Wellness Economy. However, concerning the tourism sector, wellness tourism is called by Smith and Puczkó (2008) the “gold segment” due to its highest growth rates.

Gustavo (2010, p. 129) argued that “health tourism has assumed the brand image of the original and classic “thermalism”, encompassing an endless variety of services that have health and leisure in common and where water, due to its natural relationship with the essence of the human being, remains one of the main elements, albeit used in different ways, with different objectives and alongside new techniques”. Thermalism is the second subcategory of the Wellness Economy, with the highest projected growth rate until 2025, indicating that the sector is gaining popularity and relevance in tourism and health (Yeung & Johnston, 2021). According to Kitchen’s (n.d.) projection, thermal tourism is expected to be one of the biggest trends by 2023. One factor that may have led to this growth may be related to the fact that the older adult population is becoming, in the last decades, more aware of the benefits of preventive therapies and their impacts on their health (Chen et al., 2013a, 2013b).

Due to changes on the demand side, the offer has been diversifying to complement classic thermalism (Ferreira et al., 2022). The establishments have needed to reinvent themselves, evolve and present wellness services in addition to the healing services of classic thermalism. Therefore, the emergence of the need to study how wellness thermalism is growing compared to classical thermalism is essential. This is the case in the Portuguese thermalism market, in which demand has changed over the last decade and where the COVID-19 pandemic presented difficulties for thermal establishments to overcome the consequences of the consecutive lockdowns of health services providers. Wellness services can also be a solution to overcoming such

a demand crisis. To better understand how the demand for classical and wellness thermal services evolved in Portugal in the last decade and, in particular, before and after the COVID-19 pandemic is presented this study. This aim will be achieved by applying exploratory and cluster data analysis to a Portuguese administrative database containing the number of user registers and revenues generated by each type of thermal services from 2012 until 2022.

The paper is divided into five sections. After this introduction, the section of the literature review on well-being and wellness, health and wellness services and thermalism is presented. Section 3 presents the methodology adopted, and Sect. 4 presents the results. Section 5 closes the paper.

2 Literature Review

2.1 *Well-Being and Wellness Concepts*

The exact and consensual definition of well-being has proved to be a challenge. There was some lack of consensus in the literature regarding its dimensions and implications in other scientific areas (Gorton, 1988). Only in the 1950s did the “Welfare Movement” begin to be studied and given due importance in the scientific field. Halbert L. Dunn, one of the foremost and early pioneers of the “Wellness Movement”, emphasised in his lectures that health was not the mere absence of disease, as was advocated, but a complete state of physical, mental and social well-being (Dunn, 1957). This new perspective impacted the scientific environment since, until then, the predominant philosophy in the health field was the dichotomy between health and disease (Dunn, 1959; Larson, 1999).

Despite this lack of understanding, the WHO itself, in 1946, when it was founded, included the issue of well-being in its definition of “health” and emphasised that it is not enough to have the absence of disease for a person to be healthy (World Health Organisation, 1946). The definition of well-being for several researchers started from this same principle (Adams et al., 1997; Dunn, 1977). In the mid-twentieth century, the concept of wellness was introduced into the definition of health but needed further elaboration. More recent studies justify that the lack of precision about the wellness concept is due not only to the fact that it is interchangeable depending on its context (Smith & Puczko, 2008) but also because wellness is subjective and relative (Adams, 2003).

Although there is no precise definition of well-being, most researchers, in addition to focusing on the relationship between well-being and the human being, also focus on the dimensions of well-being (Chi et al., 2020). According to Gorton (1988, p. 25), “wellness is a balance and harmony among body, mind, spirit, and emotions in an ever-changing environment”. Although quite similar to Dunn’s definition, he adds the dimension of “emotion” since he believed that the dimensions of well-being could not be reduced to a three-dimensional framework—body, mind, and spirit

(Dunn, 1959). If the new paradigm adopted a more holistic view of the human being, emotions could not be excluded as they produce energy and often dictate the state of mind (Gorton, 1988). Myers et al., (2000, p. 252) definition and wellness dimensions align with Dunn's. They define wellness "as a way of life oriented towards optimal health and well-being in which the individual integrates body, mind, and spirit to live more fully within the human and natural community". Dunn's Three-Dimensional Model continues to be widely accepted by the scientific field, although some believe the triangular model is too reductionist. Ardell (1977), for example, proposed a five-dimensional model—self-responsibility, physical fitness, nutritional awareness, stress management, and environmental sensitivity—with self-responsibility being at the centre of the concept of well-being. Gorton (1988) agreed that well-being was only achieved through self-care and self-responsibility, as it is a mindset of acceptance and lifestyle awareness. Everyone should be responsible for meeting their needs, considering the well-being of body, mind, and emotions. However, from the perspective of the National Wellness Institute (n.d.), continuing the work of Bill Hettler, it considered that there were six dimensions, four of which were internal (emotional, spiritual, physical, and intellectual) and two external (occupational and social). Over time, several researchers have contributed to the evolution of the study of the concept of well-being and its dimensions. Elements such as social contact (Mueller & Kaufmann, 2001) and spirituality (Sweeney & Witmer, 1991) have been incorporated into the dimensions of well-being.

It can be seen that despite the lack of agreement, especially with the concept's dimensions, there is an alignment regarding the nature and core idea of well-being (Roscoe, 2009). Well-being implies that human beings seek a healthy balance in their lifestyle (Mueller & Kaufmann, 2001), aiming at improving their quality of life (Renger et al., 2000) and achieving the optimal level of health and well-being (Myers et al., 2000). Another point that several researchers in this area agree on is that well-being should not be seen as something static (Chi et al., 2020; Lafferty, 1979; Myers & Sweeney, 2007). According to Dunn (1977, p. 4), achieving a high level of wellness "requires that the individual maintains a continuum of balance and purposeful direction within the environment where he is functioning".

In recent decades, the promotion of a healthy and balanced life has increased at an exponential pace and has become the focus of societies (Chen et al., 2013a, 2013b), and this trend has only become even more pronounced with the COVID-19 pandemic (Farkić et al., 2020; He et al., 2021; Li & Huang, 2022). The concern arises from several factors, such as modern society's pace, pressure, and stress (Smith & Puczko, 2008), rising healthcare costs and increased demand for and reliance on more holistic and alternative healing therapies (Voigt et al., 2011).

2.2 Health and Wellness Tourism

Consequently, the awareness of the importance of a healthy lifestyle has motivated the search for tourist destinations that somehow improve the quality of life, level of health

and well-being of the tourist (Alonso-Álvarez, 2012; Ferreira et al., 2022; Kitchen, n.d.; Rodrigues et al., 2020; Vaz et al., 2022; Wen et al., 2021). Terms such as health tourism, medicinal tourism, and wellness tourism are this segment's most common designations (Lopes & Rodríguez-López, 2022). However, the problem arises when these are used interchangeably (Smith & Kelly, 2006) since "there is a range of positions, terms, and categories depending on which author one considers" (Wright & Zascerinska, 2023, p. 175). This ambiguity is not the result of a lack of research in the area, since in the last two decades, interest in this topic has increased exponentially (He et al., 2021; Huijbens, 2011), and the volume of scientific production on the implications of well-being in tourism is proof of this (Chang et al., 2022). According to the study by Hall (2011), since 2006, there has been a continuous increase in articles on health and medical tourism. Thus, some authors justify the imprecision by the variation of concepts and perceptions of health and well-being depending on the cultural context (Huang & Xu, 2014; Huijbens, 2011; Smith & Puczko, 2008).

Health tourism is generally identified with a broader term with two main domains: medical or medicinal tourism and wellness tourism (Gulyas & Molnar, 2023). Yeung and Johnson (2018) distinguish between wellness tourism and medical tourism using the assumption of tourist motivation. According to them, wellness tourists travel to maintain, manage, or improve their health and well-being. They are motivated by the desire to prevent illness, reduce stress levels, manage and reduce less healthy habits, and seek authentic experiences. In other words, their action is proactive, entirely voluntary, and non-medical. In contrast, according to the authors, medical tourism results from the desire to access health services that are more accessible, have shorter waiting times, or offer specialised treatments not available in their place of residence. In other words, its action is reactive, medically necessary, and there is medical intervention (Yeung & Johnston, 2018).

Smith and Puczko (2008) are apologists of the same ideology, where in medical tourism, the treatment of pathology is a mandatory requirement, while in wellness tourism, the focus is on prevention. Medical tourists usually seek a wide range of services, from cancer treatments, dental treatments, surgeries, cosmetic surgeries, and fertility treatments to euthanasia (Gill & Sumant, 2019; Higginbotham, 2011). Mueller and Kaufmann (2001, p. 7) present a generic definition and do not use the curative and preventive dimensions, defining wellness tourism as "the sum of all the relationships and phenomena resulting from a journey and residence by people whose main motive is to preserve or promote their health".

In 2011, the Global Spa Summit developed a model to better understand these two tourism domains by developing a matrix with two axes. The horizontal axis presents a "continuum of product/service offerings that ranges from conventional or "generic" services/experiences (which may be available anywhere) to authentic or "location-specific services/experiences (which spin out of a country's special traditions and natural assets)" (Global Spa Summit, 2011, p. iii). On the vertical axis, it places wellness tourism and medical tourism oppositely. Thus, four quadrants are created that represent the health-related tourism market.

Wellness tourism has been growing for two decades (Huang & Xu, 2014; Voigt et al., 2011) and is expected to continue (Yeung & Johnston, 2021). According

to Dillette et al. (2021), wellness tourism is a dimension of tourism with a high added value since, on average, its spending is 60% higher than that of an ordinary tourist (Yeung & Johnston, 2018). Thus, it has become imperative to understand the underlying motivations of wellness tourists to be able to respond to their needs and expectations. According to Lee and Kim (2023), the grounds of a wellness tourist can be divided into six variables: (1) relaxation/healing/health improvement; (2) self-examination/education; (3) sympathy for nature; (4) luxury/prestige; (5) improvement of social relationships; and (6) novelty.

2.3 Thermalism

Water use for health promotion purposes is a practice that dates back to antiquity (Erfurt-Cooper & Cooper, 2009; Migliaccio, 2018; Moss, 2010). There are several historical and archaeological evidence of the use of geothermal resources by Japanese, Roman, Turkish, Icelandic, and European people for bathing, as they believed in their healing powers (Alonso-Álvarez, 2012; Lund, 2009; Taofeek et al., 2020). Río-Rama et al. (2018) identify three types of therapies with water as the central resource: thalassotherapy, spa and thermalism. What distinguishes them is the type of water used. Thalassotherapy uses seawater, spa uses “normal” water, and thermalism uses mineral water. Mineral waters are generated through specific geological conditions (Araújo et al., 2015a), having three fundamental characteristics: natural origin, bacteriologically pure, and therapeutic potential (Ghersetich et al., 2000).

Several studies show evidence of the therapeutic effects of the practice of thermalism in different pathologies and disorders, such as respiratory, digestive, dermatological, musculoskeletal, diabetes, and cardiovascular diseases, among others (Martins et al., 2021; Pereira et al., 2021; Silva et al., 2023; Taofeek et al., 2020). However, a thermal spa does not only provide rehabilitation and healing services. In fact, according to the definition established by Article 2 of the *Decreto-Lei* no. 142/2004 of 11 June of the *Diário da República Portuguesa*, a thermal spa is defined as an establishment that provides health care using natural mineral waters for “disease prevention, therapeutic, rehabilitation, and health maintenance purposes and may also practice complementary and supporting techniques for those purposes, as well as thermal well-being services”. In other words, thermalism is indicated for its curative and preventive benefits through relaxation.

Traditionally, the main focus of thermalism was on the healing dimension, with the tourists essentially seeking treatment and relief from various pathologies—that is, a so-called classical thermalism predominated. However, there was a paradigm shift in thermalism over time, and the wellness dimension became gaining importance (Ferreira et al., 2022). According to the study by Chen et al. (2008), when a consumer seeks services and experiences in wellness resorts, the primary motivation is the relaxation of body and mind—hence the marketing strategies reinforce the differentiating experience of relaxation. The study also identifies that the second

reason is the range of activities available. That is, they seek the possibility of being able to diversify. And thirdly, they seek contact with nature. People started to seek out thermal spas not only when they were ill but also as a form of preventive care and to promote general well-being. This shift in focus has been observed in Portugal, a country with an extensive tradition of thermalism (Costa et al., 2015). According to the study by Ferreira et al. (2022) on the profile of thermal establishments users, there has been a progressive change in the number of users in recent years. Currently, thermal therapies and treatments are sought mainly by women. As for the age group, it is still quite aged, being between 50 and 75 years old. However, although the youth segment is not very significant, it is increasing. The researchers identified several studies that indicated that financial capacity was above average, as well as academic degree.

3 Methodology

In Portuguese thermal establishments—dating back to around 2,000 years ago to the Roman baths (Cantista, 2010)—the services provided were traditionally therapeutical (classical thermal services). According to Araújo et al. (2015b), due to its geological variability, which enables the existence of thermal waters with a high diversity based on physicochemical composition, Portugal offers a wide variety of thermal therapeutic services. However, the thermal service demanders request more wellness services over time, and a shift is observed in the thermal service demand. The COVID-19 pandemic dramatically impacted thermal establishments due to lockdowns imposed on health services providers and, therefore, on the thermal establishments offering classical (therapeutical) thermalism services. The availability of administrative data on the number of users recorded in thermal establishments and the income generated by those specific users allows us to understand the evolution of classical *versus* wellness thermalism before and after the COVID-19 pandemic.

In the first place, this study uses descriptive statistical methods to understand how registers shifted between classical and wellness types of treatments (looking in particular at the period before and after the pandemic) and, in the second phase, a hierarchical cluster analysis. Hierarchical cluster analysis is a mathematical algorithm that groups similar objects into groups called clusters. In this case, each cluster will group the Portuguese thermal establishments by type of treatment and the subsequent income generated to understand if they changed their treatment approach over time, particularly after the pandemic. The study intends to find a set of comparable thermal establishments clustered together where each group is distinct from the others, and the establishments within each cluster are broadly similar. The Euclidean distance between two clusters and Ward's linkage criteria, which reduces the sum of squared distances of each observation from the average observation in a cluster, will be applied (Köhn & Hubert, 2014; Wierzchoń & Kłopotek, 2018).

Data is collected by the Portuguese *Direção Geral de Energia e Geologia* (DGEG) and by the *Associação de Termas de Portugal* (ATP) to describe registers on classic

(therapeutic) and wellness thermal services and the respective income generated from 2012 to 2022.

4 Results

The evolution of thermal users' records by type of thermalism is visually clear in Fig. 1. The figure shows how the number of records by type of thermal treatment evolved from 2012 until the last year registered, 2022. Such evolution translates into tendency lines that indicate the negative trend in the number of classical registers over time and the positive trend in the number of wellness registers.

Indeed, in Table 1, it is possible to observe the relative distribution of registers by type of treatment and, additionally, the average annual growth rate observed by branch over the period. Apart from the two first years in analysis (2012 and 2013), where classical and wellness thermalism presented approximately the percentage of registers (with 2013 showing a bigger number of records in classical thermal treatments), all the other years offer a clear shift towards wellness. On average, wellness demand increased by 3.08%, while classical demand decreased by 4.32%.

Going further, Tables 2 and 3 start presenting the microeconomic analysis of the active establishments and their respective relative registers and income generated.

Over the last decade, the number of active thermal establishments, mostly located in the North of Portugal, varied between 37 (in 2012) and 46 (in 2019, the years before the pandemic started). During the pandemic, active thermal establishments decrease to minimum values. Last year (2022), the number of active thermal establishments began to increase but is far from the maximum values presented before the pandemic. It should be noted that various Portuguese thermal establishments remained closed during the study period, and several did not register clients (zero registers).

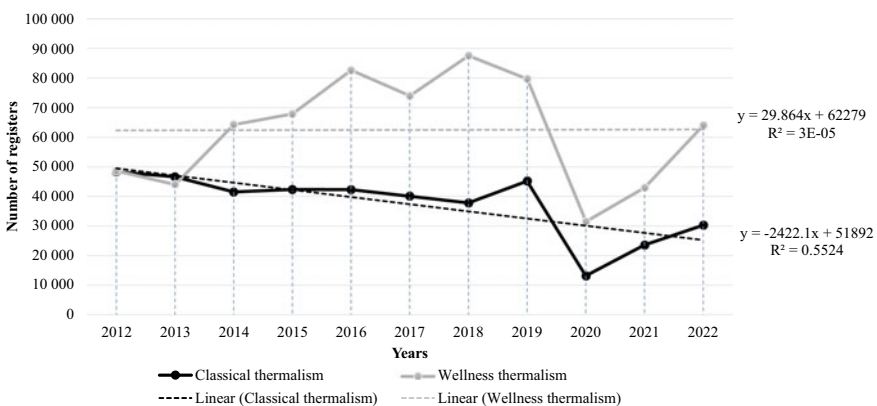


Fig. 1 Trend evolution of thermal users registered on classical and wellness thermal treatments from 2012 to 2022

Table 2 Evolution of the ratio wellness/ classical registers from 2012 to 2022

Years	Valid	Absent	Median	Mean	Standard deviation	Coefficient of variation	Minimum	Maximum
	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	%	<i>n</i>	<i>n</i>
2012	37	15	0.3	2.6	6.6	256.8	0.0	38.1
2013	40	12	0.4	3.0	8.5	280.6	0.0	48.2
2014	40	12	0.5	3.9	8.7	224.4	0.0	43.4
2015	40	12	0.5	3.7	9.6	261.5	0.0	56.7
2016	40	12	0.8	6.0	18.8	315.1	0.0	107.7
2017	40	12	1.0	7.4	24.1	325.0	0.0	141.6
2018	43	9	1.5	40.5	150.4	371.1	0.0	926.0
2019	46	6	1.2	10.7	28.4	266.4	0.0	152.7
2020	38	14	1.8	37.0	163.6	442.6	0.0	995.0
2021	37	15	1.6	6.5	16.3	250.7	0.0	91.4
2022	39	13	1.4	9.7	27.4	281.5	0.0	159.8

Table 3 Evolution of the income generated in thermal establishments, by person, from 2012 to 2022

Years	Valid	Absent	Median	Mean	Standard deviation	Coefficient of variation	Minimum	Maximum
	<i>n</i>	<i>n</i>	€	€	€	%	€	€
2012	37	15	152.1	156.6	84.1	53.7	32.1	396.3
2013	40	12	158.0	151.1	82.1	54.3	0.0	315.4
2014	40	12	138.1	132.3	85.4	64.5	0.0	321.8
2015	40	12	130.6	142.4	95.4	67.0	18.8	413.1
2016	41	11	123.8	132.0	93.9	71.1	0.0	442.1
2017	40	12	114.5	137.5	88.7	64.6	19.9	339.6
2018	44	8	112.5	115.6	77.8	67.3	0.0	252.1
2019	46	6	117.5	130.4	109.3	83.8	14.8	677.9
2020	40	12	83.2	106.0	74.1	69.9	0.0	258.5
2021	38	14	108.1	121.6	66.7	54.9	15.9	265.7
2022	39	13	118.7	135.8	98.0	72.1	6.3	428.1

Table 2, in particular, presents the statistical distribution of the ratio of registers between wellness and classical thermalism. In 2012, on average, the 37 active establishments recorded 2.6 wellness users by each classical client. This number increased to almost 41 wellness users for each classical one. The number decreased drastically when the pandemic started in 2020 but recovered faster in the second year of the pandemic. This resulted from the lockdown that demanded the closure of all health service providers (where classical thermalism is included) during most

of the pandemic. Wellness providers, however, were authorised to open and offer services. In 2022, without lockdowns that restricted some of the services supplied, the ratio between wellness and classical services started increasing again, reaching values higher than the ones observed in 2017 but not yet the values observed in 2018. The start of a war in Europe and the consequent economic crisis may affect the demand for thermal services. However, a longer time is needed to be sure of such a trend and the reasons for explaining it. Another note that should be made regards the enormous heterogeneity observed among the registers made by thermal establishment. The coefficient of variation that indicates, in percentage, the standard deviation observed stands between 250% and almost 443%. Thermal establishments in Portugal differ a lot regarding the relative rate of users, which indicates the need to understand better how they differ and how they may be similar.

Table 3 presents the income generated by person registered in Portuguese thermal establishments. In 2012, the value reached almost 153€/person, and the value is being decreased, even if not steadily. During the first pandemic year, the value reached 106€/person, and last year, the value increased to almost 134€/person. Also, for this indicator, the coefficient of variation shows a significant difference among thermal establishments. The justification is the income generated by the type of thermal treatments. Classical thermalism demands a stay in the thermal establishment for at least 12 days, while around 90–95% of the demand for wellness thermalism has lasted just one day since 2016 (Turismo de Portugal, 2022). The difference in the duration of stay inevitably affects the income generated. According to the numbers of the association of Portuguese thermal establishments (Turismo de Portugal, 2022), in 2021, each person who demanded classical treatment spent an average of 273€ while each wellness client spent, on average, around 45€.

The thermal establishments in Portugal are heterogeneous, being necessary to cluster such establishments to understand if the tendency observed on average happens for all the establishments. Being not possible to analyse thermal establishments one by one, the research will group them regarding the registers by type and the income generated per person. Three years were chosen to understand how thermal establishment groups are characterised and how they evolved—the year that represents the beginning of the analysis period (2012), the year before the pandemic started (2019), and the last year with available data (2022). Figure 2 and Table 4 show how many groups should be considered each year, using the Elbow method plot for the lowest BIC value.

For 2012 and 2022, the Portuguese thermal establishments could be clustered into four groups. In 2019, before the pandemic, the thermal establishments were more heterogeneous, and it is possible to cluster them into five groups. After the pandemic, the results return to values similar to those of the beginning of the analysis period.

In the three years, one thermal establishment is entirely different from others. It has the most registers on classical thermal treatments and the one with the highest income per person. It may be considered an outlier on the Portuguese landscape of thermal establishments. In 2012 and 2019, it is possible to find a cluster of thermal establishments with a classical thermal vocation—they present a higher value of registers on classical thermal treatments. They also have the highest income per person (except

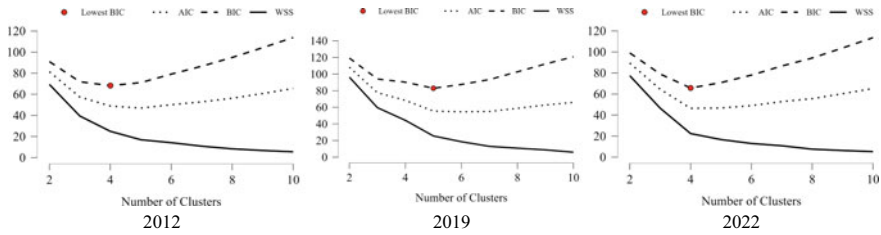


Fig. 2 Elbow method plot for defining the optimal number of clusters for 2012, 2019, and 2022

Table 4 Criteria for defining the optimal number of clusters for 2012, 2019, and 2022

Clusters	N	R ²	Criteria		
			AIC	BIC	Silhouette
4	37	0.7	53.2	72.5	0.3
5	46	0.8	55.5	83.0	0.3
4	39	0.8	48.2	68.2	0.4

Note The model is optimised with respect to the *BIC* value

the outlier). In 2019, the difference in the income per person is not so different, however, than the thermal establishments with a good balance between classical and wellness services. In 2022, after the pandemic, the cluster of thermal establishments with classical vocation disappeared to give place to thermal establishments that balance the two types of services and, therefore, can also balance the income per person. These are the establishments that present the highest income per person nowadays. Another clear change is the tendency for several thermal establishments to present a vocation for offering wellness services. These services are attracting an increasingly significant number of registers compared to classical thermalism registers. They still keep a large number of classical records and are, therefore, able to present a vital source of income per person. The number of establishments with the most prominent wellness vocation is relatively stable, even if a decrease in these establishments is decreasing over time—pure wellness thermal establishments are being reduced in the Portuguese market and replaced by establishments with a more diversified supply.

The values presented in Table 5 can be observed in Fig. 3, where the clusters’ differences are well visible. The cluster with just one observation is not shown in the figure.

Table 5 Distribution of thermal establishments and the respective mean value by cluster and variable

Years	Clusters		Number of establishments	Income/ person	Registers_ CT	Registers_ WT
				€	<i>n</i>	<i>n</i>
2012	1	Classical vocation	11	203.3	2054.0	485.9
	2	Balance vocation	14	184.3	352.6	129.1
	3	Wellness vocation	11	67.0	699.1	3545.8
	4	Outlier	1	239.6	13,117.0	2434.0
2019	1	Classical vocation	10	155.7	1852.7	1211.6
	2	Balance vocation	22	154.6	248.9	351.5
	3	Tends to a wellness vocation	6	68.9	541.3	2470.5
	4	Wellness vocation	7	55.7	802.9	5439.0
	5	Outlier	1	236.4	12,306.0	6943.0
2022	1	Balance vocation	21	160.6	270.7	368.7
	2	Tends to a wellness vocation	12	120.7	960.3	1795.3
	3	Wellness vocation	5	55.8	791.8	5663.2
	4	Outlier	1	198.8	9080.0	6448.0

5 Final Remarks

As mentioned, thermal tourism is expected to be one of the biggest trends by 2023. Therefore, besides classical thermal treatments traditionally offered in leading Portuguese thermal establishments, these establishments are offering wellness services and a shift is clearly observed in Portugal. The tendency towards wellness services is positive and growing, while the supply of classical services decreased in absolute and relative terms. Over time, and especially after the COVID-19 pandemic, establishments with a classical vocation were replaced by establishments with a more balanced vocation—they offer in a balanced manner both types of services and are able to increase the income generated per person. These results indicate that the Portuguese thermal market is being able to match its supply to the growing demand

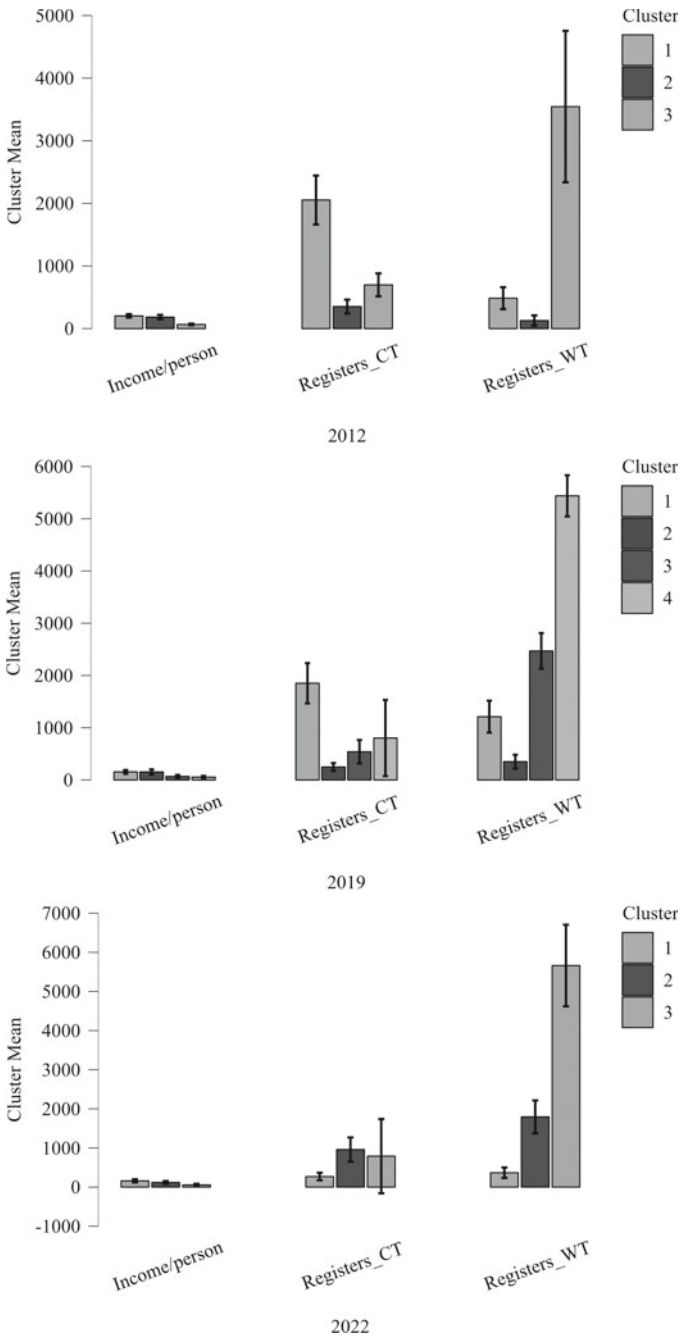


Fig. 3 Mean value of the variables by cluster and year

for wellness and to answer the increasing requests for a balanced life where health and well-being are interlinked and indivisible.

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