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Dynamics of accommodation structures and tourist flows in Băile Felix-Băile 1 Mai and Băile Herculane: a comparative statistical analysis

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Abstract

This study examines the long-run co-evolution of accommodation supply and tourist demand in two major Romanian spa destinations - Băile Felix-Băile 1 Mai (Bihor County) and Băile Herculane (Caraș-Severin County) - over 2001-2024. Using annual official statistics from the Romanian National Institute of Statistics - Tempo Online (Institutul Național de Statistică, 2025), we compare primary series for accommodation structures, existing accommodation capacity (bed places), accommodation capacity in function (place-days), tourist arrivals, and overnight stays. We further derive three integrative indicators: average capacity per establishment (as a proxy for supply fragmentation), average length of stay (overnight stays/arrivals), and accommodation capacity utilisation (overnight stays/capacity in function). To contextualise destination roles within their regions, we also compute resort shares within county totals for key supply and demand measures. Results indicate a common structural shift toward a more fragmented accommodation base and a strong compression of average length of stay toward short-stay tourism by the end of the period. Both destinations exhibit synchronised demand disruption in 2020 followed by recovery, but with different post-shock profiles and utilisation trajectories: Băile Herculane starts as a high-utilisation system in the early 2000s, while Băile Felix-Băile 1 Mai sustains comparatively stronger utilisation through most of the 2010s, with convergence in recent years. The findings highlight that, under a short-stay regime, utilisation outcomes depend critically on calibrating operational capacity to demand absorption and on strategies that translate arrivals into overnight volume.
Keywords: *Spa destinations, accommodation supply, tourist flows, average length of stay, accommodation capacity utilisation, comparative time-series analysis*

Introduction

Spa destinations occupy a particular position in contemporary tourism debates because they sit at the intersection of health-oriented consumption, place-based therapeutic resources, and the operational realities of accommodation systems. Their performance cannot be inferred from demand volumes alone: what ultimately matters for destination viability is how tourist flows translate into overnight volume and how this demand is absorbed by the available (and operational) accommodation capacity. In spa contexts, this supply-demand coupling is especially sensitive to long-term behavioural shifts (notably the move from cure-like, extended stays toward shorter breaks), to diversification of accommodation forms, and to external shocks that disrupt mobility and service provision. For these reasons, indicator-based monitoring using consistent official accommodation statistics is more than a descriptive exercise: it provides a replicable lens for interpreting destination evolution, capacity planning, and performance outcomes over time.

Romania is a relevant case for such an approach because spa tourism has a long tradition, while the post-socialist period has brought structural changes that reshaped both the accommodation base and demand behaviour. The transition from a strongly organised, treatment-centred model to a more market-driven configuration has generally involved rapid private entry, accommodation fragmentation, product diversification toward wellness and leisure water facilities, and a re-scaling of destination governance and promotion. These shifts have tended to coincide with a compression of the average length of stay, creating a new performance constraint: even when arrivals grow, utilisation can weaken if operational capacity expands faster than overnight stays or if the destination product does not sustain multi-day consumption. Understanding this mechanism requires long, comparable time series that capture both gradual restructuring and abrupt disruptions.

Within this context, Băile Felix-Băile 1 Mai (Bihor County) and Băile Herculane (Caraș-Severin County) offer a strong comparative pair. Both are emblematic, long-lived Romanian spa systems anchored in thermal-mineral resources and established treatment infrastructure, and both are observable through the same national statistical framework. Yet they differ sharply in locational setting and post-1989 development trajectory: Băile Felix-Băile 1 Mai complex has been shaped by metropolitan proximity and successive waves of expansion and modernisation (including post-1990 private accommodation growth and post-2010 leisure-oriented upgrading), whereas Băile Herculane combines exceptional historical heritage with a marked post-1989 contraction of parts of the balneary system and more recent recovery attempts. Precisely because they share the same national institutional background but display contrasting restructuring paths, the pair is well-suited for isolating how accommodation reconfiguration and demand absorption interact under a common macro-context.

Despite the relevance of Romanian spa resorts for tourism policy and regional development, the literature still lacks systematic, long-run, comparable evidence on how accommodation supply and tourist flow co-evolve in these destinations when analysed through a coherent set of primary variables (establishments, capacity, arrivals, overnight stays) and integrative performance ratios (average capacity per establishment, average length of stay, and accommodation capacity utilisation). Existing contributions often address specific dimensions (for example, resource potential, seasonality, or destination potential), but less frequently connect structural supply change to behavioural change and to utilisation outcomes across a long horizon that includes both structural transition and major disruption. This gap is consequential because it is precisely the joint movement of supply, flows, and length of stay that determines whether a spa destination operates in a high-utilisation regime or drifts into under-absorption, even under growing arrivals.

Accordingly, this study applies a comparative time-series design for 2001-2024 using annual official statistics from the National Institute of Statistics of Romania (Tempo Online) and a consistent set of derived indicators and county-relative measures. The analysis is guided by four connected research questions: (1) how have accommodation structures and capacity evolved in each resort, and to what extent has supply shifted from a concentrated model toward a fragmented, small-unit profile; (2) how have tourist arrivals and overnight stays evolved across the main phases of the period, including the 2020 disruption and the subsequent recovery; (3) to what degree do changes in average length of stay and operational capacity explain differences in accommodation capacity utilisation between the two resorts; and (4) how has each resort's relative weight within its county tourism system changed, and what does this imply for territorial centrality and regional tourism structure. By answering these questions, the paper provides an empirically grounded comparative profile of two flagship Romanian spa destinations, focused not only on "how much" they change, but on "how" supply restructuring and demand behaviour jointly shape performance outcomes.

Theoretical background

Tourism destinations can be analysed as coupled systems in which accommodation supply and tourism demand co-evolve, generating observable operational outcomes such as accommodation capacity utilisation and average length of stay. In indicator-based studies grounded in official accommodation statistics, the analytical core typically includes the number of accommodation establishments, bed places (existing capacity and capacity in operation), arrivals, and overnight stays. From these primary series, derived ratios - especially average length of stay (overnight stays divided by arrivals) and accommodation utilisation (overnight stays relative to available bed-days) – are provided interpretable performance signals that connect market behaviour to capacity planning, operational management, and destination governance (Assaf & Tsionas, 2015; Sainaghi et al., 2017). For destinations characterised by structural change and policy-sensitive development trajectories, such as longitudinal indicators, are particularly useful because they allow researchers to distinguish demand-driven expansion from capacity-led growth, and to interpret whether observed volume increases translate into effective absorption of supply.

A first strand of recent literature clarifies why longitudinal indicators are central for planning and evaluation rather than purely descriptive. Reviews of tourism demand forecasting highlight a shift toward more robust, decision-relevant modelling and a stronger emphasis on linking demand trajectories to operational and strategic decisions (Jiao & Chen, 2018; Song, Qiu, & Park, 2019). In parallel, performance measurement research stresses that credible destination comparisons require coherent indicator systems because single metrics can be misleading outside their supply-demand context (Assaf & Tsionas, 2015; Sainaghi et al., 2017). In practical terms, this implies treating supply expansion, flow dynamics, and derived ratios (length of stay and utilisation) as a coupled set that reveals the destination's "functional logic", rather than as separate trends that can be interpreted independently.

A second strand focuses on accommodation supply dynamics and their spatial implications. Structural change in the accommodation base can signal repositioning (for example, upgrading, diversification, or consolidation) and can condition demand responses through product mix, perceived quality, and market accessibility. Evidence indicates that shifts in capacity structure can be sizeable and may reshape a destination's ability to attract and retain demand over time (Severová et al., 2021). Beyond the local scale, high-resolution analyses show that tourism intensity and growth can vary markedly across places even within the same broader region, reinforcing the value of place-based, comparable indicator frameworks (Silva et al., 2018). A national-scale geostatistical perspective confirms that tourist flows in Romania are strongly spatially differentiated and temporally structured, with county-level clustering and changing patterns over time, which justifies resort-level and county-relative benchmarking in indicator-based analyses (Stupariu et al., 2023). In spa destinations, these arguments gain additional weight because capacity reconfiguration often combines legacy large-capacity units with new waves of small and medium accommodation entry, a configuration that can generate both opportunities (entrepreneurship, niche product development) and constraints (coordination difficulties, uneven standards).

Seasonality represents a third conceptual pillar because it directly affects utilisation, revenue stability, labour demand, and the feasibility of maintaining service quality across the year. Contemporary seasonality research emphasises measurement and decomposition rather than simplified peak versus off-peak narratives, enabling more defensible comparisons across destinations and time. Approaches based on seasonal concentration and decomposition isolate seasonal effects from longer-run trends and other temporal components, clarifying whether a destination becomes more balanced, more concentrated, or structurally different over time (Andraz & Rodrigues, 2016; Duro, 2018; Fernández-Morales et al., 2016; Grossi & Mussini, 2021; Rosselló & Sansó, 2017). Seasonality also interacts with pricing and market behaviour; empirical work links seasonal demand patterns to hotel prices and to destination-level outcomes, suggesting that utilisation is shaped by both temporal concentration and perceived value (Wang et al., 2019). Romanian evidence based on geostatistical analyses of foreign tourist flows also indicates pronounced temporal structuring of demand and spatially uneven exposure to peak periods, reinforcing the need to interpret utilisation through both seasonal concentration and territorial differentiation (Stupariu et al., 2023). These insights are particularly relevant for spa systems, where demand can be shaped simultaneously by holiday calendars, health-related timing, and the growing prominence of weekend-style wellness consumption.

Average length of stay provides the behavioural bridge between flows and utilisation, and it is especially informative when the tourism product shifts toward shorter visits. Empirical studies show that length of stay is shaped by visitor composition, trip purpose, accessibility, and destination attributes, and that determinants can differ between short stays and longer stays (Atsiz et al., 2022; Oklevik et al., 2021; Thrane, 2016). In spa contexts, satisfaction drivers and perceived value can further influence behavioural outcomes such as repeat visitation and the time allocated to a destination (Anaya-Aguilar et al., 2021). Romanian evidence also supports the relevance of service quality as a behavioural driver, showing that measurable dimensions of hotel service quality vary across major urban centres and can shape tourist evaluations and the propensity to consume accommodation services (Stupariu & Josan, 2014). This implies that a stable or rising arrivals trend may still coexist with declining overnight stays if the destination shifts toward short-break consumption, making utilisation particularly sensitive to behavioural compression.

To interpret indicator trajectories in a development perspective, destination evolution, competitiveness, and resilience concepts remain useful, especially when long time series include disruptions. The tourism area life cycle model links observable patterns in capacity, demand, and utilisation to phases of exploration, growth, consolidation, stagnation, and potential renewal, providing a narrative structure for interpreting structural breaks and turning points (Butler, 2024). Modelling work offers micro-foundational support for life-cycle-like dynamics driven by feedback between demand, congestion, and investment (Marsiglio & Tolotti, 2022). Competitiveness research complements this by framing performance as an outcome of multi-dimensional drivers (product quality, governance, accessibility, and market fit) and by emphasising the value of systematic evidence syntheses to avoid selective interpretation (Abreu-Novais et al., 2016; Cronjé & Plessis, 2020). Resilience research adds the capacity of destinations and hospitality systems to absorb shocks and adapt, which becomes critical when time series span major disruptions and uneven recoveries (Brown et al., 2018; Prayag, 2018). In this line of work, governance and policy coordination matter, including the ways in which public decisions shape destination recovery pathways and long-term viability (Hoffmann et al., 2023; Joppe, 2018). The coronavirus disease 2019 pandemic has reinforced these points in tourism research by highlighting how shocks interact with pre-existing structural vulnerabilities and operational constraints (Gössling, Scott, & Hall, 2021). In the Romanian context, labour-market structure is a concrete resilience mechanism: regional disparities in hospitality human resources, wage dynamics and productivity influence destinations' capacity to maintain service standards and recover after shocks (Josan et al., 2024).

These general frameworks become more diagnostic when situated in the specific context of spa and health tourism in Central and Eastern Europe, where post-socialist restructuring has reshaped supply structures, demand behaviour, and the institutional setting of resort development. Regional literature repeatedly notes that spa destinations historically functioned as semi-medicalised systems embedded in public health arrangements and socially supported travel, with accommodation and treatment facilities often concentrated in large-capacity units. After 1990, this inherited model faced the dual pressure of health-financing reconfiguration and the emergence of leisure-oriented wellness consumption with different expectations regarding quality, comfort, and experience design (Jónás-Berki et al., 2015; Kasagranda & Gurňák, 2017; Widawski, 2017). From a business-model perspective, spa tourism enterprises convert therapeutic resources into customer benefits through service bundles and experiential attributes, meaning that performance indicators are sensitive to whether destinations "sell" longer treatment-oriented stays or shorter wellness-oriented breaks, and whether demand is stabilised across the year or concentrated into peaks (Szromek & Naramski, 2019). Environmental and climatic suitability research further suggests that spa tourism performance can be conditioned by climate-related constraints and seasonal comfort patterns, which influence both demand timing and operational feasibility (Miszuk, 2021). In addition, pandemic-sensitive time-series analyses in the region highlight that spa systems can experience pronounced discontinuities in arrivals and utilisation, making long-run monitoring essential for distinguishing structural change from shock effects (Šenková et al., 2020).

Romania is a particularly relevant setting for these debates because spa tourism combines a strong balneological tradition with pronounced post-1990 restructuring and territorial divergence. A system-level interpretation frames Romanian spa tourism as marked by a communist-era development paradigm followed by post-communist reconfiguration, with consequences for ownership structures, investment cycles, and demand behaviour (Erdeli et al., 2011). Within the Romanian literature, the spa product is also discussed through the lens of balneotherapy and thermalism, emphasising the continuing relevance of therapeutic resources while acknowledging that contemporary competitiveness requires service modernisation and market alignment (Surdu et al., 2015). Marketing-oriented contributions stress the need to clarify and position medical tourism destinations and to translate therapeutic potential into coherent destination branding and communication, particularly in a market where trust and perceived quality are decisive (Stăncioiu et al., 2014).

Research from Romania adds an explicitly territorial and infrastructure-sensitive perspective that is directly relevant for interpreting utilisation and length-of-stay dynamics. Work connecting infrastructure and touristic traffic to Romanian tourism regionalisation highlights that destination performance is mediated by accessibility and broader territorial integration, not solely by local endowments (Baltălungă & Dumitrescu, 2013). Studies that examine tourism development premises in mountain or peripheral contexts underline that tourism trajectories are conditioned by investment feasibility and the capacity to build complementary attractions and mobility systems (Costea, 2011). Similarly, comparative work on peripheral countryside development (including Romanian Banat) frames tourism as an instrument whose effects depend on structural constraints and regional development profiles, reinforcing the need to interpret resort trajectories in a broader territorial system rather than in isolation (Šťastná et al., 2015). Related evidence from Romanian spa resorts also points to the role of the built accommodation stock and its maintenance: the deterioration and uneven rehabilitation of resort villas and heritage accommodation can become a structural constraint that ultimately surfaces in utilisation levels and the capacity to sustain longer stays (Tofan & Niță, 2017). Beyond physical infrastructure, structural conditions in the tourism economy also include the labour base: regional disparities in hospitality employment, wages and productivity shape service quality and the ability of destinations to sustain competitiveness, with clear shock effects in 2020 followed by recovery dynamics (Josan et al., 2024). For spa resorts, these territorial insights matter because the therapeutic resource alone does not guarantee year-round demand; utilisation depends on how effectively resorts mobilise accessibility, complementary activities, and a coherent value proposition.

Destination-level Romanian studies demonstrate how these mechanisms can manifest as divergent pathways across resorts. Research focused on Băile Herculane illustrates that strong historical and therapeutic endowments can coexist with development constraints and uncertain repositioning, suggesting that underinvestment and product-market mismatch can translate into weak utilisation even when the resource base is exceptional (Aluculesei & Nistoreanu, 2014). Conversely, evidence from Băile Felix emphasises entrepreneurship and service-economy dynamics, showing how business opportunities and managerial perceptions can support expansion and diversification—yet also implying that rapid supply growth raises the analytical importance of demand absorption and stay-length dynamics (Bădulescu et al., 2024). In parallel, research on health tourism and spa services in Romania identifies both current configurations and future perspectives, supporting the view that Romanian spa destinations operate within a transition from treatment-centric models toward more heterogeneous balneotherapy-wellness-recreation mixes, with uneven modernisation rhythms across resorts (Popescu et al., 2014).

Romanian scholarship also adds important demand-side and behavioural evidence that helps interpret length of stay and utilisation. Studies on domestic tourists' values, perceptions, and attitudes toward the medical tourism offer indicate that trust, perceived completeness of packages, and perceptions of service quality condition interest and conversion into actual travel behaviour (Ile et al., 2021). Satisfaction research points to generational differences in how spa services are evaluated, suggesting that changing expectations can shift demand patterns in ways that affect stay duration and repeat visitation (Truțescu, 2020). In addition, sentiment-analysis-based work on online booking platforms shows how digital traces can serve as complementary signals of destination image and performance, and how platform-mediated narratives may influence demand stability and choice—

mechanisms likely to matter especially in short-break wellness segments (Truțescu & Nicolaie, 2024). Motivation-based comparisons between visitors and non-visitors to spa resorts further reinforce that prior experience and perceived attractiveness influence participation in spa tourism, shaping the volume and structure of demand that resorts can realistically capture (Niță & Drăguleasa, 2025).

The Romanian literature links spa tourism to sustainability and crisis contexts, reinforcing the relevance of resilience-informed interpretation of time-series indicators. Analyses of balneal tourism sustainability in the pre- and post-pandemic period highlight that recovery is uneven and that sustainability narratives must be grounded in measurable operational outcomes such as utilisation and demand stability (Oprea et al., 2023). Romanian work on tourism seasonality in spa destinations provides direct evidence that seasonality profiles vary across resorts, reinforcing that indicator-based comparisons can uncover meaningful structural differences that are not visible in aggregate national trends (Stupariu & Morar, 2018). A related Romanian time-series application using the same core flow indicators (arrivals, overnight stays, average length of stay and seasonality) compares tourist dynamics in the rural area of Oradea metropolitan region with Bihor County, reinforcing the usefulness of a county-relative benchmarking logic for interpreting local trajectories over long periods (Stupariu et al., 2022). In addition, work describing balneal and spa tourism trajectories in Romania across past, present and future perspectives provides a contextual frame for interpreting resort-level trajectories as part of broader national restructuring processes (Roangheș-Mureanu & Oglindoiu, 2019).

Taken together, the international literature on performance measurement, seasonality, length of stay, competitiveness, and resilience (Assaf & Tsionas, 2015; Sainaghi et al., 2017; Andraz & Rodrigues, 2016; Fernández-Morales et al., 2016; Grossi & Mussini, 2021; Butler, 2024; Brown et al., 2018) and the Central and Eastern European and Romanian scholarship on spa tourism restructuring, territorial constraints, business models, and behaviour (Erdeli et al., 2011; Kasagranda & Gurňák, 2017; Szromek & Naramski, 2019; Popescu et al., 2014; Baltălungă & Dumitrescu, 2013) support an integrated interpretation: spa destination trajectories depend on how effectively resorts restructure the accommodation base, diversify the tourism product, and stabilise demand across the year while navigating inherited infrastructure constraints and evolving consumer expectations. This synthesis justifies a comparative, indicator-based analysis of Băile Felix-Băile 1 Mai and Băile Herculane for 2001-2024 that quantifies the joint dynamics of establishments, capacity, arrivals and overnight stays; explains utilisation through the interaction of operational capacity and length-of-stay change; and interprets long-run trajectories and breakpoints through destination evolution, competitiveness and resilience lenses.

Study area

Băile Felix and Băile 1 Mai (Bihor County) form one of Romania's most important spa agglomerations, located at an altitude of 140 m in the north-western sector of the Apuseni Mountains' foreland (Fig. 1). Băile Felix lies in the Crișurilor Plain at the foot of hills descending from the Pădurea Craiului Mountains, crossed by the Hidișel stream and located approximately 9 km from Oradea and 22 km from the Borș border crossing. Its development is documented from the eighteenth century: references from 1763 mention a bathing basin, later rebuilt in stone (1771) and complemented by bathing cabins, while modern development accelerated after the first modern drilling at the main spring in 1885. The resort benefits from a mild temperate continental climate, with relatively moderate winters and summers, and it is anchored in thermal mineral waters (41-49°C) with low total mineralisation (around 1 g/l), alongside a bioclimate generally described as protective. The therapeutic profile is supported by a wide range of treatment facilities (thermal baths in tubs and pools, hydro- and electrotherapy, mud applications, inhalations, physiotherapy and wellness services), which historically sustained longer spa-type stays.

Băile 1 Mai, situated about 2 km from Băile Felix and around 10 km from Oradea, belongs to the Sânmartin area at the contact zone between the Miersig Plain and the Oradea Hills. Its balneary history includes earlier toponyms (Băile Sfântului Ladislau, Băile Haieului, Băile Episcopești), with ownership linked to the Roman-Catholic Episcopate of Oradea in 1374. Initial therapeutic practices used sapropelic mud and mineral waters associated with the Pețea stream, while modern treatment facilities were developed mainly in the 1950s-1960s and the resort expanded continuously after 1978. The natural therapeutic factors include oligomineral waters (bicarbonate and lightly chlorinated, with temperatures up to about 42°C) and sapropelic mud extracted from the local lake, and the treatment base includes multiple electrotherapy facilities, mineral-water baths, massage, and structured physical therapy.

From an accessibility and functional-region perspective, the two resorts are embedded in the Oradea Metropolitan Area and the administrative unit of Sânmartin, with "facile access" explicitly linked to both the road network and Oradea International Airport. Road connectivity is structured around the Oradea ring road (DN76/E79) and the dedicated link toward Sânmartin, while the A3 motorway connection in the Biharia-Borș sector strengthens the westward gateway toward the Romanian-Hungarian border area. In market terms, demand remains predominantly domestic (including organised distribution via large Romanian tour operators), while proximity to Hungary is framed locally as both a

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competitive benchmark and a cross-border opportunity for the thermal destination. The tourism product has evolved from a primarily medical balneotherapy model toward a mixed offer that couples treatment bases with all-season leisure and wellness (thermal pools, aqua-park style amenities and spa services), consistent with a shift toward shorter, mixed-purpose stays alongside classic treatment packages. Key turning points can be summarised as the major socialist-era investment cycle of 1968-1977 (new drillings, hotels and treatment infrastructure), the post-1990 wave of private accommodation and services, and the post-2010 expansion and modernisation of leisure water facilities in both resorts (Consiliul Județean Bihor, 2021; Culiciu, 2018; Ministerul Dezvoltării Regionale și Turismului, 2011; Primăria Oradea, 2020; S.C. Turism Felix S.A., 2024; Zona Metropolitană Oradea, 2020).

For Băile Felix-Băile 1 Mai spa complex, there are at least two relevant institutional layers that cover promotion and, in a broader sense, destination management. At the strictly local level, the Association for the Promotion of Tourism in Băile Felix and Băile 1 Mai Resorts acts as a dedicated promoter for the two resorts, with a public presence sustained through recurring marketing actions (for example, participation in international tourism fairs and the consolidation of the "Băile Felix-Băile 1 Mai" tourism brand, with explicitly stated objectives related to visibility growth and partnership development). In parallel, at the scale of the extended destination, Visit Oradea (the Association for the Promotion of Tourism in Oradea and the Region) explicitly presents itself as a destination management organisation, built on a public-private partnership initiated in 2015 between the local authority in Oradea and key tourism actors; its own communication defines Oradea as a "thermal waters paradise" together with Băile Felix and Băile 1 Mai. In practice, this structure functions as an umbrella for marketing and coordination of the integrated urban-spa package (of Oradea-Băile Felix type), including actions such as study visits for travel agencies (Asociația pentru Promovarea Turismului din Oradea și Regiune, 2025; Asociația pentru Promovarea Turismului în Stațiunile Băile Felix și Băile 1 Mai, 2025; Bihoreanul, 2025; Primăria Oradea, 2025).

Băile Herculane (Caraș-Severin County) provides a contrasting spa setting in south-west Romania (Fig. 1), at an average altitude of about 160 m, in the Cerna River valley between the Mehedinți Mountains (east) and the Cerna Mountains (west). The destination's long history is anchored in Roman-period spa use: an attestation from 153 AD is associated with a votive tablet from the baths, and the Roman complex at Therme Herculi included temples, baths, monuments, and statuary dedicated to Hercules, Esculap and Hygieia. Later, after 1718, the resort's built framework was substantially shaped under Austrian rule, with a strong Baroque imprint; Roman imperial thermae are preserved within the monumental structure of Hotel Roman and integrated into the tourism circuit. Climatically, Băile Herculane features an intramontane depression climate with sub-Mediterranean influences, where surrounding mountains temper continental effects and reduce exposure to strong winds. Its therapeutic resource base is diverse, including multiple categories of mineral waters (with temperatures roughly from the high 30s°C to above 60°C) and distinctive chemical characteristics (notably sulphurous components in several sources), complemented by facilities for mineral baths, internal cure points, inhalations, electro- and hydrotherapy, medical gymnastics, massage and terrain cure routes.

Figure 1: Location of the spa resorts Băile Felix-Băile 1 Mai and Băile Herculane on the hypsometric map of Romania

The resort's position on the Cerna Valley corridor gives it strong linear accessibility: it is directly served by DN6 (European route E70), the principal road axis between Bucharest and Timișoara, and by rail through the landmark Băile Herculane station (opened in 1878), which is situated in close relation to the E70 corridor. These transport attributes underpin a predominantly national catchment, historically aligned with health-related travel, but increasingly compatible with shorter stays that combine spa use with landscape and heritage experiences. Product-wise, diversification rests on three pillars: mineral-water therapy, a highly legible imperial-Baroque heritage ensemble, and immediate access to Domogled-Valea Cernei National Park's mountain and gorge routes. Development milestones can be condensed to: Roman foundations and the eighteenth-nineteenth-century Austrian remodelling; socialist-era expansion of hotel and treatment capacity south of the historic core; the post-1989 collapse of much of the balneary operation (successive closures of baths and most hotels, followed by advanced degradation of historic structures); and more recent attempts at recovery driven by civic heritage-rescue initiatives such as Herculane Project (Ministerul Dezvoltării Regionale și Turismului, 2011; Parcului Naţional

Domogled-Valea Cernei, 2025; Popa, 2020; Primăria orașului Băile Herculane, 2025; Zaharia, 2020).

In the Băile Herculane spa resort, there is a local non-profit organisation focused on tourism promotion, Pro Turism Herculane, which publicly formulates a clear mission: to capitalise on and promote the resort's resources (thermal waters and natural setting) to as broad an audience as possible, supported by both its website and social communication channels. In a 2019 interview, the organisation's representative indicates that it began in 2013, and in 2021 there are public initiatives associated with the organisation aimed at more coherent promotion together with economic actors and local authorities, suggesting a local "coalition-building" role around a shared tourism agenda (Baghiu, 2021; Bute, 2019; Pro Turism Herculane, 2025).

Methodology

This study applies a comparative, time-series approach to quantify and interpret the evolution of accommodation supply and tourist demand in two major Romanian spa destinations: Băile Felix-Băile 1 Mai (Bihor County) and Băile Herculane (Caraș-Severin County), over 2001-2024. The empirical basis consists of annual official tourism statistics extracted from the National Institute of Statistics of Romania (INSSE), Tempo Online platform, complemented by own calculations for derived indicators and relative measures.

The analysis uses a coherent set of primary variables, reported for each resort and disaggregated by accommodation category where available. The main supply-side variables are: number of tourist accommodation establishments, existing accommodation capacity (bed places), and accommodation capacity in function (operational capacity, expressed as place-days, reflecting bed places multiplied by the number of operating days). Demand-side variables include: tourist arrivals and overnight stays, reported for the same territorial units and accommodation categories. To strengthen the territorial reading, the study also integrates county-level totals for Bihor and Caraș-Severin, allowing the computation of resort shares within the county tourism system.

On this basis, several secondary indicators are constructed to capture structural change and performance. Average accommodation capacity per establishment is computed as the ratio between existing capacity and the number of establishments, providing a proxy for the degree of fragmentation or concentration of the accommodation stock. Average length of stay is calculated as overnight stays divided by arrivals, capturing the transition from longer spa-type stays toward shorter breaks. Occupancy rate (utilisation of capacity) is computed as overnight stays divided by accommodation capacity in function, reflecting demand absorption relative to operational supply. In addition, county-share indicators are calculated for key variables (for example, resort totals as a percentage of county totals), to evaluate whether the resorts are consolidating or losing relative weight within their regional context.

Analytically, the study combines (1) descriptive statistics (levels, changes, percentage shares), (2) structural profiling by accommodation type (hotels, tourist villas, tourist and agrotourist guesthouses, and other accommodation reception structures), and (3) comparative interpretation between the two resorts, focusing on differences in scale, diversification, and shock sensitivity. The temporal dynamics are assessed by identifying major phases (expansion, contraction, recovery) and notable breakpoints visible in the annual series (including the 2020 disruption and subsequent rebound).

Where category-specific series contain missing values in particular years, these are treated as missing observations and are explicitly acknowledged in interpretation; category-level comparisons avoid over-reading discontinuities, while total series are analysed consistently at annual resolution.

The analytical procedure is descriptive and comparative. First, annual time series are examined to identify long-run trends, cyclical phases, and visible breakpoints (including the 2020 shock and the subsequent recovery visible across multiple indicators). Second, structural profiles by accommodation type are used to determine which segments underpin growth, decline, or stabilisation. Third, the two resorts are contrasted systematically, both in absolute levels and through county-relative indicators, in order to highlight differences in scale, diversification, and territorial centrality.

Data consistency is addressed explicitly at category level. Where accommodation-type series contain missing values in particular years (the manuscript notes such gaps, for example for the tourist villa series), these observations are treated as missing rather than imputed, and interpretation is anchored primarily in the continuous total series, with category-level readings conditioned by data availability.

Results

Dynamics of the accommodation supply

Tourist accommodation establishments

Băile Felix-Băile 1 Mai registers a very strong expansion of accommodation reception structures over 2001-2024 (10.8-fold), with a net gain of 215 units. The change is also structural: the 2024 profile is dominated by tourist and agrotourist guesthouses (103; 43.5%) and other accommodation reception structures (84; 35.4%), while hotels account for 21 units (8.9%) and villas for 29 (12.2%). The time series suggests two acceleration phases, around 2010-2012 and again in 2021-2022, consistent with a rapid proliferation of small and medium units. At county scale, the resort maintains a high structural weight in Bihor (43.7% in 2024; peak 47.3% in 2021), accompanied by a long-term rebalancing away from hotel concentration (54.5% of county hotels in 2001 versus 38.9% in 2024) and toward non-hotel segments, particularly "other structures" (39.1% in 2024) (Fig. 2).

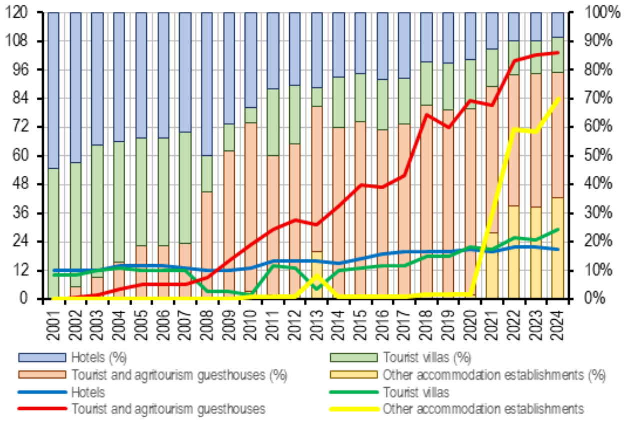

Figure 2: The dynamics of tourist accommodation establishments by type of establishment in Băile Felix-Băile 1 Mai (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

Băile Herculane follows a more moderate, but still clear, expansion over 2001-2024 (4.3-fold), adding 72 structures overall. Internal restructuring is pronounced: tourist villas become marginal (1 unit in 2024), while tourist and agrotourist guesthouses reach 43 units and other structures 35; hotels total 15. By 2024, guesthouses represent 45.7% and other structures 37.2%, with hotels at 16.0%. Growth is stepwise, with pronounced upswings around 2008-2009, 2011-2012, and 2020-2021, followed by slower consolidation toward the end of the period. At county level, the resort's overall share in Caraș-Severin remains comparatively stable (26.6% in 2024; maximum 34.0% in 2014); category shares point to a declining hotel concentration (44.1% in 2024) and a strengthening of other structures (24.0% in 2024) (Fig. 3).

Comparatively, both resorts converge toward a fragmented supply base dominated by guesthouses and other small-scale structures by 2024, but expansion intensity differs sharply. The net increase is almost three times larger in Băile Felix-Băile 1 Mai (+215) than in Băile Herculane (+72), indicating a faster accommodation boom in Bihor's flagship spa agglomeration. The 2024 mix is similar in the dominance of guesthouses and other structures (Felix: 43.5% and 35.4%; Herculane: 45.7% and 37.2%), yet legacy segments diverge: Felix retains 29 villas and a smaller hotel share (8.9%), whereas Herculane retains a higher hotel share (16.0%) but villas are nearly absent. At county level, Felix also shows a stronger spatial pull (43.7% of Bihor's total structures in 2024) than Herculane does in Caraș-Severin (26.6%), suggesting a more concentrated county-level organization of accommodation supply around the resort in Bihor.

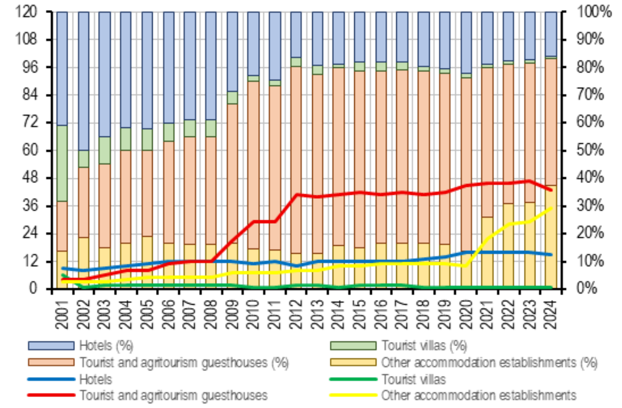

Figure 3: The dynamics of tourist accommodation establishments by type of establishment in Băile Herculane (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

Existing tourist accommodation capacity

Băile Felix-Băile 1 Mai shows a clear long-term capacity expansion over 2001-2024, reaching 9,591 places in 2024 and recording a net gain of 2,969 places (+44.8%). The trajectory is stepwise rather than smooth, with a temporary downturn in the late 2000s and renewed growth concentrated after 2011 and again after 2021. Structurally, the resort remains hotel-centred in absolute capacity, but the composition of capacity changes materially: hotel places decrease to 5,560 in 2024, while non-hotel segments become the main source of additional capacity - guesthouses reach 2,108 places and "other structures" 1,279, alongside a smaller, but visible, contribution from tourist villas (644). This shift is consistent with a diversification process in which total capacity grows despite a contracting hotel backbone. At county scale, Băile Felix-Băile 1 Mai continues to function as the dominant accommodation pole, although its share of Bihor's total capacity declines to 53.5% in 2024; in contrast, the resort still concentrates a large part of the county's hotel capacity (65.8% in 2024), indicating that higher-capacity, higher-comfort stock remains spatially anchored in the spa core (Fig. 4).

Băile Herculane displays a comparatively stable capacity profile, with 5,050 places in 2024 and only a slight net change over 2001-2024 (−3.1%). The key signal is therefore not total capacity growth, but internal restructuring: hotel capacity declines to 3,398 places and tourist villas become marginal (32 places), while guesthouses (880) and other structures (740) expand and partially compensate for losses in legacy, higher-capacity segments. In other words, the resort moves away from a large-unit legacy stock toward a more dispersed, lower-capacity accommodation base, while keeping total capacity broadly constant. At county level, the resort's share of Caraș-Severin total capacity decreases to 46.6% in 2024, suggesting a relative strengthening of capacity dynamics outside the resort; nevertheless, Băile Herculane remains the principal anchor of county hotel capacity (73.1% in 2024), which points to persistent spatial concentration of higher-comfort places in the traditional spa nucleus (Fig. 5).

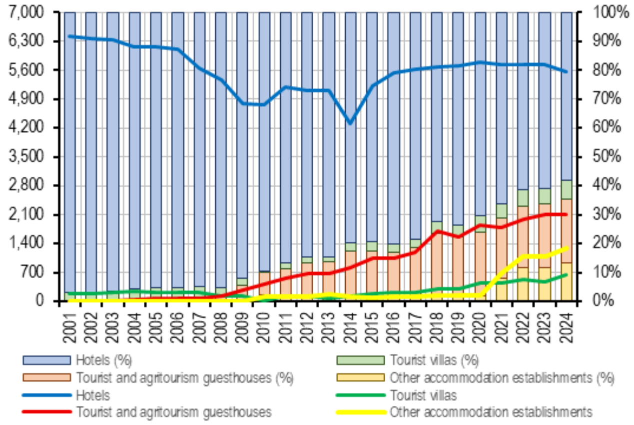

Figure 4: The dynamics of existing tourist accommodation capacity by type of establishment in Băile Felix-Băile 1 Mai (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

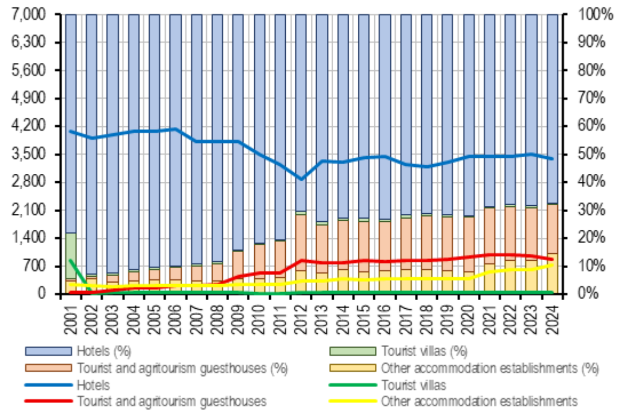

Figure 5: The dynamics of existing tourist accommodation capacity by type of establishment in Băile Herculane (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

Comparatively, the two resorts align on diversification but diverge on development mode. By 2024, Băile Felix-Băile 1 Mai combines diversification with strong total growth (9,591 places; +44.8%), while Băile Herculane combines diversification with near-stability in total capacity (5,050 places; −3.1%). In Băile Felix-Băile 1 Mai, new capacity is primarily added through non-hotel segments (guesthouses and other structures), whereas hotels lose capacity; in Băile Herculane, diversification is mainly compensatory, offsetting declines in hotels and especially villas. Their county roles also differ: the decline in total-capacity share is stronger in Caraș-Severin (to 46.6%) than in Bihor (to 53.5%), implying a more pronounced deconcentration of capacity in Caraș-Severin. At the same time, both resorts still dominate county hotel capacity in 2024 (65.8% in Bihor; 73.1% in Caraș-Severin), but the downward long-term tendency indicates that the expansion frontier in both counties increasingly lies outside the classic hotel-centric spa core.

Tourist accommodation capacity in operation

Băile Felix-Băile 1 Mai undergoes a long-term reconfiguration of operational accommodation capacity (capacity "in function", combining places and operating days). By 2024, total operational capacity stands at 2,285,997, implying only a marginal long-run change compared with the early 2000s (−1.6% over 2001-2024). This apparent stability, however, conceals pronounced cyclical volatility (including a deep trough in the mid-2010s and a major shock in 2020) followed by a strong recovery in the early 2020s. The decisive transformation is compositional: hotels remain the largest component, but their operational capacity declines to 1,389,230 and their share contracts to 60.8% in 2024. The offsetting growth is concentrated in non-hotel segments, especially tourist and agrotourist guesthouses (477,101; 20.9%), complemented by tourist villas (187,796; 8.2%) and other accommodation structures (231,870; 10.1%). At county scale, the resort's contribution to Bihor's total operational capacity drops to 49.3% in 2024, indicating that the operational-capacity frontier increasingly shifts toward locations outside the spa core (Fig. 6).

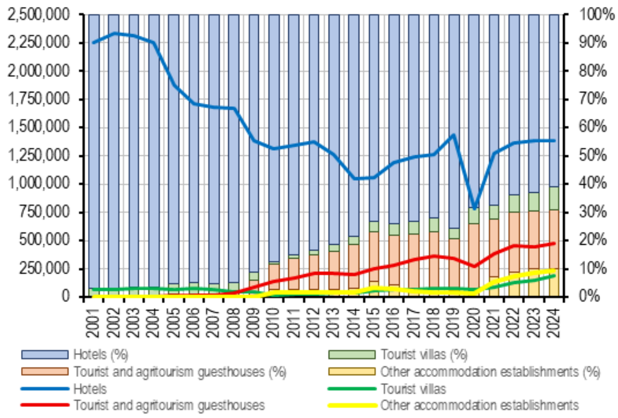

Figure 6: The dynamics of touristic accommodation capacity in function by type of establishment in Băile Felix-Băile 1 Mai (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

Băile Herculane follows a comparable pattern of cyclical adjustment, but with a slightly stronger long-run

Forum geografic. Studii și cercetări de geografie și protecția mediului
Volume **XXIV**, Issue **2** (**Decembre 2025**), pp. **262-281**; DOI: **10.5775/fg.2025.3722.d**

contraction. In 2024, total operational capacity reaches 1,205,707 (−3.7% over 2001-2024), with visible downswings and recoveries culminating in a post-2020 rebound that does not fully eliminate longer-term pressures. Structurally, hotels continue to anchor operational capacity, yet their weight declines: hotel operational capacity reaches 894,362 and the hotel share falls to 74.2% in 2024. Non-hotel components expand and become a meaningful counterbalance, led by tourist and agrotourist guesthouses (185,536; 15.4%) and other structures (121,873; 10.1%), while tourist villas remain marginal in the operational mix (0.3% in 2024). For category-level interpretation, the villa series contains missing values (2002 and 2023), which limits strict year-to-year inferences for that segment. At county level, the resort's share of Caraș-Severin operational capacity declines to 58.3% in 2024, consistent with a gradual deconcentration toward other localities (Fig. 7).'

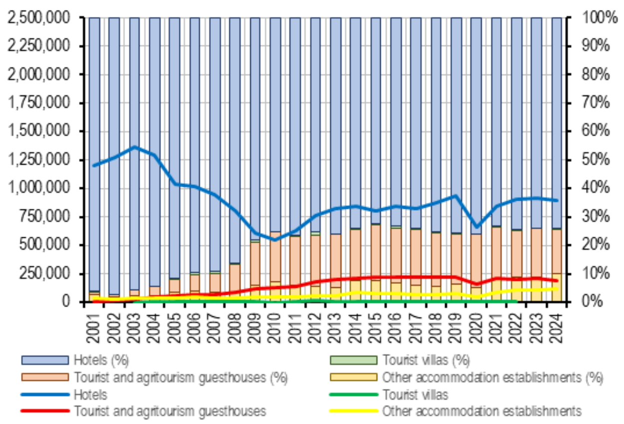

Figure 7: The dynamics of touristic accommodation capacity in function by type of establishment in Băile Herculane (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

Comparatively, Băile Felix-Băile 1 Mai operates at a substantially larger scale: its 2024 operational capacity (2,285,997) is around 1.90 times that of Băile Herculane (1,205,707). Both resorts move away from near-total hotel dominance toward more diversified operational capacity, but the magnitude differs, with a stronger diversification in Băile Felix-Băile 1 Mai (hotel share 60.8%) than in Băile Herculane (74.2%). In both cases, the main counterweight to declining hotel-based operational capacity is the rise of guesthouses and other structures, which increases the functional fragmentation of the accommodation base. The two series also display synchronized disruption and recovery around 2020-2021, reinforcing the role of system-wide shocks rather than purely local factors. Finally, the decline in county shares (Bihor: 49.3% in 2024; Caraș-Severin: 58.3% in 2024) indicates that, over 2001-2024, operational capacity expands relatively faster outside the two spa cores than within them, even as both resorts remain the dominant nodes of their respective county tourism infrastructures.

Average tourist accommodation capacity per accommodation establishment

Băile Felix-Băile 1 Mai shows a pronounced long-term downsizing of average establishment size, with the overall mean capacity per structure reaching 40 places per unit in 2024, compared with much larger unit sizes at the beginning of the period. This pattern is consistent with a transition from a supply dominated by a limited number of high-capacity units toward a much larger population of small and medium establishments. Hotels continue to define the upper end of the size distribution, yet their average size also declines substantially, reaching 265 places per hotel in 2024, which signals a weakening of the large-hotel model in average terms (through restructuring, market entry of smaller hotels, or both). Non-hotel segments consolidate the fragmentation signal: villas remain small in typical years and reach 22 places per unit in 2024; guesthouses converge toward a small-unit norm, reaching 20 places per unit in 2024; and "other structures" shift from an initially high average to a very low average by 2024 (15 places per unit), indicating that this category increasingly consists of numerous micro-units rather than a few large facilities (Fig. 8).

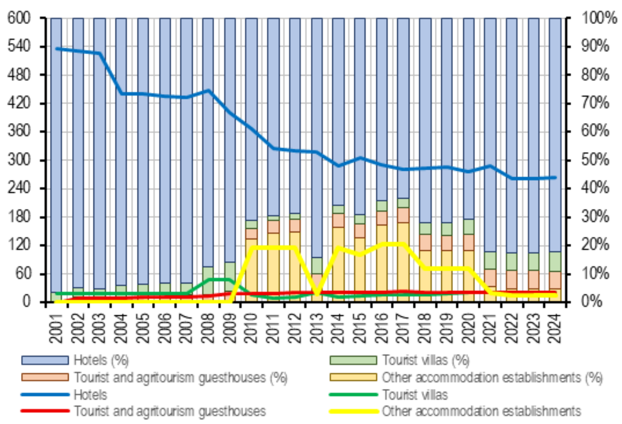

Figure 8: The dynamics of average tourist accommodation capacity per accommodation establishment by type of establishment in Băile Felix-Băile 1 Mai (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

Băile Herculane follows the same general trajectory - fragmentation and downsizing - but ends the period with a slightly higher average establishment size. The overall mean capacity per structure reaches 54 places per unit in 2024, reflecting a less extreme proliferation of micro-accommodation units than in Băile Felix-Băile 1 Mai. Hotels remain the largest category, but their average size declines to 227 places per hotel in 2024, again pointing to a gradual erosion of the large-hotel dominance in average terms. Villas show the sharpest long-term contraction, reaching 32 places per unit in 2024 and aligning with small-scale villa typologies. Guesthouses remain firmly within the small-unit segment, reaching 20 places per unit in 2024, while "other structures" also shrink toward a low average (21 places per unit in 2024), reinforcing the broader pattern of a more fine-grained, dispersed accommodation base (Fig. 9).

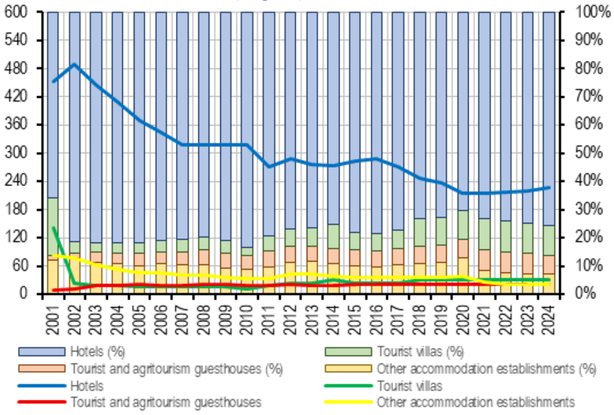

Figure 9: The dynamics of average tourist accommodation capacity per accommodation establishment by type of establishment in Băile Herculane (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

Comparatively, both resorts experience a strong decline in average capacity per structure over 2001-2024, implying that establishment growth outpaces bed-capacity growth and that market entry increasingly occurs through small units. The downsizing is more intense in Băile Felix-Băile 1 Mai, which reaches a lower overall average (40) than Băile Herculane (54) by 2024, consistent with a more extensive proliferation of micro-accommodation units in the former. In both settings, hotels remain the largest category but converge downward in average size (265 in Băile Felix-Băile 1 Mai; 227 in Băile Herculane), narrowing the gap between hotels and the rest of the supply. By 2024, non-hotel segments display broadly similar small-unit profiles: guesthouses cluster at 20 places per unit in both resorts, "other structures" remain low (15 versus 21), and villas are small (22 versus 32). Overall, the trajectories point to a shared transition from concentrated, high-capacity accommodation toward a diversified, fine-grained supply base, with Băile Felix-Băile 1 Mai exhibiting the stronger shift toward smaller average establishment size.

Dynamics of tourist flows

Tourist arrivals in accommodation establishments

Băile Felix-Băile 1 Mai records a strong expansion of tourist arrivals over 2001-2024, combined with a clear diversification of demand across accommodation types. By 2024, total arrivals reach 253,366, and the post-2020 recovery is not only complete but also growth-oriented. Hotels remain the main gateway in absolute terms (177,092 arrivals in 2024), yet their relative dominance weakens as non-hotel segments absorb an increasing share of demand. The diversification signal is especially visible in the rise of tourist and agrotourist guesthouses (39,215 arrivals in 2024) and, to a lesser extent, in tourist villas (20,083) and other accommodation structures (16,976). In territorial terms, the resort's county role becomes relatively less central despite absolute growth: its share of Bihor total arrivals reaches 41.8% in 2024, indicating that other destinations in the county capture arrivals at a faster pace over the same interval (Fig. 10).

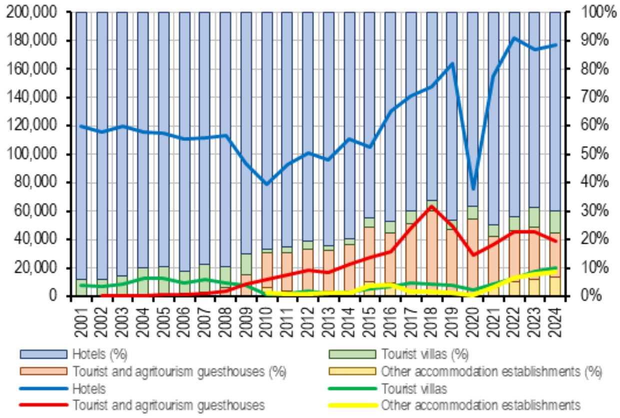

Figure 10: The dynamics of tourist arrivals in accommodation establishments by type of establishment in Băile Felix-Băile 1 Mai (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

Băile Herculane displays a more cyclical demand trajectory and retains a more hotel-centric profile. In 2024, total arrivals reach 160,093, reflecting a recovery that is broadly complete but less expansionary than in Băile Felix-Băile 1 Mai. Hotels represent the backbone of demand, accounting for 135,556 arrivals in 2024 and shaping the overall pattern through their dominant contribution. Non-hotel segments expand as well, but mainly as a secondary layer: guesthouses reach 13,595 arrivals and other structures 10,462 in 2024, while tourist villas remain marginal (480 arrivals in 2024). For accommodation-type detail, the villa series includes missing values (2002 and 2023), which constrains strict category-specific interpretation for those years.

At county scale, Băile Herculane continues to function as the principal demand pole: its share of total county arrivals is 67.2% in 2024, signalling persistent spatial concentration of tourism demand in Caraș-Severin around the spa core (Fig. 11).

Forum geografic. Studii și cercetări de geografie și protecția mediului
Volume **XXIV**, Issue **2** (**Decembre 2025**), pp. **262-281**; DOI: **10.5775/fg.2025.3722.d**

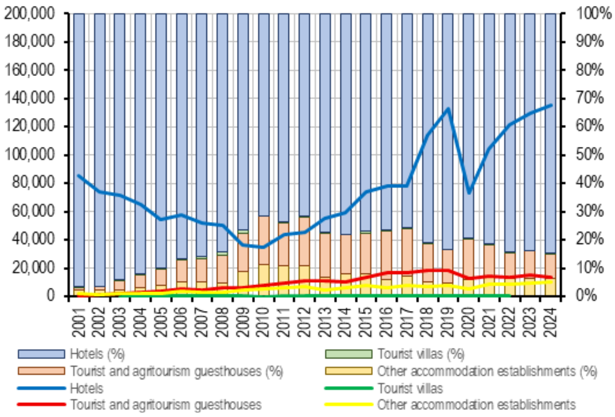

Figure 11: The dynamics of tourist arrivals in accommodation establishments by type of establishment in Băile Herculane (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

Comparatively, Băile Felix-Băile 1 Mai operates at a larger demand scale by 2024 (253,366 arrivals versus 160,093) and exhibits a more diversification-driven growth model. While both resorts remain hotel-led, the accommodation mix of arrivals is more balanced in Băile Felix-Băile 1 Mai, where non-hotel segments (especially guesthouses) account for a substantial and rapidly grown component of demand. Băile Herculane, in contrast, remains strongly anchored in hotel arrivals, which aligns with its higher county centrality. This is also reflected in the spatial concentration of hotel demand in 2024: Băile Herculane concentrates 82.1% of Caraș-Severin County hotel arrivals, whereas Băile Felix-Băile 1 Mai concentrates 42.4% of Bihor County hotel arrivals. Overall, both resorts register the 2020 shock and subsequent rebound, but the post-2020 path is more expansionary in Băile Felix-Băile 1 Mai and more stabilization-oriented in Băile Herculane.

Tourist overnight stays in accommodation establishments

Băile Felix-Băile 1 Mai sustains a high-volume overnight economy throughout 2001-2024, while undergoing a clear shift from near-total hotel dominance toward a more diversified overnight mix and showing strong sensitivity to system-wide shocks. In 2024, total overnight stays reach 899,966—high by historical standards, although still below the pre-shock maximum. Hotels remain the backbone in absolute terms (735,572 overnights in 2024), yet their relative weight declines as non-hotel segments gain substantive relevance in the overnight profile. Guesthouses become a significant component (83,924 overnights in 2024), alongside tourist villas (43,333) and other accommodation structures (37,137), indicating that extended stays are increasingly distributed across smaller-scale units rather than being concentrated almost exclusively in hotels. The county perspective confirms a gradual spatial deconcentration of overnight demand: the resort accounts for 58.1% of Bihor County overnight stays in 2024, implying that the county's overnight economy becomes more dispersed even as Băile Felix-Băile 1 Mai remains the dominant node (Figl 12).

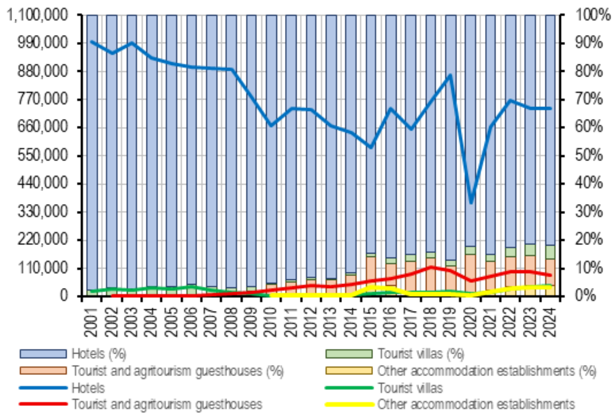

Figure 12: The dynamics of tourist overnight stays in accommodation establishments by type of establishment in Băile Felix-Băile 1 Mai (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

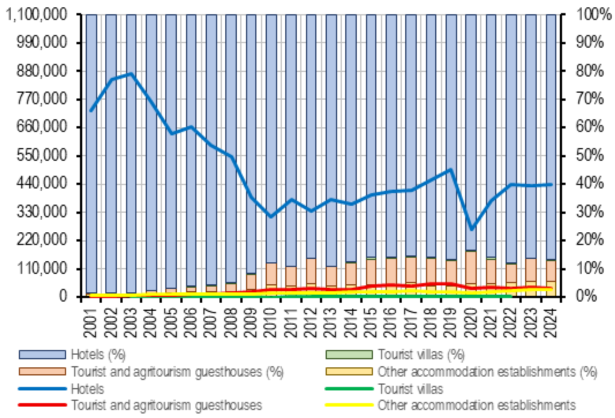

Figure 13: The dynamics of tourist overnight stays in accommodation establishments by type of establishment in Băile Herculane (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

Băile Herculane shows a more pronounced contraction-recovery pattern over the period and retains stronger hotel centrality in overnight terms. In 2024, total overnight stays reach 502,380, reflecting a recovery that is broadly stable in the most recent years but does not fully restore earlier highs. Hotels continue to shape the overnight trajectory, accounting for 436,470 overnights in 2024 and remaining the decisive component of the total. Non-hotel segments expand but remain secondary: guesthouses reach 35,744 overnights and other structures 28,474 in 2024, while tourist villas remain marginal (1,692 in 2024). For accommodation-type detail, the villa series includes missing values (2002 and 2023), which limits strict continuity of interpretation for that category. Territorial concentration remains very high: in 2024, the resort still generates 76.1% of Caraș-Severin County overnight stays, indicating that overnight demand remains strongly anchored in the spa core despite gradual diversification (Figure 13).

Comparatively, Băile Felix-Băile 1 Mai operates at a larger overnight scale in 2024 (899,966 versus 502,380) and exhibits a stronger diversification of overnight stays away from hotels. Both resorts share the same broad macro-pattern of pre-2010 weakening, growth toward the late 2010s, a major disruption in 2020, and recovery thereafter; the main difference lies in the structure and spatial footprint of recovery. Băile Felix-Băile 1 Mai combines high volume with a more balanced distribution of overnights across guesthouses and other non-hotel forms, while Băile Herculane remains more dependent on hotel overnights and more spatially concentrated within its county. This divergence is also visible in county roles: Băile Felix-Băile 1 Mai's share of Bihor County overnights is 58.1% in 2024, whereas Băile Herculane retains a markedly higher dominance in Caraș-Severin County (76.1%). Overall, both destinations recover strongly after the 2020 shock, but Băile Felix-Băile 1 Mai evolves toward a more diversified overnight system, while Băile Herculane remains comparatively concentrated and hotel-centric.

Average length of stay

Băile Felix-Băile 1 Mai shows a sustained contraction of the average length of stay, consistent with a transition from a classic spa-treatment profile toward a shorter-stay model. By 2024, the total average length of stay reaches 3.6 nights, indicating a structural shift toward brief visits and micro-holidays even in a traditionally long-stay destination. Hotels mirror this transformation and remain the key mechanism behind the aggregate compression: the hotel segment stabilizes at 4.2 nights in 2022-2024, signalling that shorter trips have become mainstream even in the core accommodation format. Non-hotel categories are structurally shorter and reinforce this pattern: tourist villas reach 2.2 nights in 2024, guesthouses stabilize at 2.1 nights in 2023-2024, and other accommodation structures converge around 2.2 nights in 2023-2024 after earlier volatility. Relative to Bihor County, the resort continues to generate longer stays than the county mean (139.3% in 2024), but the advantage narrows over time, pointing to gradual convergence toward the broader county stay pattern (Fig. 14).

Băile Herculane starts from a more pronounced long-stay baseline and then experiences a deeper, longer compression, consistent with the erosion of extended cure-type stays and the rise of shorter leisure trips. In 2024, the total average length of stay reaches 3.1 nights, reflecting a stronger end-state compression than in Băile Felix-Băile 1 Mai. Hotels again drive the aggregate: the hotel average declines to 3.2 nights in 2024, indicating that the traditional long-hotel-stay model is no longer dominant in practice. Non-hotel segments cluster in the short-stay range and remain comparatively stable: guesthouses stabilize at 2.6 nights in 2023-2024 and other accommodation remains around the mid-2 to low-3 range. Tourist villas are more volatile and reach 3.5 nights in 2024; the villa series includes missing values (2002 and 2023), which limits strict continuity of interpretation for that segment. Relative to Caraș-Severin County, the resort remains above the county average (113.2% in 2024), although the premium gradually declines, again indicating convergence (Fig. 15).

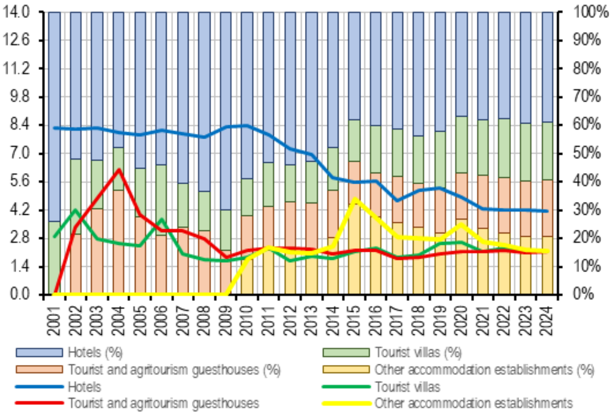

Figure 14: The dynamics of average length of stay by type of establishment in Băile Felix-Băile 1 Mai (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

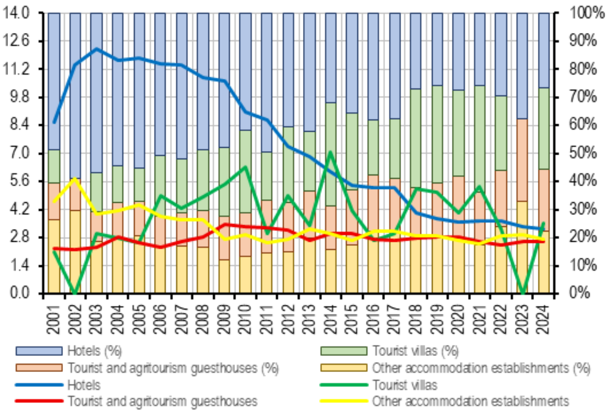

Figure 15: The dynamics of average length of stay by type of establishment in Băile Herculane (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

Comparatively, both resorts converge toward short-stay tourism by 2024, but from different historical baselines and with different compression intensity. Băile Herculane begins with substantially longer stays and ends slightly lower (3.1) than Băile Felix-Băile 1 Mai (3.6),

Forum geografic. Studii și cercetări de geografie și protecția mediului
Volume **XXIV**, Issue **2** (**Decembre 2025**), pp. **262-281**; DOI: **10.5775/fg.2025.3722.d**

implying a stronger shift toward short breaks in Herculane. In both cases, hotel compression is decisive: hotel stays reach 4.2 nights in Băile Felix-Băile 1 Mai and 3.2 nights in Băile Herculane, pulling down the overall averages. At the same time, the growing weight of guesthouses and other small-unit segments - clustered around 2.1-2.7 nights - structurally favours shorter trip formats. Overall, the trajectories indicate a transformation from cure-like extended stays to more flexible, weekend and micro-holiday consumption, with Băile Herculane exhibiting the stronger final compression and Băile Felix-Băile 1 Mai retaining a marginally longer average stay.

Accommodation capacity utilization

Băile Felix-Băile 1 Mai exhibits a medium-to-high utilization profile, with occupancy clustering around the low-40% to low-50% range for most of the period and showing a clear sensitivity to the 2020 shock. By 2024, the total occupancy rate reaches 39.4%, which places the resort slightly below its pre-pandemic utilization regime and indicates an incomplete return to earlier peak-performance conditions. Hotels function as the main stabilizer of overall utilization: their occupancy reaches 61.6% at the best-performing points of the series and remains the segment that anchors the aggregate, while non-hotel categories display markedly weaker and more volatile utilization. Tourist villas show the widest dispersion (ranging up to 50.2% in the strongest year but dropping to very low values such as 11.2% in weaker years), consistent with small bases and irregular demand absorption. Guesthouse-type units remain structurally lower (17.6%-35.5%), implying that the rapid proliferation of small units does not automatically translate into proportionate utilization and may reflect stronger seasonality, shorter stays, and more uneven market positioning (Fig. 16).

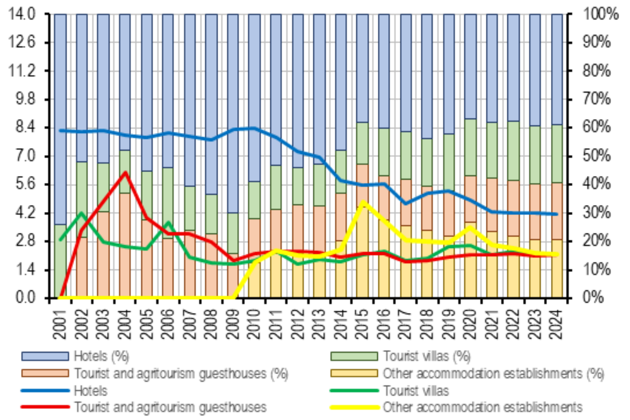

Figure 16: The dynamics of accommodation capacity utilization by type of establishment in Băile Felix-Băile 1 Mai (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

Băile Herculane follows a distinctly different trajectory: very high utilization at the beginning of the series, followed by a prolonged decline and only partial recovery in the later period. The early 2000s are characterized by exceptionally strong occupancy, reaching 65.7% at the peak, which implies a tight demand-capacity balance and high absorption of available capacity. This regime weakens substantially in the following years, with the resort settling into a markedly lower utilization range after the mid-2010s. In 2024, total occupancy reaches 41.7%, signalling recovery relative to the 2020 low but remaining far below the initial high-utilization regime. Hotels still underpin performance, yet their utilization deteriorates strongly relative to the early period (for example, from 68.4% at the high point to low-40% values during the downturn years), suggesting weaker matching between demand and the available hotel stock, slower repositioning, and/or intensified seasonality. Segment dispersion is again substantial, especially for tourist villas (ranging from 9.0% in low years to 72.6% in episodic high years), while guesthouse-type units remain persistently low (14.8%-24.1%), limiting their contribution to aggregate occupancy (Fig. 17).

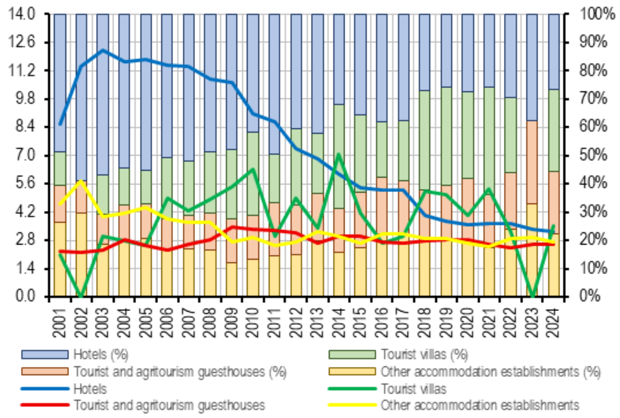

Figure 17: The dynamics of accommodation capacity utilization by type of establishment in Băile Herculane (2001-2024)

Data source: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table and own calculations

Comparatively, Băile Herculane begins as the clear utilization leader, but Băile Felix-Băile 1 Mai becomes the more consistent performer through much of the middle of the period, and the two converge by the early 2020s. The contrast between peak regimes is large: Băile Herculane reaches 65.7% at its early maximum, whereas Băile Felix-Băile 1 Mai's early utilization is much lower, reflecting different historical demand-capacity balances. Over time, Băile Felix-Băile 1 Mai gains relative advantage through stronger and more stable hotel-led utilization, while Băile Herculane experiences a sharper deterioration in its hotel segment and a longer adjustment toward a lower-utilization equilibrium. By 2024, the totals are close again

(39.4% versus 41.7%), indicating that recent performance is shaped less by historical dominance and more by contemporary capacity management, seasonality control, and the ability to convert arrivals into effective overnight production under a more fragmented accommodation structure.

Discussion

This comparative, indicator-based study of Băile Felix-Băile 1 Mai and Băile Herculane over 2001-2024 shows how accommodation supply, tourist flows, and derived performance ratios co-evolve, and why interpreting any single metric in isolation can be misleading. By coupling structural variables (number of establishments, bed places, capacity in function) with behavioural and performance indicators (average length of stay and accommodation capacity utilisation), and by adding county-share measures, the analysis provides an integrated picture of destination dynamics that aligns with contemporary calls for coherent performance-measurement frameworks in tourism and hospitality research.

A first robust finding concerns the structural transformation of the accommodation base. Both resorts shift away from a concentrated, large-unit model toward a more fine-grained supply, but the magnitude differs. In Băile Felix-Băile 1 Mai, the number of establishments expands strongly (22 in 2001 to 237 in 2024), while average capacity per establishment drops sharply (301 to 40), signalling a rapid proliferation of small units and an increasingly diversified supply structure. Băile Herculane follows the same direction (average capacity per establishment 237 to 54), yet ends the period with a higher average size, suggesting a comparatively slower or less extensive fragmentation of supply. This pattern is consistent with evidence that structural change in accommodation capacity can be sizeable and can reshape how destinations absorb demand and reposition their product mix, with implications for competitiveness and destination management.

On the demand side, both resorts display a shared macro-cycle: weakening toward 2009-2010, sustained expansion to 2019, a sharp disruption in 2020, and recovery thereafter. However, the post-2020 trajectories are not identical. Băile Felix-Băile 1 Mai reaches a high-volume plateau after recovery but remains below its 2019 peak in overnight stays (993,364 in 2019 versus 899,966 in 2024), while Băile Herculane returns to a relatively stable level close to its recent plateau (502,380 in 2024). This divergence matters because it suggests different demand absorption regimes: a more expansionary recovery in Felix versus a more stabilisation-oriented recovery in Herculane, which is relevant when interpreting resilience as both “bouncing back” and adapting to new market conditions.

Average length of stay emerges as a key behavioural mechanism linking flows to utilisation. Both resorts converge toward short-stay tourism by 2024, but from different baselines and at different speeds. Băile Herculane starts the early 2000s with very long stays (11.7 in 2003) and compresses to 3.1 by 2024, while Băile Felix-Băile 1 Mai moves from 7.9 (2003) to 3.6 (2024). The decisive driver is the compression of hotel stays (down to 4.2 in Felix and 3.2 in Herculane by 2024), showing that even the core spa-hotel segment increasingly hosts shorter visits. This is consistent with the broader literature that treats length of stay as sensitive to visitor composition, trip purpose, accessibility, and destination attributes, and that distinguishes determinants of short stays from those of longer stays; in spa contexts, perceived service value and satisfaction can additionally shape repeat visitation and time allocated to the destination. Substantively, the observed compression suggests a structural shift from “cure-like” extended stays toward weekend and micro-holiday consumption, which can raise arrivals while simultaneously weakening occupancy unless overnight volumes increase.

Accommodation capacity utilisation synthesises these interacting changes and reveals the most consequential contrast between the two resorts. Băile Herculane begins as a clear utilisation leader, peaking at 65.7% in 2002 and remaining high in 2001-2008, then experiences a pronounced decline, with a steep break in 2012-2014 (down to 36.5% in 2014) and only partial recovery to 41.7% in 2024. In contrast, Băile Felix-Băile 1 Mai maintains a medium-to-high occupancy profile with multi-year high phases (for example, 52.1%-53.4% in 2006-2009; 52.4%-52.9% in 2014-2016), then also drops in 2020 and recovers to 39.4% by 2024. The crossover in the early 2010s - when Felix sustains around 47.5%-52.4% while Băile Herculane falls into the high-30s - indicates that long-run “historical dominance” does not guarantee continued performance; rather, utilisation appears increasingly shaped by contemporary capacity management and by the ability to translate arrivals into longer effective stays under changing consumption patterns. Structurally, hotels remain the performance backbone in both resorts, but stability differs: Felix shows higher and more stable hotel occupancy in much of the post-2014 period, whereas Băile Herculane’s hotel segment shows a sharper deterioration, consistent with weaker demand absorption relative to available capacity or slower modernisation and market repositioning.

The county-share indicators add a territorial interpretation that is often absent from single-destination performance profiles. In Bihor County, Băile Felix-Băile 1 Mai remains the dominant node, yet its shares decline markedly (for example, its share of county overnight stays from 83.9% in 2001 to 58.1% in 2024), implying a more spatially distributed tourism economy over time. In Caraș-Severin County, Băile Herculane remains far more concentrated (overnight stays share from 92.5% to 76.1%), signalling that the county's tourism system continues to rely heavily on the spa centres. On the supply side, both resorts also lose relative weight in operational capacity within their counties (Bihor: 80.5% to 49.3%; Caraș-Severin: 69.9% to 58.3%), suggesting that capacity growth increasingly lies outside the traditional spa centres even while the resorts remain dominant infrastructure nodes. For regional planning, these patterns point to different governance challenges: managing polycentric growth and quality consistency in Bihor County versus strengthening diversification and complementary nodes in Caraș-Severin County.

From a resilience perspective, the synchronised 2020 shock across indicators and the subsequent rebound illustrate both vulnerability and adaptive capacity in spa tourism systems. The recovery is not merely a return to previous levels but also a reconfiguration under changed demand conditions, with shorter stays and a more diversified accommodation base playing a larger role. This aligns with work that frames resilience as the ability to absorb shocks while adapting through governance, coordination, and product adjustment rather than through passive recovery alone. Practically, the results suggest that sustaining utilisation under a short-stay regime requires strategies that either extend stays (through treatment packages, multi-day experiences, and repeat-visit incentives) or increase throughput without eroding service quality, while aligning operational capacity decisions with realistic demand absorption.

The study's descriptive design is also its main limitation and its key practical strength. Using annual official statistics enables long-run comparability and a clear reading of phases and breakpoints, but it cannot directly decompose seasonality, price effects, quality upgrading, or detailed market segmentation. The presence of missing values in some accommodation-type series (for example, tourist villas in specific years) further cautions against over-interpreting category-level discontinuities. Even with these constraints, the integrated indicator framework demonstrates that, for spa destinations, the critical analytical and managerial question is not simply "growth versus decline," but how supply restructuring, length-of-stay compression, and capacity management jointly shape utilisation and the destination's evolving role within its wider regional tourism system.

Conclusion

This paper set out to quantify and interpret the co-evolution of accommodation supply and tourist flow in two emblematic Romanian spa destinations - Băile Felix-Băile 1 Mai and Băile Herculane - over 2001-2024, using INSSE Tempo Online annual series and a consistent set of derived indicators (average capacity per establishment, average length of stay, and accommodation capacity utilisation), complemented by county-share measures.

The results confirm a shared structural transition away from a concentrated, large-unit accommodation model toward a more fragmented supply base dominated by small units, but with different intensity. Băile Felix-Băile 1 Mai expands from 22 to 237 accommodation structures and records a steep decline in average capacity per establishment (301 to 40 places per structure), indicating rapid proliferation of small and medium units. Băile Herculane follows the same direction (22 to 94 structures; 237 to 54 places per structure), yet ends the period with a higher average unit size and a more persistent hotel-centred configuration. In capacity terms, Băile Felix-Băile 1 Mai grows strongly (6,622 to 9,591 places), while Băile Herculane is broadly stable to slightly declining (5,209 to 5,050).

On the demand side, both resorts exhibit the same macro-dynamics - decline into 2009-2010, expansion to 2019, a sharp 2020 disruption, and recovery thereafter - yet the post-2020 outcome differs. Băile Felix-Băile 1 Mai stabilises below its 2019 overnight peak (993,364 in 2019 versus 899,966 in 2024), while Băile Herculane returns to a relatively stable plateau close to its recent levels (502,380 in 2024; 503,842 in 2023). A central behavioural mechanism behind performance change is the strong compression of the average length of stay: Băile Felix-Băile 1 Mai contracts to 3.6 by 2023-2024 (from 8.0-7.9 in 2001-2003), while Băile Herculane contracts more deeply to 3.1 in 2024 (from a peak of 11.7 in 2003), indicating a systemic shift from extended spa-type stays toward shorter visits even within the hotel segment.

Accommodation capacity utilisation integrates these processes and highlights a long-run re-ranking. Băile Herculane starts as the utilisation leader (peak 65.7% in 2002) but experiences a pronounced decline with a steep break in 2012-2014 (down to 36.5% in 2014) and only partial recovery to 41.7% by 2024. Băile Felix-Băile 1 Mai becomes the stronger performer through much of the 2010s (47.5%-52.4% in 2012-2014), then both converge after the 2020 minimums, reaching similar utilisation levels by 2024 (39.4% in Băile Felix-Băile 1 Mai versus 41.7% in Băile Herculane). Overall, the evidence supports the interpretation that, under a short-stay regime, utilisation depends critically on aligning operational capacity with demand absorption and on the capacity of the destination to translate arrivals into overnight volume.

The county-share indicators add an explicit territorial reading: both resorts remain dominant nodes, but their relative weight declines, signalling faster growth of tourism activity and capacity outside the spa cores. Băile Felix - Băile 1 Mai's share of Bihor County overnights falls from 83.9% to 58.1%, while Băile Herculane's share of Caraș-Severin overnights remains much higher but still decreases from 92.5% to 76.1%. On the operational-supply side, the same deconcentration appears (Bihor: 80.5% to 49.3%; Caraș-Severin: 69.9% to 58.3), even though both resorts continue to anchor county hotel capacity in 2024 (65.8% of Bihor hotel places in Băile Felix-

Băile 1 Mai; 73.1% of Caraș-Severin hotel places in Băile Herculane).

From a policy and management perspective, two implications follow directly from the indicator evidence. First, the observed fragmentation of supply and the growth of non-hotel segments require stronger destination-level coordination to protect service consistency and to manage capacity in function under more heterogeneous operating patterns. Second, sustaining utilisation under compressed length of stay implies that performance strategies should target either effective stay extension (through product packaging and experience design that increases overnight volume per visitor) or tighter operational-capacity calibration, because expanding capacity without a commensurate increase in overnight stays is reflected in lower occupancy.

The study's main limitation is its annual, descriptive nature: while long-run series clearly identify phases and breakpoints (including 2020), they cannot directly decompose seasonality, pricing, quality upgrading, or detailed market segmentation, and some accommodation-type series include missing values that constrain continuous category-level interpretation. Future work can build on this baseline by integrating monthly data (to test seasonality-utilisation links), segmenting by tourist origin and accommodation comfort categories, and applying explanatory modelling to quantify how capacity restructuring and length-of-stay shifts jointly drive utilisation outcomes across spa destinations.

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Author contribution

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Conflicts of interest

The authors declare no conflict of interest.

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