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DOCTORAL THESIS

**ROMAN ROADS AS SPACES SHAPING GEOGRAPHICAL
AXES. DYNAMICS. IDENTITY. ARCHAEO TOURISM**

(Summary)

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INTRODUCTION

1.1. Importance of the topic in the national and international context

Recent developments in tourism indicate a significant expansion of its role in economic and social dynamics, going beyond its traditional function as a recreational activity. Tourism is increasingly analysed as an instrument for capitalising on cultural and natural resources, contributing to the consolidation of territorial identity and to the development of local communities. Romania is regarded as a touristic and cultural destination owing to its valuable historical heritage and high touristic attractiveness.

For this phenomenon to gain momentum and function properly, in-depth multidisciplinary studies encompassing the main objective of the research are needed. The need for such in-depth studies stems from the fact that capitalising on points of touristic and cultural attraction will be achieved on the basis of archaeological heritage, with the help of axis-type structures.

Internationally, this field of study is approached at a level far more advanced than that found within our own country. Research into heritage and the entire archaeological infrastructure is supported by a large number of funding schemes as well as by conservation and valorisation plans. The territorial planning of international archaeological structures truly highlights the role of archaeological remains and the fact that they can generate independent revenue by strengthening national identity through cultural heritage. Archaeotourism is included in regional development strategies and attracts funding to serve this purpose. Thematic tourist routes are interpreted as cultural and historical axes used in initiatives aimed at capitalising on tourism.

International studies on this subject have intensified because this type of tourism has been operating successfully for several decades. The promotion of thematic routes has been made possible by archaeological discoveries that have been leveraged for the development of archaeotourism. The concept of the geographic-historical axis is used precisely to highlight the connections that exist between the two fields of study and how they facilitate the interpretation of cultural resources for the benefit of the region they belong to. International models demonstrate that organising heritage into well-defined territorial structures, managed by local authorities, can generate multiple benefits.

At international level, studies on capitalising on archaeological heritage have demonstrated the effectiveness of using thematic routes and territorial networks in tourism development. These models highlight the importance of integrated planning and institutional collaboration in heritage management. The high density of archaeological discoveries in Transylvania is a well-founded reason to promote the touristic value of settlement structures and Roman roads, since they reflect the territorial organisation and evolution of the present-day landscape. At present these are insufficiently exploited, because the archaeological sites that lend themselves to promotion are promoted individually, without being incorporated into a coherent system of thematic axes and tourist routes, unlike international models. The territorial system formed by geo-archaeo-touristic axes highlights the relationship that exists between geography, archaeology and tourism. The need for this interdisciplinary research theme at national level will create models for analysing the territory from the perspective of archaeological heritage development, giving fresh impetus to research in the field.

1.2. Motivation for choosing the topic

The motivation for choosing this research topic is the result of a combination of subjective and objective factors. The historical-archaeological wealth that the region of Transylvania still holds today is owed to the lifelong work of specialists and enthusiasts of the past, who through research identified new perspectives and found answers to numerous questions. The contributions made by historians who have supported the complexity of the cultural heritage have helped in understanding both the past and the present-day territory of Transylvania.

When I chose this topic and this field of research, I started from my own specialisation in tourism, acquired at bachelor's and master's level, from knowledge of archaeology rooted in my family's history, and from a wish to bring together, in the dynamic of the two fields mentioned above, the scientific geographic approach without which neither could function. Through the concept and study of axis-type structures, I wanted to develop a multidisciplinary study highlighting the valorisation of tourism in the context of sustainable development. Thus, over recent decades the archaeological heritage of Transylvania has been the subject of much research, in history and archaeology as well as in geography, economics and tourism. Existing studies are based on the analysis of known sites, the reconstruction of Roman roads, their valorisation through economic indicators, and the assessment of their touristic potential. Tourism-related research is abundant and highlights the importance of capitalising on tourism

from both an economic and a cultural point of view. Analysing this body of research, I identified the fact that each subject is treated individually, without any analysis being proposed that integrates the relationships among these three disciplines. This context, in which studies are treated from separate perspectives, gives rise to a well-defined academic motivation underlying the present doctoral thesis, entitled 'ROMAN ROADS AS SPACES SHAPING GEOGRAPHICAL AXES. DYNAMICS. IDENTITY. ARCHAEO TOURISM'. The need for a multidisciplinary study integrating these related fields forms the basis of research that highlights the integration of archaeological heritage into territorial axes that contribute to regional and national tourism development.

In the current research I carried out an analysis of the geo-archaeo-touristic axes located within present-day Transylvania. These axes are grounded in the existing archaeological heritage and in the consolidation of thematic axes with a view to their valorisation. The present work brings together three different disciplines which, taken together, function as a unified system, creating a dynamic of the territory and genuine potential for the sustainable development of archaeotourism. Practising tourism is a human need, a choice made by each individual.

The need to conserve and develop existing cultural heritage constantly influences the evolution of society and territorial development from both a structural and a functional point of view. Demand for practising archaeotourism in Romania has been rising compared with the previous decade, a fact which encourages the study of archaeotourism axes across the territory of Transylvania.

1.3. Stated aim and research objectives

The stated aim of the doctoral thesis is to highlight the development potential of present-day Transylvania through geo-archaeo-touristic axes derived from the existing, discovered and studied archaeological heritage. This research is distinguished from current studies in the field by the fulfilment of its main objective through an integrated approach to the geographical framework, the incorporation of archaeological heritage into thematic axes, and the touristic valorisation of that heritage. Axis-type structures are capable of highlighting the territory's potential for regional development. The secondary objectives are extensions of the main objective, delimited at both a theoretical and an applied level:

- Determining and analysing the territorial distribution of archaeological heritage in relation to the region's major geographical structures;
- Identifying and spatially delimiting the geographical and historical structures that are the subject of the geo-archaeo-touristic axes, by correlating the three elements across the territory;
- Establishing the touristic and cultural value of the geo-archaeo-touristic axes and their touristic development potential within a territorial context;
- Formulating directions for capitalising on heritage by integrating axis-type structures into regional tourism;

1.4. Research hypotheses

The doctoral thesis is centred on a general hypothesis that starts from the archaeological heritage of the territory in question. **The general hypothesis holds that the spatial distribution of the archaeological heritage in the study area is not random, but is conditioned by the geographical framework -- the circulation corridors and nodes that enabled the creation of Roman roads, the hydrographic network, the relief and the climate.** The hypothesis is considered confirmed if the majority of the archaeological sites and routes identified overlap spatially with the geographical structures mentioned. Three specific hypotheses derive from the general hypothesis, namely: **the first specific hypothesis holds that a relationship between geography and archaeology can be demonstrated.** The location of Roman archaeological heritage (roads, forts, settlements) is determined by geographical structures favourable to circulation -- hydrographic and orographic corridors. **A second specific hypothesis, within the interdisciplinary approach, starts from the idea that archaeological heritage is a key factor in tourism development and in shaping specific tourist products.** Identifying and characterising the axes according to the historical functions they fulfilled, and integrating them into tourist routes, allow the regional tourism offer to be diversified and favour the development of archaeotourism. Territorial dynamics are, in fact, the result obtained through the interaction of natural factors and anthropic resources. This leads to a further research hypothesis concerning the correlation of the three research fields, namely the demonstration that **capitalising on heritage through principles of ethics leads to sustainable development.** Territorial dynamics are, in fact, the result of the interaction between natural factors and anthropic resources, and the correlation of the three research fields -- geography, archaeology, tourism -- supports this relationship. The research hypotheses in this work aim to

create a useful instrument for capitalising on archaeotourism in the Transylvania region, with economic implications and the stimulation of sustainable development.

1.5. Limitations of current studies and the need for research in the field

Numerous archaeological research studies have focused largely on identifying discoveries, determining the historical period they belong to, their conservation, and their integration into other specialist studies. Historical studies have contributed to knowledge of archaeological and cultural heritage as well as to its contribution to regional development. Although research is abundant and highly specific, the geographical element is very little integrated, being merely mentioned within historical descriptions. Multidisciplinary studies are relatively limited, and the concept of the geo-archaeological axis, to which touristic valorisation is added, remains insufficiently explored in the specialist literature. On the other hand, studies in human geography and tourism focus on assessing the touristic potential of individual tourist attractions, without an in-depth analysis of the phenomenon that led to that attraction being located at that particular point in the territory. Because these disciplines are approached separately and individually, information becomes fragmented and there are limitations in understanding how these disciplines contribute to the dynamics of space. An interdisciplinary perspective must be grounded in a concrete methodology correlating the three fields of study. The limitations of these studies open up a new perspective on how archaeological tourism could be capitalised on. This is why the need for the present research becomes ever more evident, as it seeks to overcome these limitations.

2. STATE OF RESEARCH AT NATIONAL AND INTERNATIONAL LEVEL

2.1. Current scientific context and theoretical grounding regarding the current state of knowledge in the field

The territorial structures proposed in the present doctoral research lie at the intersection of geography, archaeology and tourism. This encourages an interdisciplinary approach to documentation aimed at understanding how natural and anthropic elements are combined.

The analysis of axis-type structures creates a theoretical and practical framework for capitalising on historical and cultural heritage. The main concept used in this research is the 'axis', employed across all three disciplines. This linear form actively participates in organising human activities and favours the concentration of economic activities with a view to territorial development. In this research I draw on three types of axes: geographical, archaeological and touristic. By reviewing the relevant literature, it becomes clear that historical axes are closely linked to geographical axes, which together favour the creation of tourist axes and their valorisation. Geographical axes have a major bearing on everything related to transport networks, both current and historical, that survive to this day; hydrographic axes played an important role in establishing Roman roads, many of which survive largely intact today; and development axes make it possible to take everything studied so far to a new level by capitalising on it touristically.

The current scientific context shows that axis-type territorial structures play a fundamental role in human development, and through this approach the existing spatial relationships are identified and a conceptual framework for interpreting them is created.

2.2. Current state of research in relation to the subject

2.2.1. International research on geographical axes and Roman roads in the context of historical linear structures

The development of historic roads is closely tied to geographical axes, which are often determined by natural features, trade routes, political borders and cultural connections. Geographical axes -- such as mountain ranges, rivers, valleys and coastlines -- have historically influenced the direction and layout of roads. Geographical axes refer to natural or man-made

lines that guide movement and connectivity. These axes have often shaped the alignment of historic roads through natural features:

- Rivers served as natural axes for transport and trade. Roads often developed along river courses in order to facilitate movement and access to water.

Bryan Campbell (2012) discusses the main themes that made river courses strategic and economic elements in the development of Roman roads. The most fitting examples of hydrographic axes were the Danube, the Rhine, the Nile and the Tiber, which were used as trade routes, functioning as “natural highways” that facilitated the circulation of goods and people. Roman settlements were designed, sited and aligned along river axes in order to have strong connectivity to resource access.

Horden and Purcell (2000) argue that rivers were essential resources and transport routes, and that many types of settlement shaped their economic activities along them. Rivers were interpreted as geographical axes because they acted as connecting hubs, being vital axes for trade and linking areas and territories.

Whittaker (1994) succinctly shows how geographical-type axes influenced the development of Roman frontiers. In this case, we focus on the example of hydrographic axes, which served a military and defensive purpose, but also a strategic one, aiding connectivity and facilitating the movement of goods throughout the empire. Remaining in the same vein, Wilson (2011) describes how rivers played a crucial role in the economy of the Roman Empire and how they fulfilled their role as “natural highways” and economic axes. The Romans invested heavily in infrastructure over water, including the construction of bridges, canals, ports and storage facilities. Roman roads were frequently correlated with hydrographic axes, using river valleys as natural routes linking settlements, which contributed to more efficient circulation and trade activity.

- Roads were built through mountain passes and corridors in order to link regions separated by rugged terrain.

Kolb (2019) presents Roman roads as both a foundation and a means of exercising power, since in the ancient writings of Greek and Roman authors, roads were mentioned among Rome's greatest achievements. The most relevant example he cites is the speech delivered by Aelius Aristides before Emperor Antoninus Pius: he described the Romans as having measured the entire globe, joined rivers with bridges of every kind, cut through mountains to create roads,

established stopping points in uninhabited regions, and introduced a civilised and orderly way of life everywhere. The example that stands out most clearly in the article is the pass through the Swiss Jura Mountains, at Pierre Pertuis, which formed part of a commercial and military route. The Roman inscription found at this pass, dedicated to Marcus Dunius Paternus, demonstrates that political, economic and strategic motives were all involved in implementing the road network.

Fred (1941) presents the route of the Via Egnatia (Figure 1) as one of the most important arteries in the entire Empire, built by the Romans through the mountains, especially during winter, when sailing across the Mediterranean Sea was almost impossible. This road was built with great skill, creating stable ground for trade within the Empire. The Via Egnatia crossed the Balkan Mountains, linking the port of Dyrrachium in Albania to Thessalonica in Greece and continuing on to Byzantium, in Constantinople. Studies and research on this road are extensive: Wilson (2019) describes the history of the road and the beginning of Gnaeus Egnatius's project, presenting the road as a geographical axis structure; Taşkıran and Binan (2021) trace the limits of the axis and highlight its archaeological, historical, economic, technical, cultural and, not least, natural value, since it encompasses all these elements, such as mountains or rivers.



Figure 1. Route of the Roman road Via Egnatia (source: https://pastandpresent.al/via_egnatia)

Frankopan (2019) offers a comprehensive exploration of how geographical axes influenced the development of roads, focusing especially on the Silk Road. He highlights the interplay between geography, trade and human movement, illustrating how natural features and strategic routes shaped the creation and evolution of historic roads. Frankopan points out that the Silk Road was not a single road but a network of routes that followed key geographical axes:

- The east-west axis: the Silk Road followed mainly an east-west axis, connecting China with the Mediterranean Sea. This axis was determined by the natural geography of Eurasia, including mountain ranges, river valleys and deserts.
- Natural corridors: the routes often crossed natural corridors, such as the Hexi Corridor in China, the Fergana Valley in Central Asia and the mountain passes of the Pamirs. These geographical features served as natural axes that guided the direction of movement and trade exchanges.

The network of Roman roads reflects a complex functional organisation that allows the routes to be classified according to the roles they fulfilled. In this context, the present research seeks to outline distinct axes corresponding to the main functions: economic, military and politico-administrative.

In Roman Dacia, the limes and Roman roads can essentially be regarded as axes, since they conform to the principle mentioned above, namely that they are linear forms of development based on the idea that all major activities can be concentrated along a single, unique linear configuration, usually centred on major transport infrastructure. Likewise, the connection between one Roman fort and another can be considered an archaeological axis, since it too is built around a road. An archaeological axis is created when archaeological heritage is found along its route, which gives it its value as an axis, and this depends heavily on geographical factors. Roads, civilian and military settlements, and everything pertaining to life in Roman Dacia developed in close relation to favourable geographical factors.

2.2.2. Geographical axes and development corridors in the specialist literature

The phenomenon of axis development is also confirmed by several historical examples that became transport hubs over time: in Europe, ancient Roman roads connected Rome with England, Babylon, Spain and Egypt, so that trade routes truly became hubs; likewise in the United States, Route 66 facilitated the development of many major settlements, such as Las Vegas (Figure 2).

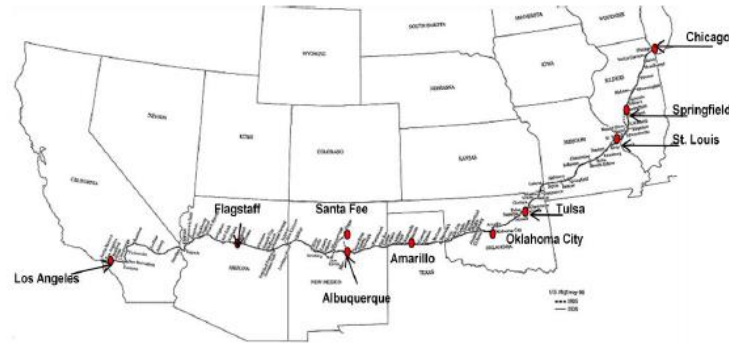


Figure 2. Cities and points along the Route 66 axis (source: Purboyo et al., 2012)

Santoso, Purboyo and Sawitri (2013) analyse how a territory's dynamics change based on the development of a transport node within an axis. Moreover, the study emphasises the influence of transport infrastructure on development and the shaping of urban growth. Taking the specific case of transport nodes along the development axis in the Jamanis District region, these serve as a catalyst for the area's economic and social development. The territory underwent visible transformations during the authors' reference period owing to the presence, at the node, of a mosque built in 1990. Thus, five stages of development of the existing transport node are identified (Figure 3), each stage spaced roughly five years apart:

- The initial attraction was the mosque, built in 1990;
- The development of businesses related to catering and leisure followed in the second stage;
- Mixed land use began, with both businesses and residential areas present;
- The urbanisation process began, with permanent businesses, housing and infrastructure improvements;
- The area became a regional centre, able to sustain its own transport flow.

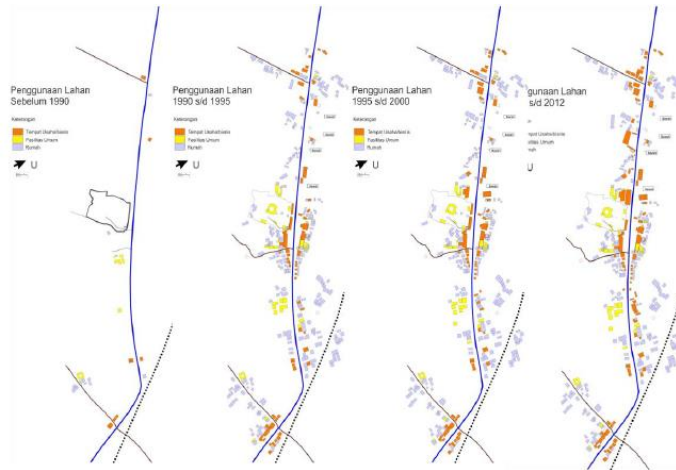


Figure 3. Stages of development of the Jamanis district (source: Santoso et al., 2013)

Population expansion dates back to the Roman Empire, when urban and rural mobility already existed. Today too, urban expansion is developing very rapidly, driving territorial movements and dynamics that create development corridors and urban centres. All the structures that emerge from this development process pose many challenges in administrative, economic and social terms. Georg and Taubenböck (2015) introduce the notion of urban corridors, arguing that these concepts remain underdeveloped. The authors, citing other sources, note that an urban corridor is generally understood as a chain of cities connected by linear transport routes. However, a universally accepted definition of the term is lacking, which keeps the notion of the “urban corridor” vague. The term is used in scientific works worldwide, and the corridors identified range from the local to the transnational level, such as the corridor axis linking Beijing to Tokyo via Pyongyang and Seoul (Figure 4).



Figure 4. The Tokyo-Beijing cross-border corridor axis (source: Georg and Taubenböck, 2015)

At national level, the concept of the development axis and territorial corridor has also been analysed through the lens of anisotropic regions. In this respect, Crețan, Jucu and Antoni (2016) show that the Timiș-Cerna Corridor constitutes a linear structure organised around a main development axis with asymmetric flows.

2.2.3. National and international models highlighting tourist axes

A tourist axis can be understood as a spatial structure organised around lines of circulation that concentrate touristic resources and functions, favouring the development and distribution of flows across the territory (Ielenicz and Comănescu, 2006). Through this polarising function, axes contribute to structuring tourist space and integrating attractions into a coherent system.

The current research presents tourist axes found along the road network that exists today, or that existed in antiquity, within the territory of Dacia Porolissensis, with importance for internal and international circulation. The value of the tourist axes will be determined both by their archaeological basis and by the present-day cultural heritage that can be exploited.

Pazhuhan and Shiri (2020) sought to identify the main tourist axes of Hormozgan province, using GIS and TOPSIS. Their study is based on an analysis of accessibility, the presence of tourist attractions, and the settlement and concentration of population, laying the groundwork for major tourist axes. The authors regard tourism as a socio-economic development strategy in both rural and urban contexts. By applying their research methodology, 15 axes were identified underpinning religious-historical tourism, sports tourism and nature tourism, all with economic implications. The study shows how practical measures, such as investment in infrastructure along the axes and strategic planning, could transform the province into a top destination in Iran.

Another study grounded in development axes and the promotion of tourism in a particular area and province of Indonesia is the article by Purboyo and Santoso (2016). In it, the authors develop the theory of development axes and note that the main objectives of the research are to determine the size of the analysed area and its attractiveness, both based on infrastructure development. This study shows that a religious site, of a somewhat touristic nature, can become a development hub within an axis.

It is telling that the growing attractiveness of this area along the development axis was closely tied to economic activity, the emergence of facilities and the development of transport.

These developments meant that this space along the axis no longer remained merely a transit space but became a standalone tourist destination (Figure 5). The attractiveness of the location on the axis will generate tourists, and tourists in turn will generate growth in demand for services and goods.

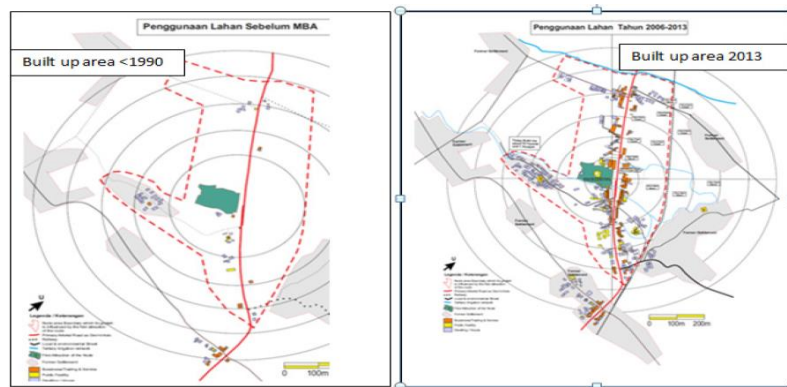


Figure 5. The area of the Baitul Amanah mosque before and after development (source: Purboyo and Santoso, 2016)

Humolli and Krasniqi (2015) focus on identifying the key factors driving tourism development at local and regional level. Their study defines the main axes that influence tourism and their involvement in regional growth. The main axes are proposed along Corridor X, Corridor VII and the international routes R1 and R2. These are overarching corridors in South-East Europe and represent the main routes of circulation across the region, including their branches. A further perspective is offered by Vesalon and Crețan (2019), who highlight the role of heritage and territorial identity in strengthening the attractiveness and competitiveness of tourist destinations.

The axes identified bring an economic contribution, together with infrastructure and accessibility; they influence historic sites, traditions and cultural and heritage factors, and thus have the potential to attract a large number of tourists. The way in which they are designed contributes to environmental sustainability, to the role that ecotourism and conservation efforts play in sustainable tourism, and to involving and empowering local communities in the social process of tourism.

2.3. State of research at regional level

Within our country, no studies exist that examine geo-archaeo-touristic axes precisely as a standalone entity or as an interdisciplinary model; however, individual studies do exist on

Roman roads, the Roman limes, tourism and its development potential in archaeological areas, and on the relationship between geography, archaeology and tourism.

2.3.1. Roads in Dacia in ancient geographical sources

According to Rădoescu and Hortopan (2010), Dacia's integration into the Roman Empire led to the development of a complex road network intended to ensure the province's connection to the Empire's main circulation axes. Roads played an essential role both in troop movement and territorial administration, and in the conduct of economic exchange. The organisation of the network allowed for efficient connections between the province's different regions and facilitated communication with neighbouring territories through strategic crossing points over the Danube. The authors also point out that Roman engineers adapted road construction to local geological, geomorphological and climatic conditions. In general, routes followed the straightest possible lines, and where the relief imposed restrictions, they were adjusted to the terrain's configuration. Technically, the roads were built from successive layers of gravel and sand and had a slightly convex shape to facilitate water drainage (Rădoescu, Hortopan, 2010). At the same time, the Danube river was an essential element in structuring these relationships, functioning as a major transport and communication axis. Along it a complex infrastructure developed, which allowed the Dacian space to be integrated into a circulation network of European scale.

Thus, although positioned at the periphery of the Empire, the province of Dacia was connected through a coherent system of roads and transport routes, which secured the link with the main west-east circulation directions and supported the functioning of the economic and military system (Rădoescu and Hortopan, 2010).

2.3.2. The limes interpreted as a cross-border axis system

The integration of the territories north of the Danube into the Roman Empire played an important strategic role, with Dacia becoming a key point in the empire's defence system (Figure 6). Its geographical position gave the Romans the opportunity to control an area at the edge of the known world, contributing to the stability of the Danubian frontiers (Gudea, 1977).

The organisation of this province was not accidental; it aimed to create an effective defence system capable of protecting the interior territories and monitoring the border areas. Dacia thus functioned as a contact zone between the Empire and the outer territories, playing an important role in the regional military balance.

According to Marcu, Cupcea and Breeze (2021), the Roman Empire's defensive system consisted of walls, towers and small forts, supported by the activity of scouts and fleets that monitored riverine and coastal areas. The legions formed the core element of the provincial army, distributed strategically along the frontiers, either directly on the border line or nearby. Alongside them, auxiliary troops, regarded as support units, were stationed in smaller fortifications. After the fall of the Roman Empire, many of these military structures, especially the forts, continued to play a defensive role and influenced the subsequent development of urban settlements.

Within the Roman defensive system, the limes played an essential role, representing the contact zone between the empire and the outside space. Its functioning relied on the ability to react quickly in situations of risk, through the efficient mobilisation of troops at vulnerable points.

A key element in this process was the road network, which ensured the connection between the different components of the system and allowed for the rapid movement of military forces.

According to Coşofreţ (2017), the Roman defensive system known as the limes reached its highest degree of development during the period of the Roman Empire's maximum expansion, representing a concrete expression of the administrative organisation and geopolitical thinking specific to that era. The frontier network stretched over a distance of more than 5,000 km, starting from the Atlantic Ocean area -- where the Limes Germanicus was defined -- and crossing the entire European continent, all the way to the shores of the Red Sea and North Africa, where the Limes Tripolitanus and, respectively, the Limes Arabicus took shape. The construction of roads and military infrastructure throughout the Empire pursued multiple objectives: clearly delimiting territories and marking their affiliation, controlling population movements in border areas, rapidly transmitting alarm signals through visual and audible means, efficiently mobilising military forces, repelling external threats, and ensuring logistics for the troops. Overall, the evolution of the limes illustrates the complexity of the Roman system of territorial, administrative and strategic organisation. The Dacian limes was not a linear defence; rather, it consisted of several elements organised in depth: roads-forts-forward line of watch and observation. Strictly speaking, setting roads aside, what is studied under the name “limes” comprises two distinct yet linked parts: the forts and the forward line of towers as fixed elements, and the troops stationed in them as mobile elements.

Based on Gudea's (1977) statements, the Dacian limes differs from the classic models of Roman frontiers through its adaptation to the particularities of the local relief. These features are especially evident in the area of the Transylvanian Plateau, where the organisation of the defensive system was influenced by terrain conditions. The forts, regarded as the main elements of the limes, were strategically placed near mountain passes or at points favourable for observation, with the aim of controlling and limiting access to the interior of the province. At the same time, fortifications were laid out along major rivers, such as the Mureş and the Olt, near Roman roads, and in certain sectors the defensive system was completed by an earthen rampart of approximately 235 km, accompanied by forts.

The route of the limes is exceptionally long and was fixed from the outset for most of its length. The territories conquered by Trajan north of the Danube were larger than the province of Dacia, which comprised only Transylvania and Banat. The territory positioned to the south belonged to Moesia Inferior. At this stage, the route of the limes was marked by the Tisza-Mureş-Western, Northern and Eastern Carpathians line, as far as Oituz.

2.3.3. Roads in Roman Dacia -- systems of geographical axes

In the specialist literature, roads in the area north of the Danube are analysed from several perspectives, depending on their importance, the way they were built and the role they played in the territory. A clear classification is proposed by Gudea (1996), who distinguishes between main, secondary and local roads, according to their position within the circulation network. In the Roman era, this differentiation was not merely theoretical but had practical implications, especially regarding road maintenance. There were routes under the control of central authorities, but also roads used at local level or for private access, each fulfilling a clearly defined function in the organisation of space. At the same time, road construction methods varied depending on terrain conditions and available resources, showing good adaptation to the natural environment. Some roads had an important strategic or economic role, while others provided local links between settlements and exploitation areas. Taken together, these distinctions highlight a well-organised network, in which each category of road contributed to the functioning of the overall circulation system.

2.3.4. Roman military settlements -- Roman forts, habitation centres along road axes

The distribution of Roman fortifications in the Transylvanian area highlights a direct relationship between military organisation, the communications network and the exploitation

of natural resources. Their placement was not accidental; it pursued both the control of strategic areas and the protection of important economic resources, such as salt or metals.

The network of forts, especially the auxiliary ones, reflects a coherent organisation of the territory, in which the distances between fortified points allowed for rapid intervention in the event of threats. This relatively uniform distribution was, however, adapted to relief conditions and the importance of communication routes, which explains variations in their placement.

At the same time, Roman roads played an essential role in structuring this system, ensuring the connection between the main military and civilian centres. Certain points functioned as convergence nodes, where several routes intersected, reflecting a complex and well-thought-out spatial organisation (Figure 7).

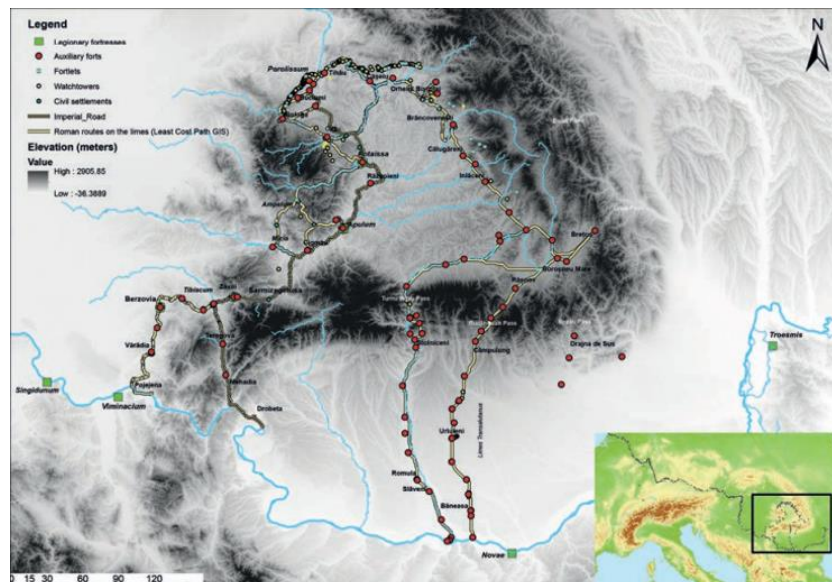


Figure 7. Main roads and fortifications in Roman Dacia (source: Marcu, 2024)

Analysis of the distribution of fortifications in the province of Dacia reveals carefully planned organisation, in which military, economic and geographical elements are closely correlated. The placement of forts was not accidental; it pursued the control of strategic areas, especially where valuable resources existed or where the main communication routes converged (Marcu, Cupcea and Breeze, 2021)

3. DATA AND METHODS

3.1. Material basis and research methodology

The research methodology is aligned with the general and specific objectives of the doctoral thesis, respecting the close multidisciplinary approach adopted. The main objective was to create and analyse the geo-archaeo-touristic axes across present-day Transylvania, the former Roman territory of Dacia Porolissensis, as well as to highlight the territory's development potential through these axes. Diverse categories of data drawn from all the fields addressed were used, including historical and archaeological data, geographic and cartographic data, data on tourism within the study area, and relevant information on current transport infrastructure as well as that of antiquity. The current research involved the use of quantitative-qualitative methods, all scientifically validated, in order to determine geographical, archaeological and touristic approaches. The axis phenomenon under study requires obtaining a complex and up-to-date overall picture that can serve as the starting point for national and international valorisation of archaeological tourism.

3.2. Bibliographic data and documentation

The precise delimitation of the research objectives and working method was achieved through a bibliographic study of the specialist literature. At national and international level, the terminology of the main axes and those connected to the subject of study was analysed with respect to geographical axes, transport axes, road axes, historical axes, tourist axes and axes within the context of sustainable development. Through this method I identified the concepts and the main typologies of axes and analysed relevant international models that addressed similar studies. Thanks to these models I was able to build an overall picture of the dominant archaeological axes across the territory of Transylvania. The integration into the research of studies, scientific articles, and documentation of doctoral theses with similar subjects and approaches formed the theoretical foundation.

The documentation process was carried out continuously from the moment this research began, involving an extensive volume of information. The information used in this research comes from the study of specialist literature found in scientific articles in national and international journals, current publications as well as those from the last century regarding the fields of geography and history, and numerous monographic studies, doctoral theses and conference papers. Transport infrastructure, both ancient and current, was documented on the

basis of national and international bibliographic sources in order to establish the organisation of the territorial space.

The main directions guiding this research were aimed at territorial developments based on what I have termed the concept of the axis. Through this concept, the main theoretical elements linking axes to the subject of the research were established. The works studied in this specialist context addressed the subject of geographical axes, axes within the context of the transport network and territorial organisation, geographical axes in relation to the development of Roman and current roads, geographical axes and tourism, and finally all of these as they relate to sustainable territorial development.

The theoretical framework was shaped through the bibliographic sources analysed, comprising both scientific works studied physically in the university's specialist libraries in printed form, sources from my own personal library acquired over the course of these years of research, and virtual and digital sources from various databases. Validated academic databases containing relevant research facilitated the smooth conduct of the bibliographic study.

3.3. Geographic and cartographic data relating to the study area

Based on the preceding information, the elements characterising the study area were identified. The spatial framework within which I place this research was analysed on the basis of current geographical information and older research that nevertheless still displayed nuances of relevance today. From a geographical point of view, the territory of Transylvania was analysed together with its constituent geographical divisions, as well as its peripheral geographical zones. The intra-Carpathian region is the study area on which I focused my orographic and hydrographic analysis.

The research methodology was carried out by summarising research in the field and by geographically characterising the study area, with the introduction of information specific to archaeology also being absolutely necessary. All this data formed the basis for creating a key framework highlighting the relationship between natural geographical factors and archaeological heritage.

Everything analysed from a geographical standpoint began with the territory's positioning, orographic data, the relief components, the primary and secondary hydrography, the climate and other factors that influenced Roman settlement in this area. The circulation flows chosen by the Romans were favoured by the Carpathian mountain range and the peri-

Carpathian and intra-Carpathian zones. These were described from an orographic and hydrographic point of view. In order to find their significance in the present-day context, the territory of Transylvania was also analysed from a regional and administrative point of view and from the point of view of transport routes.

Cartographic data were used through maps. The maps are materials either sourced or produced using GIS software. Cartographic material was used to give the thesis a geographical context, even though in most cases it represents Roman roads. Analysis of the geospatial data enabled the demonstration of the research hypotheses with which I began this study, namely demonstrating that relationships between natural and anthropic elements did exist.

3.4. Historical and archaeological data

A quantitative description of the history and archaeological heritage of present-day Transylvania, the former territory of Dacia Porolissensis, was carried out with a view to identifying the archaeological axes. The identification of these axes demonstrated that the linear continuity of Roman roads, still visible across the territory, has been maintained. The archaeological research in the present doctoral thesis is based on an inventory of Roman archaeological heritage, such as limes roads, internal imperial roads, military settlements and forts. This process was carried out through the analysis of physical and digital academic sources related to the limes, Roman Dacia and antiquity. Furthermore, the connectivity between Roman roads and the discipline of geography was demonstrated through a method of analysing the territory and the morphological structures of Transylvania, based on quantitative descriptions that allowed the identification of orographic and hydrographic axes and the tracing of the connection between the two disciplines mentioned in the previous subchapter.

Research into the historical data was based both on ancient historical sources and on the findings of modern archaeology. Within these sources I also placed cartographic and geospatial data obtained from the maps used. The Tabula Peutingeriana was one of the most widely used sources for delimiting the routes of Roman roads in Dacia as well as the main centres of human concentration. In the doctoral thesis I also mention Ptolemy's Geography, drawn from historical sources available in the academic library, information that was also useful for strengthening the research subject. The remaining archaeological data come from an in-depth study of the specialist literature dedicated to archaeological heritage. This category

also includes web pages dedicated to specific archaeological sites and projects for the valorisation of archaeological sites.

The central methodology of the thesis consisted of determining and analysing the geo-archaeo-touristic axes, and their determination consisted in integrating them into the specific focus of the research. Geographical axes are the foundation of the axes because they are created within a natural framework and, on that basis, the infrastructure that still exists today develops (roads, motorways, bridges, towns, etc.), while archaeological axes are provided by archaeological heritage and developed in harmony with geographical axes; the touristic value of the axes is the final result I sought to obtain.

3.5. Data relating to tourism and heritage

For the micro-analysis of tourist attractions, I drew on the methodology proposed by Radu Cocean (2014) in the article “Methodology for the Micro-Analysis of Tourist Attractions”. This article presents the method for evaluating the resources taken into account when identifying a potential attraction.

Archaeological heritage is the foundation of this research, since on its basis I established the geo-archaeological axes that will be capitalised on touristically. The territory analysed gains added value through the highlighted relationship between the three disciplines mentioned earlier, in line with the subject of the thesis. Heritage objectives were identified through bibliographic research of historical and archaeological data and through field visits carried out between 2022 and 2025. Tourist infrastructure was analysed using digital sources provided by the National Institute of Statistics and validated through fieldwork.

Tourism development is closely linked to the existence of attractive elements, which are the main reason for choosing a destination. In their absence, trips would tend to be occasional or transit-related in nature, without generating genuine interest in the area concerned. For this reason, identifying and evaluating attractions is an essential first step in any tourism planning effort.

At the same time, not all attractions have the same level of valorisation. Some become tourist resources only once they benefit from facilities and appropriate infrastructure that allow them to be integrated into the tourist circuit and used in an organised manner. Thus, analysing them requires an integrated approach that takes into account both the intrinsic value of the attraction and its degree of accessibility and provision.

From this perspective, the specialist literature proposes a distinction between attractions with a determining role and complementary ones. The former are those capable of independently generating interest in a destination, while the latter contribute to diversifying the tourist experience and increasing the area's overall attractiveness (Cocean, 2014).

3.6. Methods used in the research

3.6.1. Methodology for evaluating tourist attractions

For the analysis of tourist attractions, a set of criteria was used that allows them to be differentiated according to importance and their role in generating tourist flows (Cocean, 2014). In this context, attractions were analysed separately, according to their primary or secondary character. Primary attractions are those capable of determining the choice of a destination, while secondary attractions contribute to completing the tourist experience and diversifying the local offer.

Primary attractions were evaluated by reference to several relevant indicators. Uniqueness reflects the degree to which an attraction is differentiated from similar ones, highlighting its distinctive value. The scoring basis is as follows: 1 point = regional uniqueness; 2 points = national uniqueness; 3 points = international uniqueness. It also includes the authenticity of the site. Additivity expresses a site's capacity to be integrated into a broader tourist circuit, contributing to the area's overall attractiveness. Points awarded range from 1 to 3, depending on the site's capacity to be included in a “collection” of similar attractions visited by tourists. Permanence concerns the length of time the attraction retains visitor interest, while notoriety relates to its level of recognition and promotion among tourists. For the permanence of attraction factors, the scoring basis was: 1 point = attractiveness manifested over a short period (a few days, event-type); 2 points = medium period (a season); 3 points = throughout the year; and for notoriety: 1 point = low notoriety (known only locally, without detail); 2 points = medium notoriety (basic information correctly identified); 3 points = high notoriety (details known and spontaneously mentioned).

For secondary attractions, the analysis examined their relationship with the main attractions. Aspects considered relevant included compatibility between sites, spatial proximity, the capacity to temporarily substitute for the main attractions, and the degree of connectivity within the tourist system. These criteria highlight the complementary role of secondary attractions and their contribution to creating a coherent tourist experience. These too

were evaluated on a scale of up to 3 points each. Scores were not assigned arbitrarily but on the basis of verifiable field and literature benchmarks: real measured distances (for proximity), the presence/absence of the site in tourist circuits and existing heritage lists -- including UNESCO status (for notoriety and uniqueness) -- and the real duration of seasonal accessibility of the sites (for permanence). Each attraction's final score resulted from summing the scores across the four applicable criteria for its category (primary or secondary), allowing the sites analysed to be ranked.

3.6.2. Methodology for evaluating tourist facilities

Tourist facilities are the element through which attractions are integrated into the tourist circuit and turned into exploitable resources. In this research, the evaluation of facilities was carried out on the basis of a methodology focused on analysing the situation on the ground (Cocean, 2015).

The approach used is applied in nature and involves a direct evaluation of facilities, without taking future development scenarios into account. Thus, the analysis reflects the current state of the resources and allows the identification of strengths and existing shortcomings.

The evaluation was carried out at the level of each tourist resource, by identifying the relevant functional components and analysing them individually. For each element, criteria such as quality of execution, accessibility, safety of use and environmental impact were considered.

An important aspect of the methodology is the comparison of facilities against several reference levels: legal requirements and technical standards, the level of similar facilities within the competitive space, and examples of international best practice. This comparison highlights each resource's position relative to other destinations and identifies possible competitive advantages or disadvantages. Each functional unit was evaluated individually, on five composite criteria: quality of execution -- including the authenticity of the facility, standard parameters and functional performance, as well as the quality of materials used; accessibility - - suitability of the facility for all categories of tourists, including those with disabilities; operational safety -- assessed against specific risks (fire, earthquake, accidents, etc.); capacity -- the maximum number of people who can use the facility safely, without adverse effects on

the resource, tourists or the environment; environmental impact -- the functional effects of the facility on water, air, soil and biodiversity.

The scoring basis is not arbitrary; it follows the scale proposed by the methodology, which measures each facility against three explicit reference terms: a score of -1 if the facility does not meet legal requirements or technical standards in the field (requiring compliance investment); a score of 0 if the facility strictly meets minimum legal requirements/technical standards but is below the level of similar facilities within the competitive space (requiring investment to close the gap); 1 if the facility is at or above the level of direct competition but below the level of international best-practice examples (requiring investment to amplify the advantage); and 2 if the facility is at or above the level of the world's best-practice examples (requiring investment to consolidate the advantage).

The results obtained were synthesised through an overall evaluation of each resource, accompanied by observations on the main problems identified and the possible courses of action, highlighted through SWOT analysis.

3.6.3. SWOT Analysis

A subchapter of the research is dedicated to SWOT analysis, used as a tool for identifying the main shortcomings and advantages of tourist facilities. The choice of this method is justified by the applied nature of the analysis, given that facilities are concrete elements that are easy to evaluate against on-the-ground reality.

SWOT analysis allows for a clear structuring of information by highlighting both the internal and external factors that influence the functioning and valorisation of tourist resources. From this perspective, strengths and weaknesses are analysed, reflecting the current capacity of the facilities to sustain tourist activity, as well as the opportunities and threats generated by the external context.

Strengths highlight the elements that contribute to the attractiveness and functionality of facilities, while weaknesses point to existing limitations or shortcomings. Opportunities are associated with favourable trends that can be leveraged for development, while threats reflect risk factors that may affect their evolution.

By correlating these components, SWOT analysis provides a synthetic picture of the current position of tourist facilities and allows for the formulation of strategic directions for

intervention. This tool thus becomes useful in grounding decisions regarding the development and valorisation of tourist resources (Ivorschi, 2012).

3.6.4. Spatial and geographical analysis method

To study the relationship between Roman infrastructure from antiquity and today's road network, I used the spatial analysis method through GIS. This software allowed geographical data to be overlaid in order to create an overall analytical picture.

3.6.5. Quantitative and qualitative methods

A mixed approach combining quantitative and qualitative methods was more than necessary in order to fully grasp the complexity of the geo-archaeo-touristic axes phenomenon. In this respect, natural, cultural, historical and socio-economic factors had to be taken into account. All the theories and conceptual interpretations in this work were subject to qualitative analysis of information, as was the analysis and application of methods for assessing tourism. The observation and field research method involved analysing the accessibility and current state of conservation of the archaeological sites. The quantitative method supports and validates scientific knowledge and allows for highly accurate analysis of the phenomena identified. The classification of axes, analysis of spatial distribution, geographical position, relief and accessibility features, and comparative analysis are all part of the quantitative methodology.

4. REFERENCE ELEMENTS AND POSITIONING OF THE STUDY AREA

4.1. Transylvania in the context of the Carpathian orographic system

The arc of the Carpathian Mountains encompasses the middle of Romania, encircling it like the outer wall of a circular fortress. Since ancient times, geographers and historians have described this region as the “mountainous crown of the Earth”. The fortress-like character this region assumes is underlined by the vast neighbouring steppe that stretches out to the east of the Carpathians. Given this neighbouring landscape, geographers have described Transylvania as “Europe's most advanced fortress against Asia”.

Transylvania can be regarded as the centre of the orographic system of Romania's Carpathian Mountains, since from the Iberian Peninsula to the Black Sea, mountain ranges follow one another like a garland of festoons. All these mountains belong to the same family, being among the youngest generation of mountain formations on the European continent. The configuration of the Carpathians clearly shows that the folding of the Earth's surface caused the mountains to rise as their mass was pushed against the plain of the Danube Delta (Mehedinți, 1986).

Transylvania is situated at a contact zone of several morphostructural units, an unusual and unique feature within Romania's territory, which also allows the identification of orographic axes:

- At its centre lies a plateau of medium to high elevations;
- It is surrounded by mountain ranges rising more than 1,000-1,500 metres above the central plateau;
- At the foot of the mountains, on their outer edge, ranges of hills descend in elevation until they gradually merge with the outer plain;
- The plain itself is encircled by a ring of waters and rivers: the Tisza, the Danube, the Black Sea and the Dniester, which form an encircling ring of castles and fortresses since the most ancient times;

The general orientation and stepped downward slope of the relief, starting from the high elevations and descending towards the plateau, gives Transylvania negative relief inflections

with the appearance of longitudinal spaces of the orographic-axis type, which connect, in a subordinate form, to a territorial system at the level of the geographical-axis region.

4.2. Rivers -- hydrographic axis structures

The relationship between human communities and water resources within present-day Romania has old roots, being closely tied to their economic and mobility-related use. As early as the Geto-Dacian period, the Danube river was an important circulation corridor, used for navigation and trade, a fact also suggested by the presence of structures with a defensive and functional role along its banks. In the Roman period, the use of water resources took on more organised forms, as demonstrated by archaeological discoveries indicating the existence of rudimentary water-supply systems, built from durable materials suited to the technologies of the era (Újvári, 1972).

Romania's geographical position within the temperate continental climate zone, along with the presence of the Carpathian arc at its centre, are important factors in determining the configuration of its hydrography. Rivers form the most important category of water resources. They are closely tied to the Carpathian and sub-Carpathian mountain regions, since most of them originate there and it is also there that the particularities of liquid runoff are defined. While the Carpathian arc gives the hydrographic network a radial-divergent configuration, the Danube, by contrast, is the collector of 97.8% of the country's surface area, a fact that allows Romania's rivers to be regarded as Carpathian in origin and Danubian-Pontic in drainage. The total length of watercourses, as recorded in Romania's water cadastre, is 66,029 km, with a total of 4,295 rivers.

Depending on tectonics, lithology and physical-geographical factors, several types of hydrographic networks can be distinguished across Romania's territory:

- The dendritic network -- typical of many hydrographic systems, especially in flat or gently sloping regions, on large alluvial fans or piedmont areas.
- The rectangular network.

The course of Romanian rivers most clearly demonstrates that Transylvania is indeed the core of Romania. These inland rivers cut their way down towards the plain out of the

Transylvanian Plateau, where they originate, carving their beds through the surrounding crown of mountains in a centrifugal pattern.

Natural axes represent fundamental structural elements in the organisation of geographical space, generated by the configuration of the relief, the hydrographic network and the dynamics of natural processes. They are not merely physical alignments but functional systems that facilitate circulation, communication and interaction between different territorial units. Within the Carpathian space, natural axes take shape mainly along valley corridors, depressions and the contact zones between major relief units. The concentric arrangement of the Carpathians, together with their radial fragmentation, favoured the emergence of preferential directions of circulation, used since the earliest historical periods. These natural routes allowed connections between the intra-Carpathian and extra-Carpathian spaces, contributing to the development of economic and cultural exchange.

Major rivers play an essential role in shaping natural axes, acting as vectors of territorial organisation. Their valleys form circulation corridors that offer favourable conditions for movement, settlement and economic development. Relevant examples in this respect are the Mureş and Someş corridors, which have functioned over time as major connecting axes between different regions. These were exploited not only for their accessibility but also for the natural resources available nearby.

From a geomorphological perspective, natural axes are characterised by smaller differences in altitude compared with neighbouring units, by the presence of relatively flat surfaces, and by the existence of conditions favourable to human settlement. Broadly developed floodplains, terraces and contact zones between different relief types were preferential spaces for community development, owing to access to water, fertile soils and communication possibilities. At the same time, mountain passes complete the system of natural axes, facilitating the crossing of orographic barriers. These played a major strategic role, ensuring links between regions separated by mountain massifs and contributing to territorial integration. Examples such as Bran, Oituz or Tihuța highlight the importance of these connection points in the dynamics of space.

Natural axes should not be viewed in isolation but as part of a complex system in which physical and human factors interact. They provided the foundation on which transport networks, trade routes and, ultimately, present-day territorial structures later developed. In this

sense, many historic roads, including Roman ones, followed these natural directions, capitalising on the advantages offered by the geographical framework.

Natural axes therefore represent the basis of spatial organisation, influencing population distribution, economic development and the evolution of communication networks. In the context of this research, they constitute the starting point for defining the geo-archaeo-touristic axes, demonstrating the functional continuity between natural and anthropic structures.

4.3. Transport routes and the main roads of Transylvania

In Romania, transport is clearly dominated by road and rail networks, which have represented the main means of travel both in the past and today. Other forms of transport -- water, air or intermodal -- have a smaller share, mainly owing to infrastructural constraints that prevent their balanced development.

The country's transport network developed gradually over several historical stages, reaching a point today where it covers almost the entire territory. From this point of view, most localities benefit from at least minimal connectivity, being linked to other areas by at least one communication route. However, this coverage does not automatically mean uniform accessibility, since the quality of infrastructure and level of modernisation differ significantly from one region to another.

These differences are directly reflected in territorial development. Localities situated near major urban centres or along major transport axes tend to record a higher socio-economic level compared with those that are isolated or connected only through secondary networks. Easy access to infrastructure favours population mobility, attracts investment and stimulates economic activity.

The results of analyses carried out at national level highlight the fact that the most developed settlements are, generally, the large cities integrated into important transport networks, which function as attraction hubs for the workforce and for economic flows. These are concentrated especially in the western and central regions of the country, such as Banat, Transylvania or Dobrogea (Fistung et al., 2013).

Within the Transylvanian Depression, the valley corridors associated with the main rivers, such as the Someş, Mureş, Târnave, Secaşe, Hârtibaciu or Olt, played an important role

in organising the geographical space, influencing the placement of settlements and the development of communication routes. Each of these corridors has its own morphological and functional particularities, which justifies their individual analysis (Roşian, 2007).

Romania lies at the crossroads of several European communication routes, since since the earliest times the country's territory was crossed by ancient, traditional roads linking the countries around the Baltic Sea and the mouths of the Danube via the north-east of the Carpathians, as well as linking Central Europe with the Black Sea along the Danube or across the Carpathian passes. The ancient Greeks founded, on the western shore of the Pontus Euxinus, thriving port-cities through which they maintained ties with the Geto-Dacian hinterland, cities that later came under Roman imperial rule. The Romans, arriving from south of the Danube, extended their rule over most of Dacia, covering it with forts, roads and bridges whose traces are still visible today (Dumitrescu, 1983).

4.4. The habitation axes of Transylvania

To the complex elements of the natural framework was added, over time, the intervention of the anthropic factor; the Transylvanian Depression and the surrounding mountain area constitute an important zone for the settlement and evolution of the native population. This territory served as the site where the first state entities were formed, then went through a period subject to Roman influence, gradually leading to the ethnogenesis of the Romanian people (Pop, 2012).

Transylvania, a historic province located in the central part of Romania, covers an area of more than 57,000 km² (about 24% of the country's total). Geographically, its territory overlaps with several relief units: the Transylvanian Hilly Depression, the eastern and south-eastern part of the Eastern Carpathians, the northern part of the Southern Carpathians, the eastern part of the Western Carpathians (excluding the Banat Mountains) and the north-east of the Western Hills (Mărculeţ, Mărculeţ, 2024). In terms of administrative division, Transylvania includes 10 counties -- Alba, Bistriţa-Năsăud, Braşov, Cluj, Covasna, Harghita, Hunedoara, Mureş, Sălaj, Sibiu -- with a combined population of 3,820,077 inhabitants, at an average density of 66.95 inhabitants/km².

Human settlements can be viewed as nuclei of spatial organisation, in which both material resources and cultural values are concentrated. Their distribution across the territory is influenced by a combination of geographical, historical, economic and political factors. From

this perspective, they function as potential points, characterised by differing population masses and varying intensities of resource and information flows, among which dynamic relationships of interaction are established, comparable to those within a force field (Iurea, 2011).

The settlement network reflects, at a given moment, the relatively stable structure of the territorial system; however, its dynamics stem from the flows that circulate among its components. These interactions generate processes such as hierarchisation, polarisation or functional specialisation of settlements. Analysis of these transformations, as well as of the factors that determine them, provides relevant clues about the directions of evolution of settlement systems and allows for the grounding of coherent spatial-development policies. The development level of a settlement system can be assessed by analysing its structure, i.e. the types of settlements, the relationships between them and the functions they perform. The dynamics and configuration of the settlement network are factors that have directly influenced the region's level of social and economic development.

The counties of Alba, Cluj, Mureș, Bistrița-Năsăud and Sălaj form an important territorial and functional space within Transylvania, playing a significant role in organising settlement and in the dynamics of regional development in Romania. Their location in the central part of the country favours the concentration of urban centres with complex functions, alongside active rural areas, which together contribute to shaping axes of mobility, settlement and socio-economic development. At the same time, the importance of these axes is reinforced by their connection to the main European road and rail transport corridors.

The main objective of this chapter is to analyse how the counties of Alba, Cluj, Mureș, Bistrița-Năsăud and Sălaj contribute to shaping the habitation axes. To highlight the current characteristics of Transylvania's settlement system and to determine its habitation axes, the urban and rural network was analysed according to the following elements: structure, categories, number, density, territorial distribution, size and the determination of the main hubs.

5. RESULTS AND DISCUSSION

5.1. Limes roads -- a system of axes adapted to relief and hydrography

Two main river names known to us can be identified, linked to the landscape of Dacia Porolissensis. One of them, known as Marisia, Μάρισος, Marus or Μορήσης, most likely represented the border line between Dacia Porolissensis and Dacia Superior/Apulensis, a line stretching from the eastern borders of Dacia to its eastern neighbourhood. Known today as the Mureş, this river is one of the oldest references of its kind in both ancient Greek and Roman sources.

The other important river in Dacia Porolissensis is the Samus, known today as the Someş. The river served as an important supply and communications route for the forts located at the frontier and nearby. It must have been, admittedly on a smaller scale, an arrangement similar to that on the Danube, contradicting the general view held by most Romanian scholars regarding what the frontier was actually intended for, namely that the Samus river was used largely within the defensive system of Roman Dacia (Deac, 2013). Limes roads can be regarded as axes, since relief and the structures of orographic and hydrographic axes played an important role in shaping their route, and their starting and end points are clearly defined.

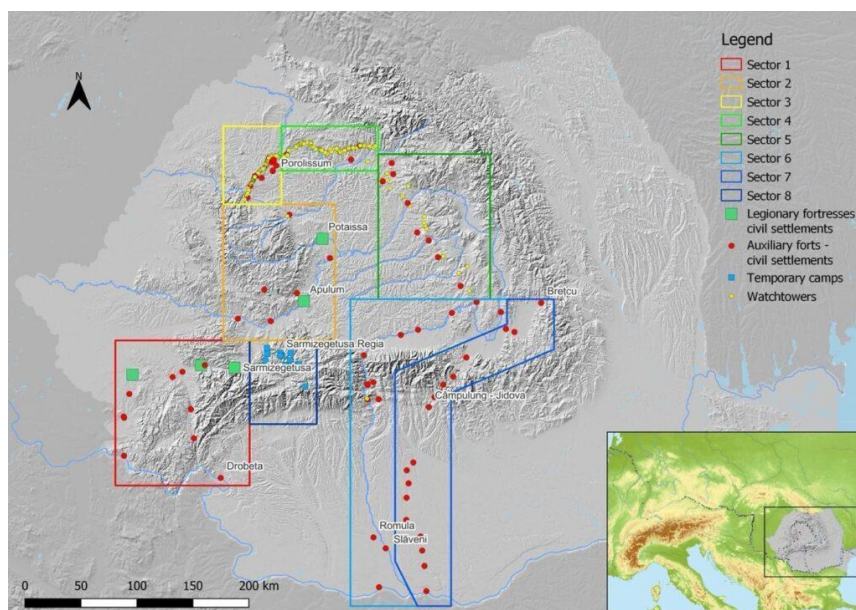


Figure 8. Map of the sectors of the Frontiers of the Roman Empire in Dacia (source: National History Museum of Transylvania)

5.1.1. The North-West Limes

The limes sector between the forts at Bologa and Porolissum has been a subject of archaeological research since the second half of the 19th century (Marcu et al., 2017). The organisation of the defensive system in north-western Dacia reflects an effective adaptation to the particularities of the relief in the intra-Carpathian contact zone, characterised by a fragmented structure and the alternation of ridges with sedimentary deposits. The route of the limes mainly followed the mountain ridges, used as natural defensive elements, especially in the Meseş Mountains area (Ferenczi, 1988). The differences in altitude between these units and the adjacent depression zones helped consolidate a natural obstacle that was difficult to cross from the outside.

Further along this system, the defensive line was supported by a network of strategic points placed on ridges and interfluvies, which ensured visibility and communication between the components of the defensive system. The placement of watchtowers on dominant heights highlights the role of relief in the organisation and functioning of this military ensemble (Ferenczi, 1988).

Structurally, the Meseş Mountains form an elongated natural horst, oriented on a south-west to north-east axis, extending for approximately 35 km in length and 2-5 km in width. The Meseş ridge represented, in antiquity, a natural barrier used with great skill by the Romans as a limes and defensive outpost. The Meseş Mountains also form a relative climatic barrier, manifested through differences in average annual precipitation (900-1,000 mm at Măgura Priei, 700-800 mm across the rest of the ridge) between the north-western and south-eastern slopes.

As for the Plopiş Mountains, only the south-western sector is of interest here, bounded by the Crişul Repede valley between the localities of Ciucea and Bucea, with higher elevations (Măgura -- 810 m, Merişoru -- 800 m and Vârful Cornului -- 882 m). Near the locality of Negreni, a limestone outcrop appears (the Piculeu peak), rising above the levelling surface with a conical shape, a spot likely used for siting a watchtower. More interesting still is the presence, south of Dealul Rupturi, on the left side of Valea Bisericii, at an altitude of 600 m, of a plateau called Cetatea Turcului, where a structure with a rampart and ditch was identified, measuring 46/44.5 m, and where fragments of Roman bricks and roof tiles were found. The settlement appears to have had a military character and formed a western outpost of the Roman fort at Bologa.

As an important defence axis, some 65 kilometres long, seven forts are concentrated along it, making the north-western sector of the Dacian limes very heavily fortified. The

numerous forts, the forward line of observation and signalling towers, and the large number of troops permanently stationed in this area are evidence of intense military activity and, correspondingly, give the area great importance within Dacia's defensive system.

5.1.2. The North Limes

The northern sector of the province of Dacia, located east of the fort at Tihău, was less investigated compared with the western frontier. Systematic research began only in the second half of the 20th century, through field campaigns coordinated by I. Ferenczi. Analysis of this sector, especially between Tihău and Cășeu, highlights a defensive organisation closely linked to the particularities of the relief. Thus, the Someș corridor and the neighbouring hilly units were effectively integrated into the structure of the defensive system, being used as natural elements supporting the defensive line (Dulamă, 2021).

At the same time, some extensions of the system went beyond the imperial boundary, using the nearby high ridges to monitor external territories. The defensive structure consisted of two main fortified points, supplemented by auxiliary elements such as small fortifications, border roads and a network of watchtowers. Subsequent research has highlighted the high density of these installations, with numerous observation points documented between the two major centres (Marcu et al., 2017).

From the confluence of the Someșul Mare with the Someșul Mic (Mica) to upstream of Jibou (roughly the confluence of the Agrij with the Someș), over a distance of about 75 km, lies the Someș Corridor (corresponding to the Someșan Plateau), continuing further downstream (to Ulmeni), where it merges into the Western Hills.

On the left side it is flanked by the Cluj and Dej Hills (the Dej-downstream of Vad sector) and the Șimișna-Surduc Hills, and on the right by the Sălătrucu Hills and the Purcăreț-Boiu Mare Plateau, from which the transversal character of the Someș within the Someșan Plateau derives, while the corridors of the Someșul Mare and Someșul Mic run along the margin of this unit.

The river's age along this course contributed to the formation of an entire series of terraces, beginning with the floodplain terrace (2-3 m, somewhat higher downstream) up to the ninth terrace (160-200 m), found only along the Someș, whereas on the other rivers of the Someș basin the highest terrace is the eighth (140 m). The first three terraces show the widest development -- the floodplain terrace, then the second terrace (8-12 m) and the third terrace

(18-22 m) -- on which the highest concentration of arable land is also recorded. Both the settlements and the communication routes avoided the floodplain zone, being sited instead on the second and third terraces: Băbeni, Răstoci, Căpâlna, Câțcău, Rogna, Podișu, Fodora, Dobrocina, etc., or on the terraced cones of the valleys reaching the Someș: Letca, Ileanda, Gâlgău, Cășeu (on the right bank of the Someș), Surduc, Lozna, Rus (on the left bank of the valley). With the exception of its upstream end, the Someș corridor has, over the centuries and up to the present, served an important transport function; through its rail and road links, the corridor constitutes an important circulation axis, facilitating connections between Transylvania and the north-western part of Romania. The main road, Dej-Baia Mare, runs along the Someș valley as far as Răstoci, after which it climbs onto the Purcăreț-Boiu Mare Plateau and passes, through the Mesteacăn Pass, into the Baia Mare Depression (Fodorean, 2006).

5.1.3. The North-East Limes

In the northern part of the province, along the line of *cuestas* near the Roman forts at Samum (Cășeu, Cluj County) and Arcobara/Arcobadara (Ilișua, Bistrița-Năsăud County), the first field research into the limes was carried out by István Ferenczi, regarded as one of the pioneers of research in this region. Through his successively published studies, he contributed to identifying and describing towers and *burgi* that were previously unknown in the specialist literature (Cociș, 2015). Through this research, Ferenczi initially identified a series of observation points near the forts at Cășeu and Ilișua, subsequently extending investigations to the Tihău--Cășeu sector and to the Ileanda--Tihău area. His work also included exploring areas further east, where similar structures were reported near the localities of Perișor, Zagra, Salva and Năsăud, in present-day Bistrița-Năsăud County.

The roads situated in this part of the limes lie within an extremely complex area from a geomorphological point of view. The first road sector forms part of the Dej Depression, situated at the confluence of the Someșul Mare with the Someșul Mic, where the Someș is formed. Others have their routes developed on the middle and upper terraces of the Someșul Mare Corridor, continuing south-east along the Șieu valley. The Someșul Mare Corridor is a major axis separating the Someșul Mare Hills and the Bistrița Hills from the Transylvanian Plain (Fodorean, 2006).

5.1.4. The East Limes

The eastern frontier of the limes was oriented towards the Carpathian space, though Roman remains are today less evident in this sector. In many cases, construction materials from the ancient structures were reused in later periods, especially in building settlements, places of worship or medieval structures. In addition, a large part of the route of the northern limes overlaps with forested areas, where forestry activity has contributed to the degradation or blurring of the archaeological traces.

The eastern sector of the Dacian limes largely follows the line of the Eastern Carpathians, bringing together a series of fortifications arranged from north to south. This category includes the forts at Orheiul Bistriței (within Dacia Porolissensis), as well as those at Brâncovenesti, Călugăreni, Sărățeni, Inlăceni, Odorheiu Secuiesc and Sânpaul, corresponding to the province of Dacia Superior. To these are added the fortifications in the south-eastern tip of Transylvania -- Brețcu, Olteni and Boroșneul Mare -- belonging to Dacia Inferior, as well as the fort at Cristești, positioned further within the province.

5.1.5. The South Limes

Although no significant urban centres existed in the eastern part of the province of Dacia Superior, the region stood out for its high density of rural settlements. The dominant activities were agriculture and livestock farming, alongside the exploitation of natural resources such as stone and salt, as well as various crafts adapted to local needs. Most of these settlements had a pronounced agrarian character. Information on agricultural practices in the upper Mureș valley area comes both from the analysis of tool deposits discovered at Mărculeni, Dedrad and Lechința de Mureș, and from archaeological research carried out at sites such as Morești and Cristești (Man, 2011).

5.2. Imperial roads -- a system of axes adapted to relief and hydrography

Imperial roads belonged to the category of communication routes of major strategic importance, alongside military and limes roads, which provided the connection between forts and allowed for the rapid movement of troops between different points of the province. These routes originated from the great road built by Emperor Trajan in the year 100 CE, along the southern bank of the Danube. The network of imperial roads facilitated both the connection between Roman fortifications and the conduct of trade between Dacia and neighbouring provinces, especially through the Mureș valley corridor.

5.2.1. Main imperial roads -- axis structures

Research into the route of the Potaissa-Napoca imperial road began in 1977. The main objective of the research was to investigate the road both archaeologically and from a topographic and topometric point of view. The road artery was researched in the reverse direction of its construction, that is, from Valea Becășului (Cluj) towards Turda, passing through the localities of Gheorghieni, Aiton, Ceanu Mic, Tureni, Copăcenii, with the town of Turda as the terminus point. This method of investigation, from north to south, along the Roman road, was chosen because the road's surface traces were better visible on the ground between Cluj-Napoca and Aiton, whereas in the Ceanu Mic-Tureni-Copăcenii sector its traces had been destroyed over time by agricultural works, which led to the road also being researched through geodetic, cartometric and, above all, geomorphological methods.

5.2.2. Roman forts positioned along the limes axis; systems adapted to relief and hydrography

Forts represent some of the most important historical sites, mainly owing to the significant volume of archaeological information they provide, both through their built structures and through the materials discovered. An advantage of forts is also their visibility on the ground, being easier to identify compared with other, less obvious remains. Moreover, the violent destruction that, in many cases, marked the end of their existence has contributed to the preservation of complex historical contexts, which makes them valuable sources for research. Interest in Dacian forts has resulted in numerous studies, from synthesis works to detailed monographs, especially from the second half of the 20th century onward, alongside the intensification of archaeological research in Transylvania.

From a defensive point of view, an alignment of fortifications in Dacia Porolissensis can be reconstructed, starting from Bologa, along the Crișul Repede valley, and continuing at the foot of the Meseș Mountains through the forts at Buciumi, Românași, Romita and Porolissum. In this sector, the system was completed by an advanced network of watchtowers laid out along the western frontier. To the north, the defensive line extended along the Someș, including the forts at Tihău, Cășeiu, Ilișua and Orheiul Bistriței, as far as Brâncovenești, on the Mureș valley. Within the province there were also important military points, such as those at Gilău, Gherla and Sutoru, which contributed to the functioning of the whole defensive system (Grec, 2010).

5.2.3. Main urban settlements -- hubs situated on the imperial road axis

The integration of Dacian territories into the Roman Empire did not entail the full inclusion of the space inhabited by this population. After Trajan's campaigns, only part of it was turned into a province, while other regions were reorganised differently or remained outside direct Roman control. Thus, certain areas in the south and south-east were incorporated into the province of Moesia Inferior soon after the first Dacian-Roman war and remained within this administrative structure throughout Trajan's reign. At the same time, extensive territories in the north and east of the Carpathian space continued to be inhabited by communities regarded as “free Dacians”, situated outside the imperial borders.

Under these conditions, the province of Dacia established by Trajan had a more limited extent than the former kingdom of Decebalus, comprising mainly central Transylvania, Banat and western Oltenia. After the emperor's death, external pressures exerted by populations from the middle and lower Danube required a reassessment of the defensive system. Hadrian intervened swiftly, giving up certain territories that were difficult to defend, such as southern Moldavia and the Wallachian Plain, and retaining only isolated strategic points, such as the bridgehead at Barboși.

To increase the efficiency of administration and defence, the province was reorganised into a tripartite system: Dacia Superior, Dacia Inferior and Dacia Porolissensis. Each of these had its own distinct territorial and military particularities. The northern sector, represented by Dacia Porolissensis, played an essential role in controlling the frontier, although it had no legions, being administered by a procurator of equestrian rank. Although the province's name was linked to Porolissum, its administrative centre was at Napoca. Later, under Marcus Aurelius, the three provinces were reunified under the leadership of a single governor, based at Apulum (Răducanu, Mărgineanu, 2014).

Within Dacia Porolissensis, three major urban centres -- Napoca, Potaissa and Porolissum -- illustrate different development models. Napoca established itself as the main administrative and financial centre, Potaissa developed under the direct influence of a military presence, while Porolissum developed around a defensive complex, also serving customs functions. Each of these towns reflects the specific relationship between military, economic and administrative factors, highlighting how imperial infrastructure and the presence of the army shaped the organisation of urban space (Wanner, De Sena, 2010).

5.3. Determining the geo-archaeological axes

The present study addresses three essential directions of territorial research: geography, archaeological heritage and its touristic valorisation. The delimitation of the geo-archaeo-touristic axes has both a theoretical and an applied character, since the routes of Roman roads and the forts existing along these corridors can be analysed with a view to their integration into a national network for sustainable development.

The terminology of axes, detailed in the second chapter, is presented in a variety of senses which, in the context of this chapter, take on a coherent form capable of supporting the integrated valorisation of the territory. In this view, an axis is conceived as a spatio-temporal corridor, which shapes territorial dynamics and acquires both functionality and identity.

According to the structure of the work, the first geo-archaeo-touristic axes relate to the limes of Dacia Porolissensis and continue with the axes of the imperial roads within the territory of Dacia Porolissensis. These axes are the result of an accumulation of archaeological sites arising from the building of Roman military structures, closely tied to the natural relief, the hydrographic networks and their strategic positioning within the territory. The placement of forts was conditioned by factors such as visual dominance over the landscape, control of waterways, and proximity to circulation corridors and administrative centres. Thus, the proposed axes behave like territorial organisms with economic, social and residential functions.

The tracing and delimitation of these axes pursue several objectives: reconstructing the Roman military structure, highlighting the potential for touristic and spatial valorisation of the heritage, and demonstrating the present-day relevance of Roman roads and settlements. Starting with the network of forts along the northern limes and continuing with those within the interior of the Roman province, situated on the main imperial roads, geo-archaeo-touristic axes with their own geomorphological specificity are proposed. This chapter proposes the following geo-archaeo-touristic axes: the western defence axis of the forts of Dacia Porolissensis, the Someş Limes axis -- a defensive axis on the northern frontier of Dacia Porolissensis, the intra-Carpathian Limes axis from Meseş to the barrier of the Eastern Carpathians, and the Potaissa-Napoca-Porolissum urban-imperial axis. Based on these axes, initiatives can be grounded for integrating historical research into a modern tourist framework, in line with current trends in regional and cultural development at European level.

5.3.1. The western defence axis of the forts of Dacia Porolissensis

The delimitation of this axis begins with the fort at Bologa and ends at the military complex at Porolissum. The natural framework of which this axis forms part has a coherent morphological and functional impact. This corridor, part of the limes of Dacia Porolissensis, capitalises on the mountainous relief formed largely by the Meseş Mountains and the hydrographic network based on the courses of the Almaş and Agrij valleys. The Almaş and the Agrij are secondary rivers but have proved vital along the segments of this axis. This limes sector also forms a natural barrier between the Transylvanian Plateau and the Tisza Plain, a fact that further demonstrates the Romans' well-chosen decision to build roads and raise fort-type structures.

The defence axis of the Meseş Limes follows two geographical-spatial patterns, divided into two sub-axes:

- Bologa -- Sutoru -- Românaşi -- Romita -- Porolissum
- Bologa -- Buciumi -- Porolissum

These two axes represent two geo-archaeological corridors that integrate natural elements of relief and hydrography together with anthropic elements of a military nature, such as Roman roads and forts. The scale and historical weight found along these corridors represent the development potential of tourist flow circulation.

5.3.2. The Someş Limes axis -- a defensive axis on the northern frontier of Dacia Porolissensis

The geographical position of this defensively-functioned axis lies within the natural framework of the Transylvanian Depression, terrain that has, since antiquity, favoured the development of military roads and Roman forts. The northern limes of Dacia Porolissensis encircles the geographical core of this depression with a well-branched hydrographic network, especially with the Someş, its main river. The river crosses the proposed axis from west to east, creating a longitudinal corridor linking the Transylvanian Depression to the mountainous area of the Carpathians. The Someş Limes axis comprises the Roman roads that connected the forts:

- Porolissum -- Tihău -- Căşeu -- Ilişua -- Orheiul Bistriţei

The Roman forts along this geographical space are closely linked to the main hydrographic axis, namely: the fort at Tihău lies at the contact point between the Meseş Mountains and the western end of the Someş corridor; the fort at Căşeu is sited on a high

terrace of the Someș; the fort at Ilișua lies on the Someș floodplain; and the fort at Orheiul Bistriței is positioned where the terrain exits the intra-Carpathian space towards the Bistrița corridor.

The area of the Transylvanian Depression was identified by the Romans and later confirmed by the specialist literature as a space of balance and convergence. The Someș Limes axis can gain touristic value, since it lies within a landscape that still preserves Roman traces from antiquity.

This network of fortifications is no accident; it is the result of a coherent strategy for managing the northern border. The Someș corridor, oriented west-east, functioned as a natural transport and migration corridor, but also as a potential vector for invasion. Controlling it was a military necessity for the Romans.

5.3.3. The intra-Carpathian Limes axis -- from Meseș to the barrier of the Eastern Carpathians

This axis functions as a link between the north-western limes and the eastern limes of Dacia Porolissensis. Through this axis, the main defensive networks within the intra-Carpathian space are connected. Its western end is delimited by the forts at Românași and Romita, situated in the Meseș Mountains area. The Porolissum complex, together with the other forts along the route also present on the Someș Limes axis (Tihău, Cășeu, Ilișua and Orheiul Bistriței), represent the forts along the axis's route that provide spatial coherence, being relatively longitudinal in arrangement. Towards the eastern direction and the south-eastern end of the axis lie the forts at Brâncovenești, Războieni Cetate and Cristești.

5.3.4. The Potaissa-Napoca-Porolissum urban-imperial axis

These three urban settlements formed the main functional hubs of Dacia Porolissensis, being nodes of command and control. This imperial axis provided the connection to the limes axes. Given that the territory was restricted to a particular area within Dacia Porolissensis, Potaissa, Napoca and Porolissum were the province's reference locations. Because the functions of the three settlements differed, the urban-imperial axis combines military and strategic value with administrative, economic and legal value.

Geographically, the urban axis lies within a rich and varied area, running from south to north and encompassing several types of relief. It can be regarded as one of the best documented geo-archaeological axes, with very high potential for tourism development. The

urban-imperial axis traces a historical transition from fortification, to municipium, and then to a point on the northern limes of Dacia Porolissensis.

5.4. Micro-analysis of the tourist value of the axes in Dacia Porolissensis

5.4.1. The defence axis Bologna-Sutoru-Românași-Romita-Porolisum

The tourist micro-analysis of the defence axis of the western forts of Dacia Porolissensis involves identifying the Roman forts with a main typology and those that are secondary. Within this axis, comprising the roads between the forts Bologna -- Sutoru -- Românași -- Romita -- Porolisum, I selected the forts at Porolisum and Buciumi as primary (Table 1), and the forts at Bologna (Resculum), Sutoru (Optatiana) and Românași (Largiana) as secondary points (Table 2).

Table 1. Scores for the primary attractions

	Uniqueness	Additivity	Permanence of attraction factors	Notoriety	Total
Porolisum Fort	2	2	2	3	9
Buciumi Fort	1	2	1	3	7

Source: own processing and analysis

	Compatibility with a primary attraction	Substitutability relative to the primary attraction	Spatial proximity to the primary attraction	Connectivity with the primary attraction	Total
Largiana Fort – traces visible only in the field, limited archaeological research	2	1	3	3	9
Optatiana Fort – can serve as an intermediate point	2	1	3	3	9

Bologa Fort – archaeologically documented and partly visible	2	1	2	1	6
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Table 2. Scores for the secondary attractions

Source: own processing and analysis

The diagram of the Porolissum fort analysis (Figure 9) is based on the analysis of uniqueness, additivity, permanence of attraction factors and notoriety. These criteria received scores according to the analysis methodology.

Uniqueness.

Although it is included on UNESCO's official World Heritage List, the Roman fort at Porolissum is not widely regarded as an international destination for archaeological tourism. Its touristic visibility on European or global tourism channels is very low, almost non-existent, yet at regional and national level the archaeological complex is unique. These limitations stem from a modest infrastructure; essential and complementary tourist facilities cannot be provided at a high capacity. The destination's potential is nonetheless significant, given its high historical value and the fact that its conservation is well managed and maintained by the authorities, making it one of the few archaeological sites in Romania at this stage of development. Based on the above arguments, this criterion was scored 3, placing the fort at national-destination rank.

Additivity.

For this criterion I awarded the maximum score, since the destination of the Roman fort at Porolissum should be included on tourists' "must-have" lists. It is not included in any archaeology-specific tourist circuit within the country, yet its positioning is regionally favourable, being located a reasonable distance from other, different types of tourist attractions in Sălaj County: the Zmeilor Garden, the county's wooden churches, and other nature parks. An annual event, the "Porolissum Fest" historical re-enactment festival, contributes to a richer tourist experience. Its additivity potential is medium, with possibilities for growth and further development.

Permanence of attraction factors.

The spectacular natural landscape and the fort's position on a hill with a direct view over the entire Transylvanian Depression provide an unusual tourist experience; the panorama and natural setting are attractive throughout the year. Favourable visiting conditions occur in spring through autumn; even though the archaeological site is open to the public year-round, the area's climate makes visiting it a seasonal activity. The lack of shelter or an indoor space for visitors to protect themselves from rain, strong wind or heatwaves affects the awarding of the maximum score on this criterion. Porolissum is a destination with only partial permanence of attractiveness -- it can be visited at any time, but weather conditions have a negative influence.

Notoriety.

From the point of view of recognition, the Porolissum fort has been under research since the early part of the last century. During the discovery phase, many locals took part alongside teams of archaeologists in identifying elements, pottery and other objects uncovered. Academic recognition is high, being well known among specialists. Since 2024, the fort has been included on the UNESCO World Heritage List, giving it even greater visibility, which will further boost its notoriety. Local notoriety is very high, while regional notoriety is not expected to reach the same levels. Overall, the notoriety score is maximal, although in a regional and national context it remains a work in progress.

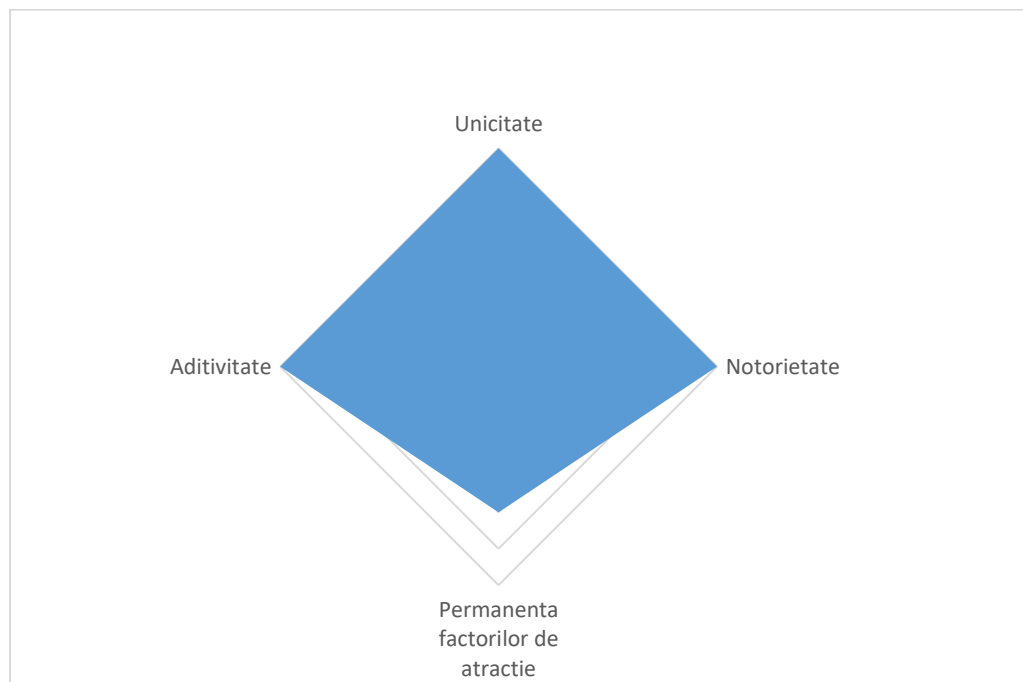


Figure 9. Diagram of the variables in the micro-analysis of the Porolissum fort (source: own processing and analysis)

Buciumi fort was subjected to the same micro-analysis, with the same criteria examined in order to produce the diagram of variables (Figure 10).

Uniqueness.

The level of uniqueness for this fort is low and it is not perceived as a unique destination. Although it carries valuable historical weight, the fort is less well known than other Roman forts (e.g. Porolissum), as it does not match them in terms of spectacle, size and state of conservation. The fort's reduced size, typical of the Roman army's auxiliary forts, does not favour this factor; the fort's ruins do not differ greatly from other regional fortifications nearby. On the other hand, the ruins that remain visible allow visitors to walk the fort's layout, still creating a touristic experience. The reason this destination receives the minimum score on this criterion is that the site is known mainly at micro-regional level, not standing out compared with sites of national and international interest. Nonetheless, this location's uniqueness can be supported by the fact that this fort forms part of Roman Dacia's defensive system, carrying military significance of its own.

Additivity.

The Buciumi fort has a medium degree of additivity. It cannot sustain itself as a standalone destination, yet there are strong possibilities for it to be included in an archaeological tourist circuit at Sălaj county level, regionally, or even nationally. It lies near other similar archaeological sites, such as Porolissum, forming part of the same defensive line of the northern limes; natural tourist attractions, especially the mountainous area of the Meseş Mountains, contribute to the destination's potential growth in additivity. Its additivity score is fair, placing the destination in the category of locations with medium potential.

Permanence of attraction factors.

Its geographical placement is strategic but not spectacular or symbolic, unlike other sites situated on hills, mountain edges or high plateaus offering panoramic views. The archaeological remains at Buciumi are a permanent attraction throughout the year, but depend on seasonal phenomena. Although visiting is not restricted, road access in winter can be difficult across the whole of the Meseş Mountains, and outside the warm season the site offers no activities, events or guided tours to stir tourist interest.

Notoriety.

Locally, the archaeological site is well known, though its values remain medium, since the information known about it is basic. The site is included in the local educational circuit, with one-day school trips organised there, for example. Its public image is also shaped by its presence in the specialist literature and by its indirect connection to the Porolissum site regarding UNESCO listing. It belonged to the northern limes system and could be a starting point for thematic association and increased notoriety. The destination's notoriety score is medium, being high within the local community but very low in national and international tourism.

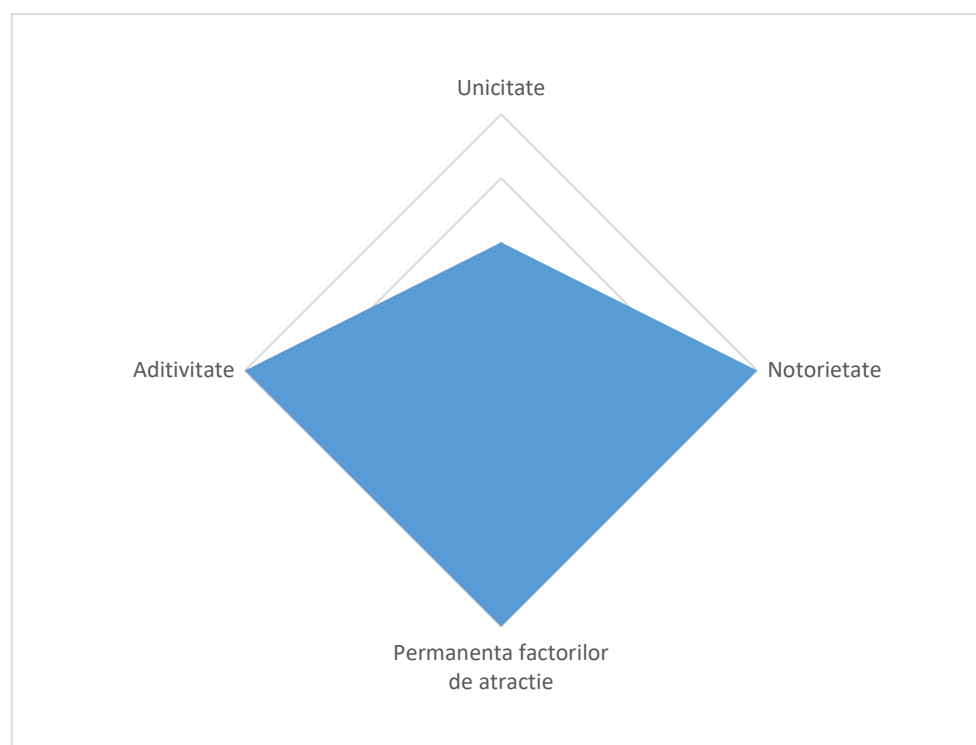


Figure 10. Diagram of the variables in the micro-analysis of the Buciumi fort (source: own processing and analysis)

Being a secondary-type attraction, the Largiana fort analysis considers compatibility with primary attractions, its substitutability, spatial proximity and connectivity with the main attraction. These factors are shown in the diagram of variables (Figure 11).

Compatibility with a primary attraction.

The Largiana fort was a small auxiliary fort forming part of the fortification system of the Dacia Porolissensis limes, with the possibility that it was also included on the route of the

imperial road. Its size relative to the primary attraction, Porolissum, is small, and it can be considered to lie within Porolissum's strategic-touristic sphere of influence. Since it cannot function as a standalone tourist attraction, this fort falls within the category of auxiliary forts and thus becomes compatible, both archaeologically and touristically, with Porolissum.

Substitutability relative to the primary attraction.

The Largiana fort cannot substitute for the fort at Porolissum, since it lacks the spectacular elements the latter has: an amphitheatre, an entrance gate, etc. It does not have the informational complexity found at the fort on Pomet Hill, and the visitor's experience will be much reduced compared with that at Porolissum. Moreover, Largiana has no reconstructions, no informative facilities and no local or national promotion. When comparing the two forts, we are referring to two different functions, namely membership of the military road network (Largiana) versus the status of a civilian settlement and regional capital.

Spatial proximity to the primary attraction.

The road distance between the two forts is approximately 20 kilometres, with an average travel time of 25 minutes. This distance is optimal and favourable to a tourist's decision to visit the secondary attraction.

Connectivity with the primary attraction.

Geographically, the secondary attraction at Largiana fort can connect with two primary attractions: Porolissum fort and Buciumi fort. These remain compatible, as they belong to the same system of limes roads. Current touristic connectivity is moderate, with Largiana being more isolated than the other two.

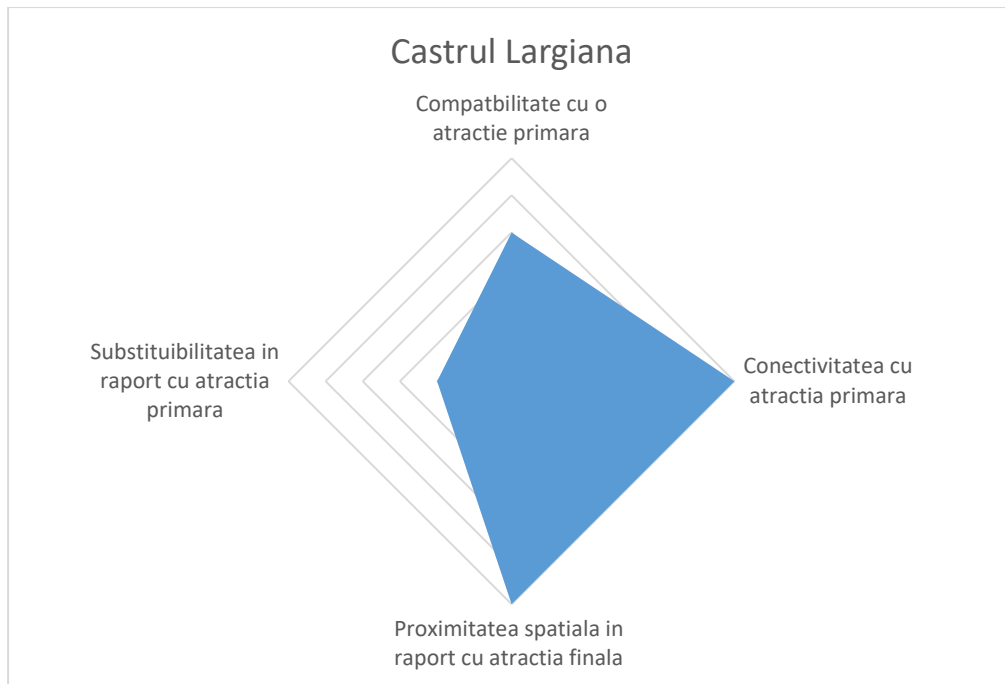


Figure 11. Diagram of the variables in the micro-analysis of the Largiana fort (source: own processing and analysis)

The diagram of variables for the Optatiana fort (Figure 12) results from analysing the factors intended for secondary attractions.

Compatibility with a primary attraction.

The Roman fort at Sutoru -- Optatiana is also an auxiliary fort that formed part of the Dacia Porolissensis limes, with an assumed starting point at Bologa fort. Optatiana is also mentioned along the Napoca-Porolissum Imperial road. Archaeologically, Optatiana is compatible with the primary attraction, Porolissum, although it lacks outstanding visibility within the local landscape.

Substitutability relative to the primary attraction.

Optatiana cannot substitute for the fort at Porolissum, since it lacks the capacity to convey the same historical feeling; it represents only a fragment of the limes's function and does not replace the strength held by the main attraction. The lack of tourist facilities makes this fort incapable of substituting for the main fort.

Spatial proximity to the primary attraction.

The fort lies at a road distance of approximately 25 kilometres, with a travel time of about 30 minutes. The distance between the two is suitable for a secondary attraction.

Connectivity with the primary attraction.

Geographically, the secondary attraction at Optatiana fort can connect with two primary attractions: Porolissum fort and Buciumi fort.

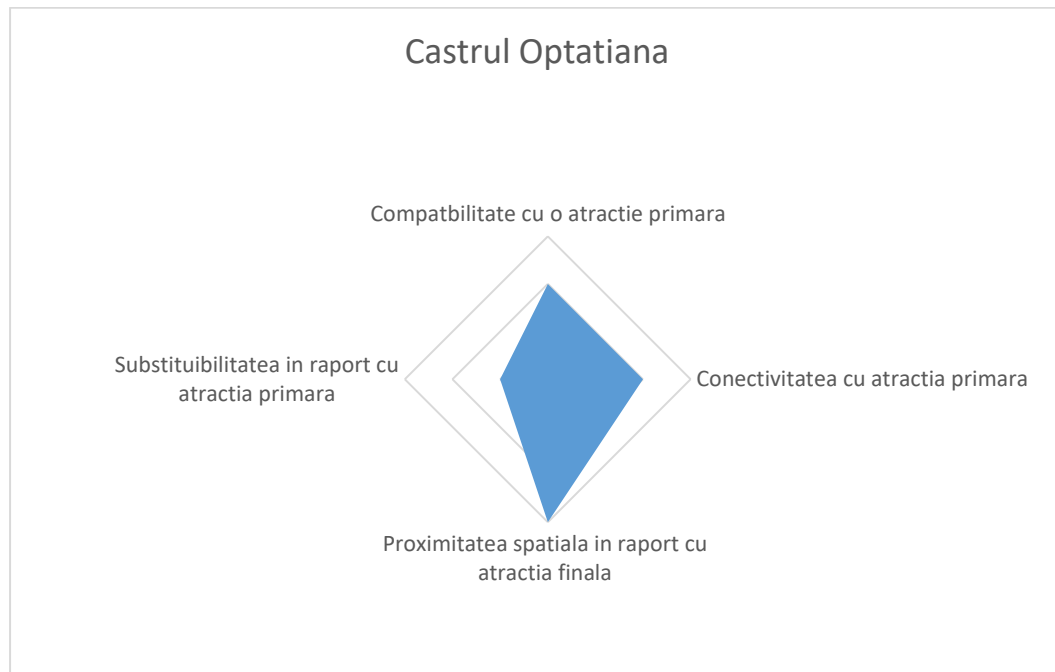


Figure 12. Diagram of the variables in the micro-analysis of the Optatiana fort (source: own processing and analysis)

Bologa fort is treated similarly to the secondary attractions, with results shown in the diagram (Figure 13).

Compatibility with a primary attraction.

Chronologically, the two forts were functional at the same time, fulfilled the same function, and are both subjects of archaeological documentation and are visible. The fort at Bologa is partly visible, with a few discoveries brought to the surface across the whole fort. It is integrated into the limes system of Dacia Porolissensis.

Substitutability relative to the primary attraction.

Although it is an important strategic military point within the limes structure of Dacia Porolissensis, the fort at Bologa cannot substitute for the fort at Porolissum, given the diversity the latter offers. Porolissum was the capital of Dacia Porolissensis, so no auxiliary fort, or one

of greater military importance, could match its grandeur. The Resculum fort can be integrated into a general archaeological trail featuring the Porolissum fort as the main attraction.

Spatial proximity to the primary attraction.

The road distance is approximately 75 kilometres via the Huedin-Ciucea-Zalău-Moigrad route, which places the Resculum fort at a moderate rating on this criterion, with a travel time of about 1 hour and 30 minutes. The fort lies at the western edge of Dacia Porolissensis.

Connectivity with a primary attraction.

Connectivity between the two forts is indirect, via the connection provided by the Roman road starting from Napoca. A further factor reducing this connectivity is the predominantly mountainous relief.

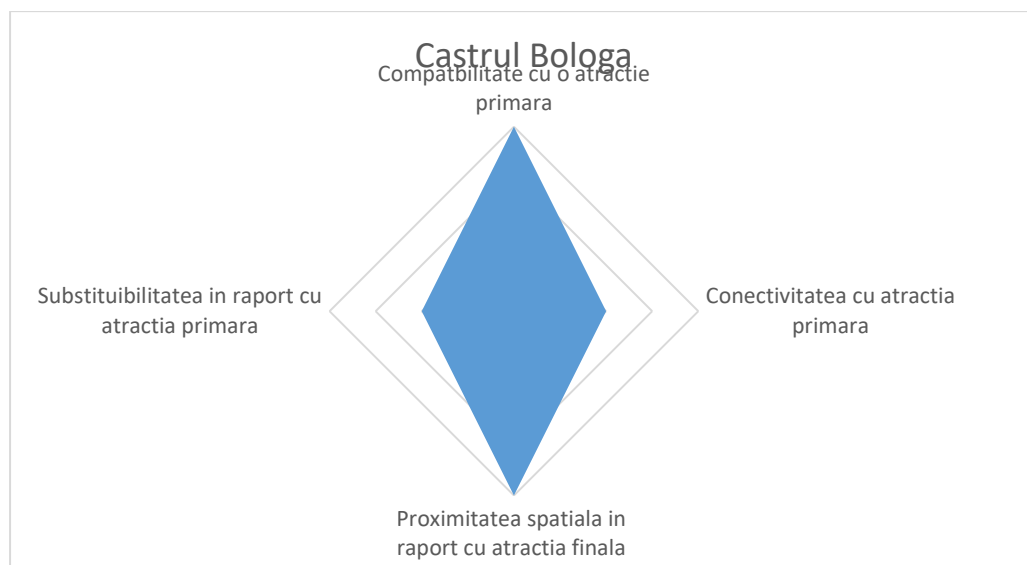


Figure 13. Diagram of the variables in the micro-analysis of the Bologa fort (source: own processing and analysis)

5.4.2. The Someș limes axis Porolissum -- Tihău -- Cășeu -- Ilișua -- Orheiul Bistriței

Along this axis, the primary attraction remains the Porolissum complex, analysed in the previous subchapter, while the secondary attractions are the other points along the axis (Table 3). The forts at Tihău and Cășeu are regarded as 'extinguished' points along the axis, since they no longer show visible traces in the field.

Table 3. Scores for the secondary attractions along the axis

	Compatibility with a primary attraction	Substitutability relative to the primary attraction	Spatial proximity to the primary attraction	Connectivity with the primary attraction	Total
Ilișua Fort	2	1	2	1	6
Orheiul Bistriței Fort – a complementary piece within the limes network	2	1	1	1	5

Source: own processing and analysis

The Ilișua fort is analysed and highlighted through the diagram of variables (Figure 14).

Compatibility with a primary attraction.

Archaeologically, the fort is compatible with the primary attraction at Porolissum, belonging to the same historical period, having similar functions, with remains visible in the field and with investment in research. It belonged to the limes of Dacia Porolissensis and was functionally integrated into the frontier system.

Substitutability relative to the primary attraction.

The archaeological discoveries at Ilișua cannot substitute for the fort at Porolissum, owing to the absence of monumental discoveries. The urban and complex experience of the settlement on Pomet Hill makes it unique in this respect, and the secondary attractions cannot reach the level required to substitute for it within a tourist circuit.

Spatial proximity to the primary attraction.

The road distance is approximately 90 km, with a travel time of nearly 2 hours; the fort at Ilișua lies at the eastern extremity of Dacia Porolissensis and cannot be integrated into a single-day tour.

Connectivity with the primary attraction.

Connectivity with Porolissum is indirect, since it requires crossing several forts before reaching the final destination.

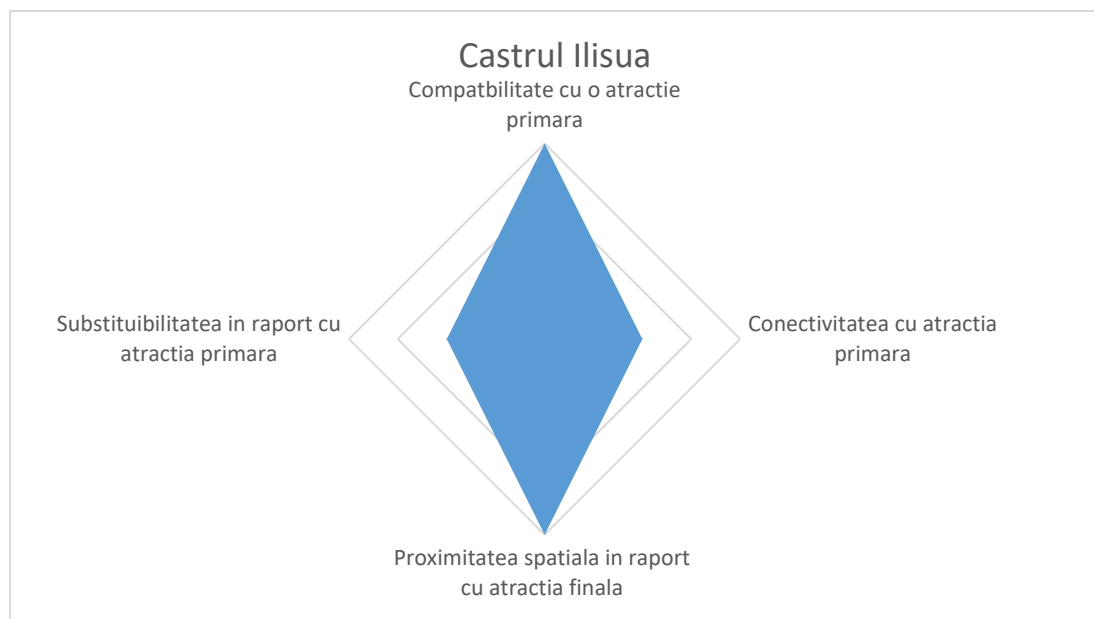


Figure 14. Diagram of the variables in the micro-analysis of the Ilișua fort (source: own processing and analysis)

The Orheiul Bistriței fort falls within the secondary-attraction category and is analysed and evaluated according to the score it received.

Compatibility with a primary attraction.

The Roman fort at Orheiul Bistriței formed part of the eastern side of the Dacia Porolissensis limes. It operated during the same period and within the same chronological context as the fort at Porolissum. This fort's compatibility with Porolissum falls in line with the others listed above, each capable of being included in a complementary visiting programme, within a tourist itinerary. The fort has visible remains in the field and is easily accessible for direct visits.

Substitutability relative to the primary attraction.

This fort does not have a large number of visible surface remains and cannot be compared with the primary attraction, which has a much stronger infrastructure. In this case, the fort remains merely a complementary site, not a substitute.

Spatial proximity to the primary attraction.

The distance to be travelled from the primary attraction to the Orheiul Bistriței fort is 110 km, roughly 2 hours' drive. The fort is positioned at the eastern extremity of the limes and cannot be integrated, within a single day, into a circuit covering all the other attractions.

Connectivity with the primary attraction.

Within the Dacia Porolissensis limes, the Orheiul Bistriței fort is compatible with a single primary attraction, namely the fort at Porolissum.

5.4.3. Interpretation of results

The Roman complex at Porolissum is, without doubt, the primary attraction of the limes network in Dacia Porolissensis. Besides being the northernmost point in the province, it is also the most extensive site, with many visible discoveries and investments, both in archaeological research and excavation and in the development of infrastructure and the area from a touristic point of view (transport infrastructure, access, tourist information infrastructure, etc.). Geographically, the complex is set within a spectacular landscape, offering wide visibility and attractiveness from this point of view too. It can be regarded as the core and starting point for integration into archaeotourism circuits.

The Roman fort at Buciumi can also be included among the primary attractions, though the score obtained by the Porolissum fort is not matched by its value. The other secondary tourist attractions were assessed relative to the Roman complex at Porolissum. The visibility in the field of the archaeological remains within the Buciumi fort is good, and very close to that of Porolissum, only lacking the grandiose elements specific to a capital, such as an amphitheatre. Geographically located within the Meseș Mountains, it takes on the role of a primary fort -- a satellite to Porolissum -- and becomes very easy to integrate into a thematic archaeological circuit.

The remaining forts making up the limes axis of Dacia Porolissensis fall within the category of secondary attractions, since they do not meet certain criteria that would classify them as primary; in principle, these criteria relate to the archaeological research carried out since the last century.

The forts of Largiana, Samum and Resculum are well connected to the primary attraction at Porolissum, having nearby road positions. Their archaeological potential is weak and unexploited, yet very valuable within the limes network that existed. Each fort positioned along this axis had military and functional relevance. The archaeological discoveries are partially and relatively visible in the field; there is a tangible attraction in these forts capable of turning them into worthwhile destinations, at least as a stopping point.

The forts at Arcobadara and Orheiul Bistriței become increasingly weakly connected to the main attraction, forming part of the eastern extremity of the limes axis. These are smaller in size, with limited visibility in the field. They belong to the category of complementary secondary attractions suitable for archaeological tourism and can be capitalised on by integrating them into and creating a specialised tourist circuit. All these attractions form part of a dedicated circuit appealing to specialised tourists, not part of mass tourism.

Moreover, the element that rounds out the attractiveness of these points, whether primary or secondary, is the inclusion of the Frontiers of the Roman Empire, of which the Dacia Porolissensis limes forms part, on the UNESCO World Heritage List. The opportunity for tourism development stems from this fact, because from a local or national point of interest, a site becomes a cultural asset belonging to the whole of humanity. Any monument on the UNESCO list serves as a calling card for a country, a region or the place where it is located. Tourists receive a guarantee from specialists that these attractions are worth visiting, having been carefully selected for this list. The inclusion of cultural assets on internationally recognised heritage lists can help increase tourist interest in these sites. In this way, they can become important points of attraction, with positive effects on the local economy and on the development of surrounding communities. At the same time, capitalising on them can stimulate the diversification of tourism forms, particularly of an archaeological and cultural character.

5.4.4. The Potaissa-Napoca-Porolissum urban axis and the valorisation of heritage

The method used to objectively and comparatively analyse the tourist facilities along the urban-imperial axis identified in this work consists of applying the evaluation methodology found in the specialist literature. Emphasis is placed especially on the Potaissa complex and the Porolissum complex, which represent the two ends of the axis. Although Napoca was an important hub from several points of view, the many changes brought to the ancient town over time have resulted in the loss of its archaeological visibility on the ground. Touristic potential is far stronger and more tangible at the other two points. The purpose of this evaluation is to determine development directions, current valorisation, opportunities for improvement, and integration into regional, national and international tourist routes.

Within the Porolissum complex I selected three major site components: the commercial buildings, the “porta praetoria”, the headquarters building (principia), and the amphitheatre (Table 4). All are visible in the field, demonstrating that extensive archaeological research has been carried out and that their level of conservation and restoration is high. The presence of information plaques in front of the sites also shows they have been arranged for tourism purposes. The plaques are informative, in both Romanian and English, the latter being an internationally used language.

Table 4. Valorisation of the Porolissum tourist facility

Commercial buildings

Criterion	-1	0	1	2	Observations
Quality of execution			x		
Accessibility				x	
Operational safety				x	
Capacity			x		
Environmental impact			x		

Headquarters building (principia)

Criterion	-1	0	1	2	Observations
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Quality of execution			x		
Accessibility				x	
Operational safety			x		
Capacity			x		
Environmental impact			x		

Amphitheatre

Criterion	-1	0	1	2	Observations
Quality of execution			x		
Accessibility				x	
Operational safety				x	
Capacity			x		
Environmental impact			x		

Overall resource evaluation, including all relevant facilities analysed above -- average score

Criterion	Average score	Observations
Quality of execution	1	
Accessibility	2	
Operational safety	1	
Capacity	1	
Environmental impact	1	

Source: own processing and analysis

Development and awareness of the area occupied by the Roman complex have been strongly shaped by the presence of the Porolissum archaeological site, a fact that has contributed to the location's notoriety. The tourism phenomenon arose from people's wish for recreation and rest, moving away from the urban scenery of nearby towns and opting for walks

and hikes in the surrounding rural areas. The grid-based analysis highlights the quality-of-execution criterion, with an average score of 1, indicating that the reconstruction is relatively faithful and that conservation of these facilities, taken at a micro level, is satisfactory. Their parameters are standard, with functional performance capable of showing visitors what the buildings in question looked like in antiquity.

From an accessibility standpoint, the entire complex is easily accessible; the county roads are paved, and the complex even has a car park. After the car park, access continues on foot, so that visitors can enter the atmosphere of antiquity, when Roman roads were built solely from stone. The landscape becomes an integral part of the experience, since the predominant relief form is hills with maximum altitudes of 520 metres. The entire Porolisum complex is accessible.

The safety of visiting the facilities within the site is adequate; visitors face no visiting restrictions and conditions are safe, with no major risks. Nevertheless, visiting this facility requires that minimum safety measures be taken owing to the wooden component among the discoveries, which may wear over time.

Visitor capacity at the Porolisum archaeological site is not subject to a strict limit on the number of participants, since it lies in the open air and its surface spans the territory of several villages; however, the main points taken into analysis have a limited tourist capacity owing to the wooden materials, which may be of variable quality, and owing to spatial constraints. The Porta Praetoria is one of the most restricted sites within the facility, supporting only a limited number of visitors.

The environmental impact is almost non-existent; the pollution found within the villages' territories does not result from the tourist activity carried out within the archaeological site. At the entrance to the archaeological complex there is an accommodation and catering unit that could have an environmental impact.

For the same analysis, but carried out for the tourist facility at Potaissa, I selected three defining criteria: the Porta Decumana, the headquarters building (principia) and the perimeter wall (Table 5). The differences between the two ends of the axis are evident in terms of the level and number of discoveries.

Table 5. Valorisation of the Potaissa tourist facility

Porta Decumana

Criterion	-1	0	1	2	Observations
Quality of execution			x		
Accessibility			x		
Operational safety			x		
Capacity			x		
Environmental impact			x		

Headquarters building (principia)

Criterion	-1	0	1	2	Observations
Quality of execution			x		
Accessibility			x		
Operational safety			x		
Capacity			x		
Environmental impact			x		

Perimeter wall

Criterion	-1	0	1	2	Observations
Quality of execution			x		
Accessibility			x		
Operational safety			x		
Capacity			x		
Environmental impact			x		

Overall resource evaluation, including all relevant facilities analysed above -- average score

Criterion	Average score	Observations
Quality of execution	1	
Accessibility	1	
Operational safety	1	
Capacity	1	
Environmental impact	1	

Source: own processing and analysis

The discovered elements score at a medium level for quality of execution; although the elements are visible, they have been only partially reconstructed, with modest conservation and a lack of interventions to enhance their value. The site is visible and easily accessible to the general public, and all resources can be visited. The settlement has a further advantage in its proximity to the town of Turda and its connectivity with local routes. The tourist facility is safe to visit; the stone structures are stable and show no issues of structural integrity. There are no risks and no danger of collapse or injury. The complex can be visited at any time of year, by groups without restriction on numbers. There is no risk of congestion, since everything is laid out in an open space. Everything is well integrated into the landscape, without visible alteration of the surrounding environment. The only pollution risk factor lies in the negligence of locals/tourists that may arise during a visit to the site.

The most important step in capitalising on the Potaissa archaeological site concerns the restoration, conservation and rehabilitation of this outstanding archaeological heritage, through the application of balanced, minimally invasive intervention methods, in line with the provisions of the European Convention on the Protection of the Archaeological Heritage of Valletta, adopted in Romania under Law No. 150/1997, as well as its integration into the local tourist and economic circuit. This project seeks to increase the area's attractiveness and stimulate economic development, including through the creation of new jobs in tourism and by supporting cultural and creative industries, with an impact on the local community's quality of life. Interventions planned for sites such as the palaestra, the via praetoria, the via principalis, the via sagularis, the porta decumana, the porta principalis dextra, the porta principalis sinistra, the thermae, and the curtain and north-western bastions are carried out under the coordination of archaeology and restoration specialists. Activities include preventive archaeological

research, monitoring of works within the vegetation layer, and oversight of interventions carried out in sectors already researched and given primary conservation.

The Porta Decumana and the Principia building are to be capitalised on by creating structures intended to convey the dimensions and volumetric appearance of the original buildings. In the case of the Roman baths, the project provides for the restoration of the ruins and the fitting out of special structures for the conservation and protection of both the archaeological remains and the movable heritage discovered on site, such as architectural elements from the fort. Decoratively differentiated, colour-coded gravel will be used to restore the flooring: red in the areas fitted with a hypocaust system and white in the other rooms. In the areas heated by the hypocaust, the specific components of the Roman heating system will be partially reconstructed, including the suspended floor and the supporting structures made of brick and waterproof mortar.

At the same time, the project provides for the arrangement and marking of the main roads within the fort -- the Via Praetoria, the Via Principalis and the Via Decumana -- as well as the restoration of the perimeter route, the Via Sagularis, in order to facilitate both visiting the site and its monitoring and maintenance.

Along the visitor route, rest areas will be fitted out, equipped with benches, waste bins and drinking-water fountains. At important points along the roads and at intersections, information panels will be installed, including general presentations of the fort, graphic representations and orientation signage for visitors. Near the Porta Principalis Sinistra, a building intended for sanitary facilities will be constructed, with an area of approximately 87 m². It will include separate facilities for women and men, a space adapted for people with disabilities, and a storage area for maintenance materials. To protect and delimit the archaeological site, an area of approximately 233,700 m² will be fenced off, including both the interior of the fort and its exterior defensive walls. The ancient territory of the former municipium of Napoca is covered by the modern infrastructure of present-day Cluj-Napoca, and discoveries relating to antiquity are concentrated at various points across the city but are not accompanied by specific archaeological interpretation. Thus, when applying the evaluation methodology, the Napoca point on the Potaissa-Porolissum urban axis cannot be analysed, representing a missing link in the coherent valorisation of the urban axis, despite the rapid, modern development of the city of Cluj-Napoca.

5.4.5. SWOT Analysis

The Roman complex at Porolissum is the best-preserved point along the urban axis and benefits from a much higher level of conservation than the other two points. In order to promote it as the axis's main point, I compiled a SWOT analysis (Table 6).

Table 6. SWOT analysis of the Porolissum archaeological complex

Strengths	Very good geographical position; attractive natural setting with spectacular views towards the mountainous area of the Meseş Mountains and the Western Carpathians; very good road accessibility; the discoveries are in very good condition; presence of explanatory plaques and a tourist information centre; capable of attracting a niche tourist flow focused on archaeology, culture and education; presence of accommodation and catering infrastructure; complex with no visitor-number limit.
Weaknesses	Weak digitalisation relative to current technological development, limiting greater tourist attractiveness; lack of a tour guide -- the information tourists receive is limited to the information plaques; the potential for historical reconstruction is not exploited to its full capacity; the complex is exposed to weather conditions, being an open-air space, making it a seasonal tourist attraction.
Opportunities	Could form the end point of a thematic archaeological tourist route; promotion of the site through the annual thematic festivals organised there; attracting funding and integration into UNESCO projects.
Threats	Risk of becoming isolated owing to lack of promotion -- the site could be forgotten, being positioned at the periphery; erosion of the wooden parts of the site owing to weather conditions; lack of trained, qualified staff to support cultural tourism.

Source: own processing and analysis

By contrast with the Porolissum site, the one at Potaissa has not been capitalised on to the same extent, although it is documented and validated similarly from an archaeological standpoint. The tourist facility within the Potaissa archaeological site is far more modest, and the surrounding landscape is also different in terms of integration. Table 7 highlights the SWOT analysis of the tourist facility at Potaissa.

Table 7. SWOT analysis of the Potaissa archaeological complex

Strengths	High accessibility owing to its location within the town of Turda; numerous accommodation and catering options; well-preserved sections and identifiable archaeological discoveries.
Weaknesses	Lack of a tourist information centre based solely on the archaeological site; weak, almost non-existent local promotion, especially of cultural-tourism activities; poorly signposted attraction, especially lacking information panels; lack of a local brand and a compelling local story.
Opportunities	Integration into a tourist-axis route owing to the point's major historical value within military Dacia; attracting funding for developing the existing heritage and increasing tourist value; creating cultural events to promote archaeology and ancient history.
Threats	Tourist flow that may be directed towards other tourist attractions in or near the city; possible degradation of the discoveries if neglected.

Source: own processing and analysis

The SWOT analysis of the two points along the Potaissa-Napoca-Porolissum urban axis that can be capitalised on today reveals a strong connection in terms of archaeotouristic potential. The Roman roads associated with this axis demonstrate spatial continuity, which, besides being reflected in modern infrastructure, also links the two points along the axis, adding further value within an archaeotouristic circuit. The comparative study carried out with the help of SWOT analysis brings out the level of touristic valorisation of the two archaeological complexes.

5.5. Geo-archaeological axes in present-day geography and spatial correspondences

The road network analysed in this thesis represents one of the most durable and influential transport systems developed in antiquity. In synergy with physical geography -- relief and hydrography -- Roman infrastructure was strategically designed to meet the military, administrative and economic needs of the province of Dacia. Roman roads connected forts and urban centres to one another and to the frontier points, being designed with engineering rigour, maximum visibility, territorial control and easy access to natural resources. This network has not only physically endured within the landscape but has also retained its relevance and influence to the present day, determining -- directly or indirectly -- the routes of modern roads.

Roman roads can be viewed as generative axes of territorial development. Urban settlements that formed near these roads underwent accelerated urbanisation, with many being raised to the status of municipium or colonia. Thus, the spatial matrix of Transylvania's urban network reflects the pattern imposed by the Romans in Dacia Porolissensis, showing morphological and functional continuity between the old structures and contemporary ones (Figure 15). The aim of this subchapter is to analyse the spatial overlap between Roman roads and today's road infrastructure, highlighting the high degree of territorial coherence and the perpetuation of major circulation directions.

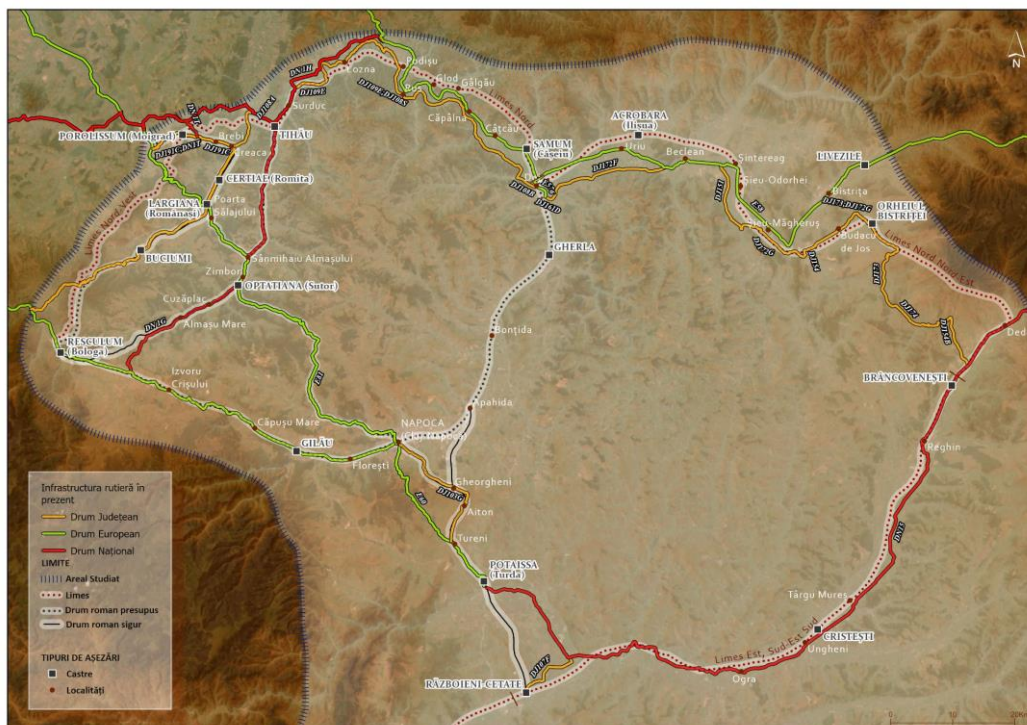


Figure 15. The route of the limes and the current route in Dacia Porolissensis (own source)

A telling example is the route of the Roman road between Bologa and Porolissum. This ancient axis is faithfully reflected in the contemporary road network through:

- National Road DN1H
- County roads DJ108A, DJ764B and DJ108E

These modern arteries follow the course of the Roman road almost entirely, confirming ancient geostrategic logic and supporting the idea of infrastructural continuity and the perpetuation of spatial utility. From a touristic-valorisation standpoint, this route offers a major competitive advantage: the easy accessibility of heritage sites -- forts, fortifications, archaeological terraces -- encouraging the sustainable development of cultural and archaeological tourism.

Within the western defence axis of the forts of Dacia Porolissensis, part of the Roman defensive system of Dacia Porolissensis, the route Bologa -- Sutoru -- Românași -- Romita -- Porolissum can be divided into three major segments, each with direct correspondences in the current infrastructure:

1. Bologa -- Sutoru -- overlaps with DJ108A
2. Sutoru -- Românași -- Romita -- corresponds to the DJ and DN network
3. Romita -- Porolissum (Moigrad -- Zalău) -- correlated with DN1H and the area's secondary networks

Alternatively, the Bologa -- Buciumi -- Porolissum route (Figure 16), although steeper and shorter, is likewise supported by the current infrastructure, with more fragmented or gravel sections, which does not however diminish its touristic or historical valorisation potential.



Figure 16. The limes route and the current route in the Bologa-Porolissum sector (own source)

This overlap is not merely a topographic coincidence but proof of the enduring functionality of Roman infrastructure, which established essential directions of mobility and territorial organisation. Moreover, the current road network, through the motorways planned or under construction (such as the A3), maintains the same north-south and east-west connectivity logic established as early as the Roman era.

The route of the defence axis along the northern frontier of Dacia Porolissensis is largely reproduced in the current road network (Figure 17), confirming the functional continuity of this corridor. The national and county roads currently crossing this space (such as DN17D, DN18B, DJ172G, DJ171) broadly follow the same directions dictated by the local geography and consolidated by the Romans. In addition, modern urban and road development around the centres of Bistrița, Dej, Beclean or Năsăud is closely linked to these old axes of military circulation:

- The Porolissum-Tihău road corresponds to the current road DJ108 and DN1H, which overlaps with the infrastructure from Zalău to Tihău, connecting the localities along the Someș valley

- The Tihău-Cășeu road overlaps with the current road DN1C, passing through the localities of Jibou -- Gâlgău -- Dej and Cășeu
- The Cășeu-Ilișua road follows the current road DJ172F (Cășeu -- Reteag) and then joins the DN17D and DJ172J connection; it continues to follow the Someș valley and the localities along the line of the ancient road
- The Ilișua-Orheiul Bistriței road has correspondences with the current roads DN17C and DJ172G, running eastward along the Someș and Bistrița valleys



Figure 17. Overlap of the current road with the Limes road in the northern sector (own source)

The intra-Carpathian Limes axis, from Meseș to the barrier of the Eastern Carpathians, comprises the correspondences of the Roman roads that are the subject of the other two axes mentioned earlier. The additional roads that join this axis are the Roman roads linking the forts at Brâncovenești, Războieni Cetate and Cristești. These roads are concentrated on the eastern axis of Dacia Porolissensis, marking the exit from the intra-Carpathian space.

The extra correspondence with current roads brought by this axis is:

- The Roman road Orheiul Bistriței -- Brâncovenești (Figure 18) is achieved via road DN15A, which links the town of Bistrița to Reghin, and the secondary roads that run

along the Bistrița and Șieu valleys. These correspondences have been a strategic constant since antiquity.

- The Brâncovenеști -- Războieni Cetate road maintains its connectivity through road DN15, via the modernised Târgu-Mureș -- Reghin -- Toplica segment
- The Războieni -- Cristești road has correspondences in the modern network DJ151 and DN13A. Cristești benefits from a key position in the peri-urban area of Târgu Mureș, still serving today as a road hub and development zone.



Figure 18. The current road in the Orheiul Bistriței sector (own source)

The analysis and demonstration of correspondences between ancient roads and current road axes confirm that the ancient road network was the foundation of territorial development up to the present day. Current roads follow the ancient routes to a very large extent, confirming spatial continuity and territorial logic.

Each of the axes analysed -- from the western defence axis Bologna-Porolissum, to the Someş axis or the intra-Carpathian limes axis as far as the barrier of the Eastern Carpathians -

- demonstrates multiple functionality: military in the Roman era, and today, infrastructural and economic.

Beyond their authenticity and archaeological value, these axes also acquire cultural value with touristic prospects, since they allow access to the former settlements of Dacia Porolissensis and can be integrated into tourist circuits. Thus, they offer a clear direction for capitalising on archaeological heritage.

CONCLUSIONS

In presenting the main results arising from the present doctoral thesis, entitled 'ROMAN ROADS AS SPACES SHAPING GEOGRAPHICAL AXES. DYNAMICS. IDENTITY. ARCHAEO TOURISM', I demonstrate the proposed objectives and validate the research hypotheses. The stated aim of the research involved demonstrating the spatial distribution of archaeological heritage in close relation to the geographical structures existing within the territory. The relationship between geography and archaeology has existed since antiquity, but the present work has highlighted this connection across the territory through an interdisciplinary lens. The research hypotheses formulated in the introduction were validated as follows. The general hypothesis, according to which the spatial distribution of archaeological heritage is not random but conditioned by the geographical framework, is confirmed through the identification of the four geo-archaeological axes, all aligned along hydrographic and orographic corridors favourable to circulation. Specific hypothesis No. 1, regarding the direct relationship between geography and archaeology, is confirmed through the overlap of Roman routes with the current road network, demonstrating the functional continuity of ancient infrastructure. Specific hypothesis No. 2, according to which archaeological heritage represents a determining factor in tourism development, is confirmed through the ranking obtained from the micro-analysis: sites with high scores (Porolissum, also included on the UNESCO World Heritage List, and Buciumi) correspond to a genuine touristic status as primary attractions. Specific hypothesis No. 3, concerning the ethical valorisation of heritage as a premise for sustainable development, is confirmed in part -- the analysis of facilities and the ranking of priority investments provide a concrete framework for responsible valorisation, although the absence of data on actual tourist flows (mentioned below, among the limitations of the research) does not allow for a complete quantification of long-term sustainability.

The archaeological heritage still preserved, alive, across the territory of Transylvania follows a logical course in relation to geography, since it is aligned according to relief, hydrography and circulation nodes. On this basis I was able to identify four main geo-archaeological axes:

- The western defence axis of the forts
- The Someş limes axis
- The intra-Carpathian limes axis

- The Potaissa-Napoca-Porolissum urban-imperial axis

Each axis fulfils a specific function; the first three are limes axes, generally military in nature, while the last is an urban axis linking three major centres of Dacia Porolissensis. Moreover, beyond identifying these axes and demonstrating their direct relationship with geography, I overlaid the former Roman roads linking the forts along each axis with the current road network. This step was carried out to confirm the logic behind the creation of these axes. The territory in question has been developed, up to the present day, on the basis of the structures the Romans put in place.

The historical elements within the geo-archaeological axes were subjected to a tourism analysis in order to highlight their genuine touristic potential. This was made possible by applying validated research methodologies in the field of tourism and using different tools. With the help of these methods, I can state that I moved towards a ranking of archaeological sites. The touristic value of the axes is presented on the basis of a hierarchy. Through the micro-analysis of the touristic value of the axes along the northern limes of Dacia, I identified two archaeological sites with potential which, following the application of the scoring system, stood out for uniqueness and notoriety. The fort at Moigrad -- Porolissum obtained 9 points and is also included on the UNESCO World Heritage List, while the fort at Buciumi obtained 7 points. Complementing these attractions are the archaeological sites of secondary significance.

The forts positioned at the eastern and southern extremities show the greatest distance from the primary attractions. The fort at Orheiul Bistriței has the greatest distance from Porolissum and Bologa, together with the one at Ilișua, which requires dedicated circuits. This ranking thus represents the starting point for prioritising the touristic valorisation of the axes. On this basis, the present doctoral thesis provides the criteria for prioritising future investment. Archaeological sites with maximum scores form the core of the thematic circuits within the axes. Considerations that would take the research to a further level could rely on measuring tourist flows at these main sites, while attractions regarded as secondary could also benefit from addressing the shortcomings we are currently aware of. Determining the geo-archaeological axes is, in fact, the subject underlying the consolidation of tourist routes, which will ultimately launch a new form of tourism currently lacking in Romania.

For the urban axis, I chose to carry out an evaluation of the facilities already in place. The ends of the axis, namely Porolissum and Potaissa, are the centres with discoveries that can be visited. The Napoca point on the axis is today far too developed from an urban standpoint;

modern infrastructure has covered over the archaeological discoveries. Analysis of the two end points shows that the Porolissum archaeological complex has a higher score. It gains points for its more developed tourist infrastructure, better conservation of remains, and its landscape setting. This analysis shows that the well-consolidated archaeological core begins in the north, at the archaeological site of Moigrad.

The constraints I faced in carrying out this research included insufficient archaeological data, since many sites lack extensive documentation and many areas remain academically unexplored. I regarded certain points along the axes as 'extinguished points' that could not be subjected to analysis, such as the fort at Tihău, where there are no visible discoveries or infrastructure. The case of the ancient town of Napoca is a further similar example, since the methodology cannot be applied in this context either. At the same time, the complete absence of tourism data, even at archaeological sites with higher notoriety, represented a limitation of the present study. There is no data on tourist flows or on the economic impact the archaeological site has for the county it belongs to or for the Transylvania region. The lack of tourist-satisfaction studies or of any market study on archaeological tourism gave the research a theoretical bent, but these limitations did not diminish its value and did not hinder the achievement of its objectives. On the contrary, this doctoral thesis should be regarded as a milestone, a conceptual reference point from which specific and thematic tourist routes can be identified and outlined.

The practical usefulness and relevance of the results will underpin direct applicability across several fields, though the field of tourism stands to benefit most. Owing to the ranking established, the main points of attraction requiring immediate intervention for their valorisation have been identified. At the same time, deficiencies can be identified which, once addressed, would give the territory a different profile (digitalisation, audio guides, clearer signage, etc.). The fact that Roman roads have present-day correspondences facilitates the design of tourist routes, since the foundation already exists.

These strategies will add particular value to the Transylvania region, since the proposed geo-archaeo-touristic axes can easily be integrated into regional projects and master plans. At the same time, the fact that the limes is included on the UNESCO World Heritage List offers an immediate opportunity for funding and international attention.

In an academic context, the proposed concept of the geo-archaeo-touristic axis can be transferred and applied to other regions of Dacia (Dacia Apulensis, Dacia Moesia) in order to complete the picture of Dacia and fully capitalise on it.

The current research assumes the role of a fundamental basis from which many further indicators for the touristic valorisation of archaeological heritage can proceed. The concepts defined in this work, together with the proposed geo-archaeo-touristic axes, the ranking of tourist attractions relative to archaeological heritage, and the examples of international best practice, form the foundation on which future studies and research can build.

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