"BABEŞ-BOLYAI" UNIVERSITY OF CLUJ-NAPOCA
FACULTY OF HISTORY AND PHILOSOPHY
DOCTORAL SCHOOL OF INTERNATIONAL RELATIONS AND SECURITY STUDIES

Digitization of essential services in contemporary international relations. Case study: EU, US and China

PHD THESIS SUMMARY

Scientific coordinator: PhD student:

Lecturer CROITOR Mihai-Alexandru   **RUSU Mihai-Ionuț**

2024

TABLE OF CONTENTS

Keywords: digitalization, essential service, critical infrastructure, security, international relations, technology, virtual, cyber, digital, internet, resilience, sustainability;

The digitization of essential services has emerged as a transformative force in contemporary international relations, redefining the dynamics of contemporary global interactions and governance. In an era where technology transcends geographical borders, digital solutions have changed the accessibility and efficiency of essential services to modern man and have profoundly impacted international cooperation, security and the global distribution of power.

Digitalization, at its core, represents the integration of digital technologies into everyday life, developing a paradigm centered on a more interconnected and technological world, where traditional concepts of sovereignty, power and diplomacy are reassessed in the context of cyber capabilities, diplomacy and digital governance. The rapid development of digital infrastructure and services, transcending physical borders, has led to new forms of collaboration and competition between states.

In the area of essential services, digitalisation has paved the way for more inclusive and efficient service delivery. However, this digital transformation brings to the fore the challenges related to the systems and subsystems related to the field, and in this way they can exacerbate existing inequalities and tensions.

In addition, the digitalisation of essential services has significant implications for international policy and regulatory frameworks. Issues such as data sovereignty, cross-border data flows and the ethical use of technologies in public services require a rethinking of international rules and agreements. This transformation calls for increased multilateral cooperation, where diplomatic efforts are increasingly focused on building consensus on good digital governance and ensuring a safe, open and inclusive digital future.

The convergence of technology and essential services is not just a matter of domestic politics, but a complex and multidimensional phenomenon that intersects with the broader spectrum of global governance, economic development, and international security. States and organisations are increasingly using their digital infrastructure and capabilities as instruments of foreign policy and international influence.

This paper proposes a scientific approach in presenting the main theoretical and practical aspects in relation to the current challenges of the digitalization phenomenon, but also of the essential services of human life in a context of contemporary international relations, while also regarding their impact on society and the issues of utmost importance regarding the transformations and analysis of different conceptual approaches.

Argument

The reasons considered for approaching this issue came from the identification of a significant segment of users and decision-makers who show a distinct perspective on the relevance of current issues in terms of security and administration of the digital domain. It was fundamental that the chosen theme represented an excellent opportunity to emphasize for all those interested the impact of the digitization process in the provision of essential services and to demonstrate that these are crucial pillars for the efficient operation and sustainable growth of any entity, regardless of the type of organization or as a society as a whole. In my view, the focus on technology and essential services should be a key priority for any entity, whether state or non-state, especially those that are competitive, secure, and strong nationally and internationally.

If we are to refer to the academic aspect, this thesis marks an extension and a logical succession of the previous academic investigations carried out during the university course, especially in the field of political science, European studies, international relations but especially security studies.

The impetus behind the selection of the theme is rooted in the recognition of the persuasive and transformative influence of digitalization on our contemporary society. The motivation to begin this scientific journey stems from an interest reasoned by the need to understand the complex and multiple aspects of the digital revolution, its historical evolution and its profound impact on different sectors, including the economy, education, governance and international relations.

First, the ubiquitous nature of digital technologies and their rapid integration into every aspect of human life makes a compelling case for academic research. The digital revolution has not only reshaped industries and economies, but it has also redefined social interactions, cultural expressions, and individual identities. This thesis aims to analyze these complex interactions and transformations, providing a comprehensive analysis of the digital ecosystem as a whole.

Secondly, the consistent change in geopolitical dynamics due to digitalisation is of major interest. The digital age has introduced new paradigms of power, influence, and diplomacy, manifesting itself in the form of digital diplomacy, cyber warfare, and digital commerce. Understanding these changes is essential for shaping effective, forward-looking policies and strategies and progress at a national, regional and international level.

The ethical, legal and socio-economic implications of digitalization are critical areas for exploration. Issues such as data privacy, the digital divide, and the impact of automation

on employment require a thorough and nuanced understanding. An attempt will be made to contribute to the discourse on these pressing issues, providing perspectives and frameworks that can guide the creation of inclusive, equitable and sustainable digital policies and practices.

In addition, this thesis is motivated by the desire to critically analyse, inter alia, these emerging technologies, assess their potential impact and propose strategies to reap their benefits on society while mitigating the associated risks.

In the face of contemporary global challenges, exploring the intersection of digitalization and sustainability is timely and crucial. Finally, the issue of digitalisation, in particular its positive role in climate change and the huge potential of digital technologies in promoting sustainability, is an essential component of this study.

Essentially, the choice of this theme is driven by a deep interest in a comprehensive understanding of the technology ecosystem, its multidimensional implications, and the important role it plays in shaping the future. The thesis aspires to contribute to the academic body of knowledge, providing a holistic and interdisciplinary exploration of technological, geopolitical and social notions, while also providing valuable insights for stakeholders from different sectors.

As for the importance of the subject addressed, it is obvious that it is an extremely discussed and analyzed one, with an increasingly strong impact in today's society. Following the review of the specialized literature and the events on the international scene, we found that this study paradigm is in a process of continuous completion and updating, and looking from the point of view of bibliographic resources, the predominant style is distinguished by being a scientific one, and there is also a publishing base that covers the theme of this work, and its own research contributes and advances new hypotheses on this complex field. The theoretical substance of the work is argued and concretized on the basis of a laborious documentation on the specialized works from open sources.

The significance of the theme explored in this thesis, centered around the comprehensive understanding of the digital ecosystem, denotes a special importance in the context of scientific research at national and international level. The exploration of the implications of digitalization, its transformations and influence on geopolitical dynamics, resonates deeply with the current trajectory of scientific research, given the ubiquitous nature of digital technologies and their incredible impact on different facets of modern life.

The theme of this thesis is of major importance in the context of scientific research, both nationally and internationally. It addresses critical issues at the intersection of

technology, society and geopolitics, providing essential insights for informed policy-making, educational and training activities, strategic planning and a good understanding of international cooperation. By advancing the understanding of the digital ecosystem and its implications, this research contributes significantly to the body of scientific knowledge and has the potential to shape a future that is resilient and harmoniously integrated with the digital paradigm.

At the national level, the study of the digital ecosystem is essential for promoting technological innovation, economic growth and social development. Nations are increasingly recognizing the imperative of digital literacy and infrastructure as the cornerstones of competitiveness and prosperity. That is why current scientific research in the field of digitalization provides information that can drive new policy-making processes, reshape educational curricula, and guide the development of strategies to secure digital infrastructure. The thesis addresses critical national concerns such as cybersecurity, digital governance, and the integration of digital technologies into essential services.

Scientific research in these areas can provide a nuanced understanding of emerging trends, risks and opportunities, thus enabling informed decision-making and strategic planning at national level. The exploration of socio-economic aspects further underlines the relevance of this theme in addressing national priorities and challenges.

At the international level, the topic becomes even more important, as digitalization transcends borders and requires study, cooperation and dialogue worldwide. For the field of international relations, digital diplomacy and cyber warfare represent new frontiers in which the interaction between technology and geopolitics redefines the global order. And the present thesis in this field is vital for understanding these dynamics, promoting international collaboration and developing appropriate governance frameworks for international decision-makers in this digital age.

In addition, the international community faces common challenges such as cyber threats, data privacy and the environmental impact of digital technologies. The promotion of a digital culture in these areas is instrumented in the formulation of international standards, agreements and cooperation strategies to address these challenges collectively. The role of digitalization in global sustainability efforts, especially in the context of climate change and the Sustainable Development Goals, underscores the imperative of international research collaboration in harnessing digital technologies for the common good.

I consider the relevance of the chosen research topic to be extremely topical and of palpable importance in everyday life, in academic, scientific and political circles, more than

ever. That is why I took into account the considerable level of abstraction of the subject in the present research and I chose to adopt a study and analysis methodology that favors the integration of empirical and theoretical perspectives in the process of knowledge generation. I objectively judged that it was necessary for a significant portion of this work to be based on a solid empirical foundation, carried out in parallel with the theoretical analysis, in order to be able to highlight more clearly my personal contribution in the field of study addressed.

Purpose, objectives and assumptions

The main aim of this research is to reveal and understand the complexity and impact of digitalisation on societal, economic, cultural and political structures. We need to understand how previous technological innovations have laid the foundations for current and future digital transformations. This requires an in-depth understanding of the historical context in order to understand the current situation. *The secondary goal* is to assess the effects of digitalization, identifying both the opportunities for optimization and innovation, as well as the challenges and vulnerabilities that arise. And in this way we can have a deep insight into the political and cultural dynamics that influence the adoption and implementation of contemporary digital technologies.

The general objective is to explore in detail the dynamics between the digitalisation process and the provision of essential services, with the intention of verifying or challenging the presumption of a correlation between the degree of digitalisation and the level of security associated with these essential services. In this regard, the research thesis sets out the following five main objectives:

Objective 1: Analysis of technological evolution. This objective aims to provide a historical and contextual basis for the current understanding of digitalization, highlighting the key moments and technological innovations that have underpinned the current landscape.

Objective 2: Assess the impact of digitalisation in critical sectors of society. It aims to identify the ways in which digitalisation has transformed these social sectors, highlighting both the opportunities for innovation and efficiency, as well as the challenges and risks associated with the digital phenomenon.

Objective 3: Geopolitical implications of digitalisation. The objective aims to highlight how political and cultural contexts influence digital approaches, thus providing a comparative perspective on the dynamics of global geopolitical actors.

Objective 4: Identify and analyse emerging trends in digital technology. Basically following the future developments of digitalization and the ethical, security and social implications of these emerging trends.

Objective 5: Formulate strategic recommendations. Developing recommendations based on the analysis carried out, addressing both policy makers and practitioners in the field. This objective aims to turn research findings into concrete actions, providing guidelines and solutions for the effective and responsible management of the challenges and opportunities associated with the digital phenomenon.

By achieving these goals, we aim to make a valuable and comprehensive contribution to the existing literature, strengthening the understanding of the digital phenomenon and thus providing a solid basis for further research and informed policy decisions.

In support of the fulfillment of the main objectives of this thesis, the following research question is brought into debate:

"How does digitalization influence the structures and functioning of essential services and what are the implications of this process for the stability, security and evolution of contemporary societies?"

Five other secondary questions *also arise from this main question*. They are formulated to guide the investigation and to confirm that the analysis carried out systematically responds to the objectives of the work.

Question 1: In what ways has digitalisation transformed the provision and management of essential services, and what are the main opportunities and challenges associated with this transformation?

Question 2: How does digitalisation contribute to strengthening the resilience and sustainability of critical infrastructures, and what are the main risks and vulnerabilities introduced by the integration of digital technologies into these critical systems?

Question 3: What are the main synergies and tensions that arise at the intersection of digitalisation with the provision of essential services and the management of critical infrastructures, and can these interactions be managed effectively to maximise benefits and minimise risks?

Question 4: How do geopolitical contexts shape the adoption and regulation of the digital phenomenon within essential services and critical infrastructures having different implications for international cooperation and competition?

Question 5: What are the best practices and lessons learned from the integration of digital technologies into essential services and critical infrastructures, and can they shape policy-making and strategies for the future?

Each question is rigorously addressed, using the established methodology, to contribute to the development of a solid body of knowledge in the field of contemporary digitalization.

Research hypothesis It requires a balanced perspective on digitalisation, recognising both the potential benefits and the associated challenges. Validating or refuting this hypothesis through detailed research will contribute to a deep understanding of the impact of digitalisation on critical sectors and provide valuable guidance for future policies and practices. Therefore, the main research hypothesis is focused on: *Digitalisation and the integration of digital technologies in the management and operation of essential services lead to significant improvements in the efficiency and resilience of these systems. At the same time, this integration introduces new forms of vulnerability and complexity, requiring the development of solid cybersecurity and risk management strategies to ensure the long-term sustainability and security of contemporary societies.*

In the sense of the selected methodological approach, we decided to In the following, the enunciation of secondary research hypotheses, designed to complement and detail the main research, providing specific directions for analysis and validation. Each sub-hypothesis is examined through a rigorous methodology, with the aim of providing an understanding of the impact of digitalisation on contemporary essential services:

Secondary hypothesis 1: The integration of digital technologies into essential services increases the accessibility and quality of these services, but also amplifies data privacy and security risks.

Secondary hypothesis 2: The digitalisation of critical infrastructures contributes to operational optimisation and cost reduction, but exposes these systems to complex cyber threats and technological and operational disruptions.

Secondary hypothesis 3: Increased interconnection and reliance on digital systems in essential services and critical infrastructures generates a more integrated and responsive network, but creates points of weakness and systemic risks in the event of failures or coordinated attacks.

Secondary hypothesis 4: Differences in the approach and regulation of digitalisation in various geopolitical contexts significantly influence the degree of resilience and efficiency

of essential services, indicating the need for international collaboration and harmonisation in setting security and functionality standards.

Secondary hypothesis 5: The development and implementation of public policies, progressive cybersecurity strategies and advanced risk management systems are essential for the long-term integrity and sustainability of essential services and critical infrastructures in the context of an increasingly digitized world.

Before formulating the hypotheses, the epistemological frameworks were established and subsequently refined to align with the particularities of the approached theme, choosing a balanced application of qualitative and quantitative research tools. Thus, the validity and reliability of the sources used were ensured not only by their rigorous evaluation, but also by engaging in dialogue with programs, experts and practitioners in the field.

The limitations encountered during the investigation of this topic are mainly due to the inaccessibility to certain bibliographic materials that are exclusive and essential to the specific research context for new unique characteristics.

Research methodology and strategy

Within this thesis, the research methodology and strategy reflect a rigorous and systematic approach, meant to ensure the integrity and relevance of the analysis of the digital phenomenon. Within the scientific approach adopted, we managed to integrate quantitative and qualitative methodologies. That is why the elaboration of the theoretical basis was based on a careful examination of the literature, a conceptual analysis and dissection of the academic content, but with the objective of establishing an adequate theoretical framework for the interpretation of the discussed phenomena.

In order to document and support the research, we resorted to observation and documentary analysis as primary methods. In this regard, we examined official documents, legislation relevant to the field, previous studies and questionnaires, interviews and contributions to academic debates. We have also included in the analysis recognized works and articles from the specialized bibliography. An exhaustive review of the literature was carried out, with the intention of mapping the theoretical terrain and identifying existing gaps. Relevant academic sources, books, including articles, research reports and case studies, have been critically evaluated in terms of relevance and contribution to the research topic.

We applied the case study approach, manifested by several SWOT analyses, in order to evaluate and practically experiment the applicability and theoretical relevance of the findings resulting from the investigation of the proposed theme. In order to illustrate and

understand in depth the impact of digitalisation in specific contexts, a detailed examination of the phenomena in a natural and digital setting was required, providing valuable insights into digital dynamics and implications. Due to the variation and, in particular, the content of the documents analysed, an approach combining both quantitative and qualitative assessment was required, thus resulting in a synergistic application of case study and statistical methods. The qualitative analysis was focused on the interpretation of the texts, while the quantitative dimension was oriented towards the analysis of the data presented in statistical structures and reports. It is important to mention here that this methodology is not limited exclusively to the discipline of international relations and European studies.

To ensure the sustainability and reliability of the results, the research included a triangulation of methods, which involves integrating and corroborating the findings obtained through qualitative and quantitative methods, providing a complete understanding and eliminating the possible shortcomings of a single research method.

Rigorous measures have been implemented to ensure the validity and reliability of this research. Internal validity has been ensured by careful selection of case studies, while external validity has been emphasized by applying and testing results from various contexts. The reliability of the research was supported by the use of standardized tools and procedures in data collection and analysis, but by using this mixed methodology, the thesis aims to provide an in-depth and well-founded understanding of the digital phenomenon, thus contributing to the literature and providing a solid foundation for further scientific research.

If we highlight the chosen methodological strategy, the present study was not limited exclusively to the collection and examination of evidence and resources capable of validating or invalidating the hypotheses formulated. Both the established hypotheses and the qualitative and quantitative arguments, which support or contest them, have been extracted experimentally from the practical realities and from the corpus of the specialized literature. This was done by means of direct and indirect observation techniques and methods, as well as by a detailed investigation of the selected bibliography.

The original contributions are to add value to knowledge in this field by identifying a particular type of behavior of international actors in a digital context – a perspective that has not yet been sufficiently explored. In practice, rigorous adherence to the above-mentioned methodological principles has been possible thanks to constant consultations with experts in the field concerned or in adjacent areas, professional activity, as well as a thorough research of first-order, secondary and tertiary documentation. In this context, reports, analyses and strategy studies were included; doctoral theses, academic papers, journals and

articles on specific topics, various online resources, textbooks, guides, standards, norms and government documents that have been made public.

Structure of the thesis

The thesis is composed of four chapters and in their composition there are subchapters in which the distinct and defining elements of the entire chapter are highlighted. We opted for this way of structuring because we considered that there are four main directions of approach through which the research hypothesis is tested, debated and verified by completing and arguing it with the help of the chapter intended for the case study.

The first chapter establishes the essential theoretical and conceptual foundation for understanding the phenomenon of digitalization in its multidimensional context. This chapter introduces and defines key terms and concepts, providing a broad theoretical framework for further analysis.

In the first part of the chapter, terminological and conceptual clarifications are made in the field of digitization. The evolution and meaning of key terms are discussed, as well as selective theoretical concepts related to digitalization.

The chapter then explores technology from a historical point of view, examining its evolution from the First Industrial Revolution to the most recent developments in the field. Further, the chapter focuses on the digital educational field, exploring the impact of digitalization on education and learning. It also addresses the legal and ethical considerations related to digitalization, highlighting the challenges and dilemmas faced by society in the digital age. Data protection, privacy and other legal and ethical issues relevant to digitalisation are discussed.

In addition, the psycho-social aspects of digitalisation are analysed, focusing on how technology influences individual identity and social interactions. The impact of digitalisation on human behaviour, social relations and the construction of digital identity is examined. The chapter concludes with the economic aspects of digitalization and the impact of digitalization on the environment, with a special focus on renewable energies and the influence of digitalization on climate change.

Through this comprehensive approach, the chapter provides a solid foundation for a deep understanding of digitalization, laying the groundwork for the detailed analyses and discussions that will follow in subsequent chapters of the thesis.

In the second chapter, the exploration of the complexity and dynamics of the digital ecosystem is deepened, highlighting the components, emerging technologies and digital

transformations that shape the contemporary world. This section aims to provide a comprehensive understanding of digital infrastructure, technological innovations and their impact on different sectors and aspects of daily life.

In the first part of the chapter, digital systems are discussed and the role and evolution of these components that constitute the foundation of digital devices and communication networks are analyzed in detail. Particular attention is paid to computer computing techniques, highlighting how these technologies are advancing and reshaping technological infrastructures. The chapter continues with the presentation of emerging technologies that contribute to the expansion of the digital ecosystem, exploring in depth how these digital elements support the development and operation of complex digital applications.

Particular emphasis is placed on the digital transformation process, which represents the transition from traditional systems to integrated digital solutions. It explores the relationship between research and digitalisation, digital innovation and the importance of virtual space, including internet issues.

In addition, it explores the dynamics of digitalisation at individual, national, regional and global levels, highlighting how different levels of governance and collaboration influence the adoption and regulation of digital technology.

Through a detailed analysis of emerging technologies and digital transformation, this chapter provides an in-depth insight into the digital ecosystem, highlighting the profound and ubiquitous impact of digitalization in the modern world. The debates and evaluations included in this chapter contribute to strengthening knowledge about digital technologies that influence and redefine infrastructures, services, behaviours and interactions in various areas and aspects of life.

Chapter III focuses on a detailed and in-depth analysis of the role and impact of digitalisation in essential services. This chapter aims to explore how digital technologies influence, shape and transform the provision and management of services that are fundamental to the functioning of modern societies.

The chapter begins with a clear definition of the concept of *"essential services"*, highlighting their importance and characteristics in the context of social and economic life. The criteria that classify a service as essential are systematically exposed, but the involvement of the state and the private sector in the provision of these services is also highlighted.

An important section of the chapter is dedicated to the classification of essential services, the particularities of each sector, highlighting the challenges and opportunities

associated with integrating digitalisation into the provision and management of essential services.

The chapter also addresses the issue of governance of essential services, discussing the role and responsibilities of public and private entities in providing and protecting these services. It examines how effective governance and collaboration between different stakeholders are key to maintaining and improving the quality and accessibility of essential services.

The impact of essential services on society is another critical point explored in this chapter, where the risks, threats and vulnerabilities associated with essential services are exposed, as well as key concepts such as resilience and sustainability in the context of contemporary challenges and uncertainties.

The chapter concludes with a detailed analysis of the management of essential services, focusing on strategies and practices essential for risk prevention, assessment and management, but also mentions the importance of physical security, third-party analysis and investigation, as well as crisis management and the development of strategies that respond effectively to the rapid and complex dynamics. The intersection between cybersecurity and the socio-human aspects of security is also addressed, as well as the analytical perspective on digitalisation in the public and private sectors.

Through this comprehensive approach, it provides a detailed insight into the interaction between digitalisation and essential services, highlighting the complexity, interconnectivity, challenges and opportunities present in this vital area.

In Chapter IV, we focus on a comparative and in-depth analysis of how essential services, critical infrastructures and the digital phenomenon are approached by the most important geopolitical entities, the EU, the US and China. This chapter aims to reveal the impact and understand the implications of digitalization in diverse geopolitical contexts, emphasizing the differences and similarities in the strategies and policies adopted by these entities.

The chapter begins with a detailed exploration of digitalisation in the European Union, highlighting major initiatives, regulations and projects aimed at integrating and promoting digital technologies. It looks at how digitalisation is used to boost growth, innovation and social cohesion as a whole and across Member States.

The next section focuses on digitalization in the United States of America, examining national strategies and sectoral initiatives that highlight the U.S. approach to digital technology, critical and critical infrastructure. The discussion is about the role of technology

in innovation, national security, and global competition, highlighting the impact of technology leaders and the American innovation ecosystem.

The chapter also pays special attention to the People's Republic of China, analyzing the visions, ambitions and progress of this state in the adoption and development of digital technologies. The significant investments in digital infrastructure, innovation policy and efforts to become a global leader in technology are showcased.

The chapter concludes with a SWOT analysis carried out in various sectors, providing a clear perspective on the strengths, weaknesses, opportunities and threats associated with digitalization in the context of geopolitical entities. Through this analytical approach, a deep understanding of the impact and implications of digitalization in various geopolitical contexts is finalized, highlighting the importance of a documented and strategic approach to navigating the global digital landscape.

Therefore, the present paper provides convincing evidence that supports the idea of an intrinsic link between the degree of security of essential services and the effectiveness of the contemporary digital domain. In contradiction with the initial reservations, the analysis confirms the main premise of the study, demonstrating that the digitization process manifests a distinct presence and adapted to the current international context. Moreover, the investigation refutes the theory that digitalisation has a marginal and difficult-to-quantify impact on the smooth resolution of challenges and sustainable progress in the digital field.

In light of the detailed analysis presented in the thesis, it is essential to approach the digital phenomenon with a balanced attitude, recognizing both its transformative potential and the associated risks.

In my opinion, all the research efforts carried out in this niche of security studies and international relations, with a slight emphasis on the cybersecurity of essential services, have resulted in this approach, which paves the way for a more detailed and specific future investigation than the present analysis. In essence, it reveals compelling evidence of a close connection between digital security and the effectiveness of essential services, highlighting a critical interdependence between them.

The results obtained compared to the topic and objectives of the thesis reflect a close correlation with the initial objectives of the thesis, providing an in-depth perspective on how digitalization influences various aspects of contemporary life. The detailed analysis of the past, present and future potential of digitalization highlighted the importance of emerging technologies shaping critical infrastructures, essential services and contemporary international relations.

The personal contributions to this thesis are significant for the existing literature by offering an integrative perspective on digitalization. A distinctive aspect of this work is the interdisciplinary analysis, which combines the technological perspective with the social, economic and political one, offering a holistic view of the subject. In addition, comparative analyses between different geopolitical entities add significant value to understanding the impact of digitalization globally.

In conclusion, this thesis emphasizes the imperative need to navigate the ever-changing digital landscape with caution and insight. A continued commitment to research, dialogue and collaboration between all relevant actors is essential to ensure that the digital future is one that reflects our shared human values and promotes sustainable and inclusive development.